THERMO KING

INGERSOLL-RAND

DIAGNOSTIC MANUAL

SR-3 Trailer Single Temp
Microprocessor Control System
TK 54842-2-OD Rev 0 (05/11)

Part 1 – (Sections 1-5)
Part 2 – (Sections 6-8)

SR-3 Base Controller
SR-3 HMI Control Panel
and
SR-3 Base Controller Software Revision through D007
SR-3 HMI Control Panel Software Revision 6560
(Includes 6561)

Used on:
SB-130
SB-230
SB-330
SLX-100
SLX-200
SLX-300
SLX-400
SLX WHISPER

Revision History

SR-3 Single Temp Trailer Diagnostic Manual

TK 54842-2-OD Rev 0 (05/11)

SB and SLX Single Temp Trailer, SR-3 Base Controller with USB Part Number 45-2361, SR-3 HMI Control Panel Part Number 45-2372, Base Controller Software Rev through D007, HMI Control Panel Software 6560 and 6561

SR-3 Hardware and Software Features

<u>This manual covers the following SR-3 hardware versions</u>:

SR-3 Base Controller with and without USB Port
and
SR-3 HMI Control Panel

<u>This manual covers the following SR-3 software revisions</u>:

Base Controller Software Revision through D007
and
HMI Control Panel Software Revision 6560
(Includes 6561)

See Section 7 of this manual for additional details.

HOW TO USE THIS MANUAL

Because not everyone is familiar with microprocessor based control systems, please take a few minutes to read this page. It explains the content and structure of this manual. This will make it easier for you to find the information you need.

Section 1 - Safety information

This section contains the safety information for the SR-3 control system. Read this material carefully before working on the unit.

Section 2 - Hardware Description

This section describes the SR-3 control system hardware. It identifies and locates controllers, relays, LED's, fuses and other components and provides connector maps for all connectors.

Section 3 - Software Description

This section discusses the operation of the SR-3 control system software and programmable features. Each menu and feature is discussed individually to illustrate how they are used.

Section 4 - Operation

This section explains how to operate the SR-3 control system. This information is referenced by material in Section 5 Diagnostics.

Section 5 - Diagnostics

This section explains how to diagnose units equipped with the SR-3 control system. It includes both Alarm Code Diagnostics and Other Symptom Diagnostics. This section will reference material in Section 4 Operation and Section 6 Service Procedures.

Section 6 - Service Procedures

This section includes Service Procedures to assist the technician when servicing units equipped with the SR-3 control system. These procedures are referenced by the diagnostic routines in Section 5 Diagnostics.

Section 7 - Service Information

This section offers Service Information on the basic component parts of the SR-3 control system. It includes hardware and software history as well as interchangeability information.

Section 8 – Schematics and Wiring Diagrams

This section includes the SR-3 control system electrical schematics and unit wiring diagrams.

Control System Notes

The following procedures must be followed when working on units equipped with microprocessor based control systems.

- Never use testers consisting of a battery and a light bulb to test circuits on any microprocessor based equipment.

- The unit must be turned off before connecting or disconnecting the battery.

- Any time a graded sensor is replaced it must be calibrated as shown in Service Procedure A15A Temperature Sensor Grade Calibration.

- Any time the Base Controller is replaced, these Service Procedures must be used:
  - A02A Recording Existing Programmable Feature Settings Using HMI Keypad
  - A03A Replacement of the Base Controller
  - A04A Programmable Feature Setup Using HMI Keypad

- Any time welding is to be done on the unit or vehicle Service Procedure A26A Welding on Units Equipped with Microprocessors must be followed.

CHANGES AND COMMENTS

You are invited to comment on this manual so it can be updated and improved to better meet your needs. Any corrections or comments are welcome. Please complete the following information:

Manual Form Number _____

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Corrections and Comments _____

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GENERAL PRACTICES

1. Always wear goggles or safety glasses. Refrigerant and battery acid can permanently damage the eyes.

2. Never close the compressor discharge service valve when the unit is running. Never operate the unit with the discharge service valve closed.

3. Keep hands, clothing and tools clear of fans and belts when the unit is running.

4. Be sure gauge manifold hoses are in good condition. Never let them come in contact with belts, fans, pulleys or hot surfaces.

5. Never apply heat to a sealed refrigeration system or container.

6. Refrigerants in the presence of an open flame produce toxic gases. These gases are severe respiratory irritants capable of causing death.

7. Be sure all mounting bolts are the correct length for the application and are securely tightened.

8. Use extreme caution when drilling holes in the unit. Holes may weaken structural components. Holes drilled into wiring can cause fire or explosion. Holes drilled into the refrigeration system will release refrigerant.

9. Use caution when working around exposed coil fins. These fins can cause painful lacerations.

10. Use caution when working with refrigerant in a closed or confined area with a limited air supply such as a trailer, truck, container or hold of a ship. Refrigerant tends to displace air and can cause oxygen depletion. This may result in unconsciousness or death due to suffocation.

AUTO START/STOP

CAUTION:

The unit can start and run automatically any time the unit is turned on. Units start automatically in both Cycle Sentry mode and Continuous mode. Be sure to turn the unit Microprocessor On/Off switch Off before opening doors, doing inspections or working on any part of the unit.

SR-3 units may have options that allow for remote starting from a fully off state. Be sure to turn the unit Microprocessor On/Off Switch Off before opening doors, doing inspections or working on any part of the unit.

Some SR-3 electronic components are connected directly to un-switched battery power. All connections and circuits labeled with a "2" prefix are directly connected to battery power. Always disconnect the unit starting battery before servicing the unit.

REFRIGERANT

At Thermo King we recognize the need to preserve the environment and limit the potential harm to the ozone layer that can result from allowing refrigerant to escape into the atmosphere.

We strictly adhere to a policy that promotes the recovery and limits the loss of refrigerant into the atmosphere.

When working on transport refrigeration systems, a recovery process that prevents or minimizes refrigerant loss to the atmosphere is required by law. In addition, service personnel must be aware of the appropriate European Union, national, federal, state and/or local regulations governing the use of refrigerants and certification of technicians.

When refrigerants are exposed to the atmosphere in liquid form, they evaporate rapidly, freezing anything they contact. If they contact the skin severe frostbite can result. In the event of frostbite, the objectives of first aid are to protect the frozen area from additional injury and to warm it rapidly.

Refrigerant First Aid

1. Warm the frozen area by immersing it in luke-warm (not hot) water or by covering the area with warm blankets.

2. Obtain medical assistance as soon as possible.

3. If refrigerant contacts the eyes, flush them with water immediately and obtain medical assist-ance as soon as possible.

REFRIGERATION OIL

Avoid contact with the eyes. Avoid prolonged contact with the skin or clothing. To prevent skin irritation wash hands thoroughly after handling refrigeration oil.

Refrigeration Oil First Aid

In case of eye contact, flush immediately with water for at least 15 minutes. Obtain medical assistance as soon as possible.

ELECTRICAL CONSIDERATIONS

Base Controller Service

Precautions must be taken to prevent electrostatic discharge when servicing the Base Controller/Interface Board and related components. A potential difference less than that required to create a small spark between a finger and a doorknob can cause severe damage to solid state components.

Welding

Precautions must be taken before welding on the unit. Refer to Service Procedure A26A Welding on Units Equipped with Microprocessors in Section 6 of this manual for additional information.

ELECTRICAL HAZARDS

High Voltage

Model 50 units feature optional Electric Standby and utilize 460, 400 or 230 volt 3 phase AC power any time the unit is operating in Electric Mode. This voltage potential is also present any time the unit is connected to external standby power. Extreme care must be used when working on the unit, as these voltages are capable of causing serious injury or death.

1. When working on high voltage circuits, do not make any rapid movements. Unplanned movements can cause contact with high voltage.

2. Use tools with insulated handles that are in good condition. Never hold metal tools in your hand if exposed high voltage conductors are within reach.

3. Treat all wires as high voltage wires.

4. Never work alone on high voltage circuits. Another person should be nearby in case of accident.

High Voltage First Aid

Immediate action must be taken after a person has received an electrical shock. Medical attention should be summoned as soon as possible.

The source of electricity must be immediately removed, either by shutting down the power or removing the victim from the source. If the victim must be removed from a live circuit, pull the victim off with a non-conductive material. Use the victim's clothing, a rope, wood or your belt. After separating the victim from the power source, immediately check for pulse and respiration. If a pulse is not present, start CPR (Cardio-Pulmonary Resuscitation) immediately. If a pulse is present, respiration may be restored by mouth to mouth resuscitation. Obtain emergency medical assistance as soon as possible.

Low Voltage

Control circuits are typically 12 volts DC. This voltage potential is not considered dangerous, but the large amount of current available can cause severe burns if shorted to ground.

Do not wear jewelry, watches or rings when working on the unit. Severe burns can occur if these items contact an electrical circuit.

Some SR-3 electronic components are connected directly to un-switched battery power. All connections and circuits labeled with a “2” prefix are connected directly to battery power. Always disconnect the unit starting battery before servicing the unit.

UNITS EQUIPPED WITH TELEMATICS

Some Thermo King units may be equipped with Telematics options such as TracKing GPRS. These options may feature 2 way communications that include the ability to start and stop the unit from a remote location via satellite.

CAUTION:

Thermo King units equipped with optional 2 way communications can be turned on and off from remote locations at any time via satellite. Once turned on, the units can start and run automatically at any time.

Before opening the unit doors or performing any work on the unit always turn the unit off by:

1. ***Pressing the Off Key on the HMI Control Panel.***

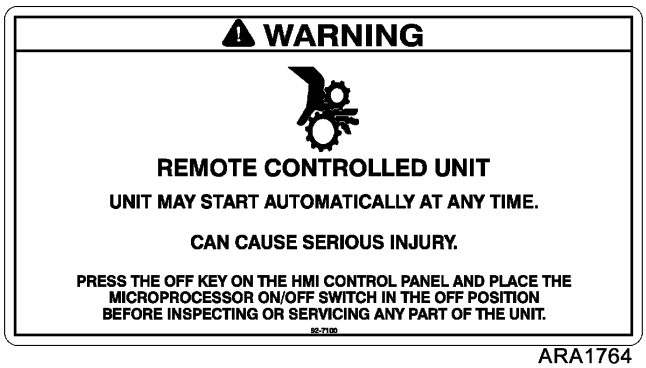
and

2. ***Placing the Microprocessor On/Off Switch in the Off position.***

Failure to do so may result in serious injury.

Remote Control Warning Nameplate

Units equipped with 2 way communications will feature a Warning Nameplate located next to the unit's lower door release.



ARA1764

Warning Nameplate on Units Equipped with 2 way Communications

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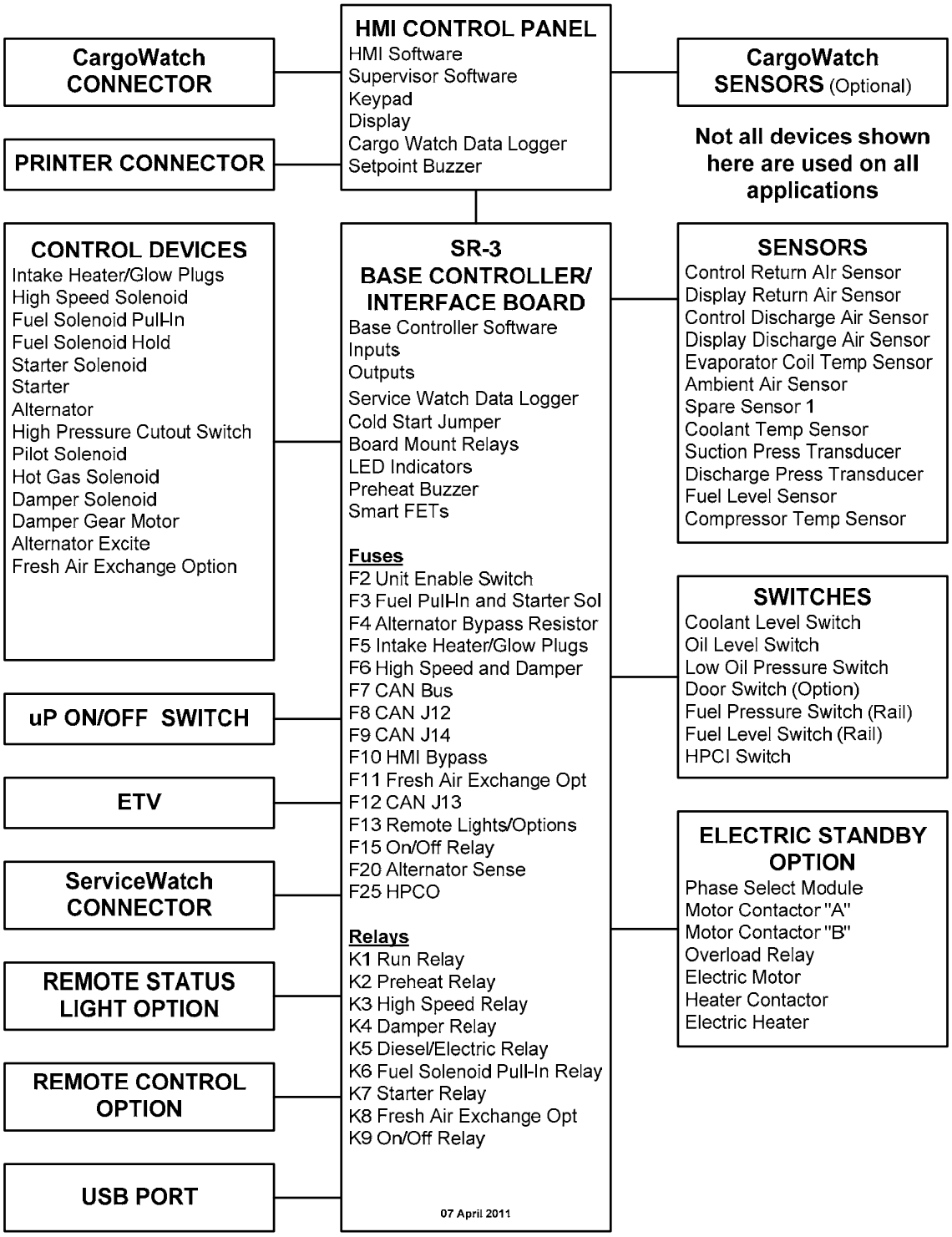
BLOCK DIAGRAM - SINGLE TEMP TRAILER APPLICATIONS

SR-3 CONTROL SYSTEM BLOCK DIAGRAM – TRAILER S/T



GENERAL DESCRIPTION

The SR-3 control system is a self-contained temperature control unit designed for truck and trailer applications. Model 30 units are powered by a diesel engine and Model 50 units are powered by either a diesel engine or an electric motor powered from an external electric standby power source. The unit mounts on the nose of the trailer. Defrost is by means of hot gas.

CAUTION

Dangerous three phase AC electric power is present whenever a Model 50 Electric Standby Unit is operating in Electric mode and whenever the unit is connected to external standby power. Voltages of this magnitude can be lethal. Exercise extreme caution when working on the unit.

SR-3 CONTROL SYSTEM

The SR-3 Base Controller Control System consists of the following main components:

- Base Controller On/Off Switch
- SR-3 HMI (Human Machine Interface) Control Panel
- SR-3 Base Controller/Interface Board
- Unit Sensors and Transducers
- Refrigeration Control Components
- Engine Control Components
- Communication Ports
- Optional Electric Standby

SR-3 CONTROL COMPONENTS

SR-3 Base Controller

The heart of the integrated SR-3 control system is the Base Controller. The SR-3 Base Controller consists of a combined microprocessor and interface board. The SR-3 Base Controller is mounted on a molded plastic mounting base that is secured to the back of the control box.

HMI-3 Control Panel

System conditions are displayed and operator instructions are sent using the SR-3 HMI Control Panel. The HMI Control Panel communicates with the Base Controller via CAN bus.

HARDWARE AND SOFTWARE COMPATIBILITY

SR-3 Base Controller

The SR-3 Base Controller is compatible with and may be used to replace the combined SR-2 Base Controller and Interface Board assembly. The SR-3 Base Controller mounting base uses the same mounting hole pattern as did the SR-2 Base Controller. The connectors on the SR-3 Base Controller are located in approximately the same positions as they are on an SR-2 Interface Board. However, when replacing an SR-2 Base Controller/Interface Board with an SR-3 Base Controller the wiring harness may need to be relocated slightly to reach the some of the connectors.

It is critical that the correct software be used.

- ✓ Single temperature applications with SR-3 Base Controllers must use Base Controller Software Revisions D0xx.

See Section 7 of this manual for additional hardware and software details and requirements.

HMI-3 Control Panel

The SR-3 Control System uses essentially the same HMI Control Panel as does the SR-2 Control System. However, SR-3 HMI Control Panels feature 8 MB of memory and are marked Smart Reefer 3 on the lower front panel as shown below.

The SR-2 HMI Control Panels feature 4 MB of memory. Other than memory, the SR-3 HMI Control Panel is compatible with and may be used to replace the SR-2 HMI Control Panel.

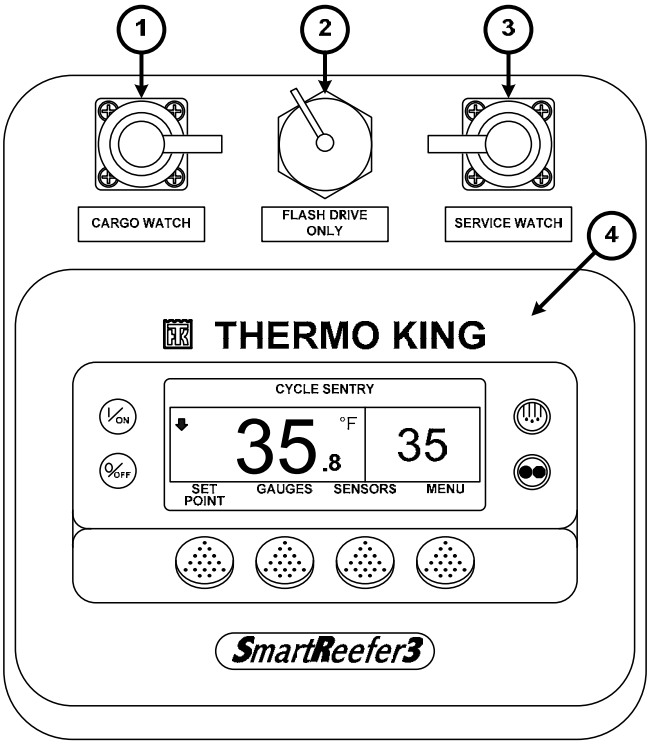
- ✓ SR-3 HMI Control Panels used on SR-3 applications without USB capability must use HMI Control Panel Software Revision 6550 or later.

- ✓ SR-3 HMI Control Panels used on SR-3 applications with USB capability must use HMI Control Panel Software Revision 6560 or later.

See Section 7 for hardware and software details.

SB SERIES CONTROLS

The control panel shown below is used on SB units.



1	**CargoWatch Download Port**
2	**USB Port**
3	**ServiceWatch Download Port**
4	**HMI Control Panel**

BASE CONTROLLER ON/OFF SWITCH

The Base Controller On/Off Switch applies 12 volts DC control power to the Base Controller at connector J4. Main power to the controls is supplied by 15 amp fuse F2.

IMPORTANT

The Base Controller On/Off switch disconnects power to the controller and most controller outputs. It does not disconnect the HMI Control Panel supply power. The HMI Control Panel is directly connected to the unit starting battery.

IMPORTANT

Always turn the unit Base Controller On/Off switch off before inspecting or working on any part of the unit.

SB Series Units

On SB units the Base Controller On/Off switch is located on the side of the control box. It can be reached by opening the engine compartment doors.

Base Controller On/Off Switch

SLX Series Units

On SLX units the Base Controller On/Off switch is located on a bracket just above the diesel engine. It can be reached by opening the engine compartment doors.

OVER-CURRENT PROTECTION

Over-current protection is provided by a fusible link located in the positive battery cable. A 15 amp main power fuse F2 is located in the “2A/2AB” circuit.

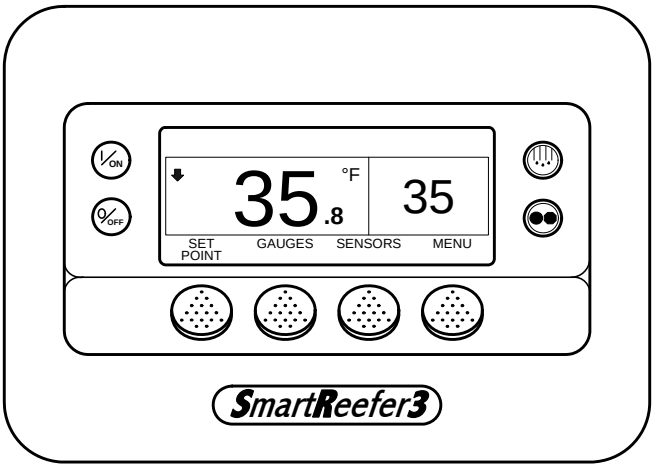
Outputs are either fuse protected or Smart FET (Field Effect Transistor), protected. All fuses are located on the Base Controller. Smart FETs halt current flow if an over-current condition exists.

A polyswitch provides over-current protection for the On/Off relay. It is located just above Relay K8. The polyswitch will reset automatically and is not field repairable.

SR-3 HMI CONTROL PANEL

The SR-3 Control System uses essentially the same HMI Control Panel as does the SR-2 Control System. However, SR-3 HMI Control Panels feature 8 MB of memory to support future options and are marked Smart Reefer 3 on the lower front as shown below. The SR-2 HMI Control Panels feature 4 MB of memory.

The HMI (Human Machine Interface) Control Panel consists of an LCD graphics display screen and eight touch sensitive keys. The four keys on the sides of the display screen are used to turn the unit on and off, initiate a manual defrost cycle, and select the desired operating mode. These keys are designated “Hard” keys as their function is always the same. The function of the four keys located below the display screen change as required by the current menu. The current function of the key is controlled by software and is displayed directly above the key. These keys are known as software controlled keys or ‘soft keys’. The same HMI Control Panel is used for single temperature and multi-temperature applications.



HMI Control Panel

HMI Control Panel Operation

The HMI contains a microprocessor and dedicated software. The HMI is a message center and does not directly control the unit operation. It communicates with the Base Controller via a controller area network (CAN) connection. The HMI displays system operating data and sends operating requests to the controller.

The display screen is used by the Base Controller to provide visual prompts and information to the operator, such as operating mode, setpoint temperatures, gauges, hourmeter readings and operating conditions of the diesel engine or electric motor. The HMI also contains the Cargo Watch Data Logger. The HMI and Base Controller communicate via a CAN (Controller Area Network) connection.

Information can be displayed in 24 possible languages. A single HMI Control Panel software revision can display a maximum of 11 languages. For this reason, there are a total of 4 HMI software revisions. Other than languages supported, these software revisions are identical. The table below shows the 4 HMI Software Revisions and the languages supported by each.

HMI Control Panel Software Revision	**Languages Supported**
65xx	English, Spanish, French, German, Italian, Dutch, Portuguese, Greek, Turkish, Hebrew, Arabic
66xx	English, Russian, Polish, Hungarian, Romanian, Bulgarian, Czech, Danish, Swedish, Norwegian, Finnish
67xx	English, Japanese, Chinese
68xx	Set up using Wintrac. Settings are: English only, English and Spanish only, English and up to 5 additional languages from the 65xx and 66xx lists shown above.

All SR-3 applications require HMI Control Panel Software Revision 6560, 6660, 6760, 6860 or later.

If the HMI Control Panel is disconnected from the unit while the unit is running, the unit will shut down. When the HMI Control Panel is reconnected the unit will not restart until the On key is pressed.

NOTE: If necessary, the HMI Control Panel can be bypassed using fuse F10 as shown on page 2-23.

HMI Control Panel Hardware Versions

All SR-3 applications require SR-3 HMI Control Panels. The SR-3 HMI Control Panel contains a Supervisor Microprocessor and Supervisor Software. The Supervisor Microprocessor is used to manage power-up and power down applications and to keep the HMI Control Panel operating under low voltage conditions.

The SR-3 HMI Control Panel uses an off line to turn the unit off when equipped with external devices such as Rear Remote Control Panels. The CargoWatch Data Logger logs unit on and unit off information as well as which device initiated the action.

For complete details of HMI Control Panel hardware versions see Section 7 of this manual.

HMI Control Panel Software Revisions

All SR-3 applications require HMI Control Panel Software Revision 6550 or later.

For complete details of HMI Control Panel software revisions see Section 7 of this manual.

Real Time Clock

The real time clock is located in the HMI Control Panel. The time is supplied to the Base Controller each time the unit is turned on.

Clock Power

The HMI Control Panel features a capacitor to provide backup power to the real time clock. This capacitor is capable of maintaining the clock for approximately two weeks with no power connected to the unit. The capacitor is recharged any time the HMI Control Panel is installed in the unit and a properly functioning starting battery is connected.

If the unit starting battery is disconnected for an extended period the clock setting should be checked when the unit is returned to service. If the HMI Control Panel is changed the clock setting should also be verified.

CargoWatch Data Logger

The HMI Control Panel contains the CargoWatch Data Logger. The CargoWatch Data Logger is a fully independent temperature logger. Up to six temperature sensors and 3 digital inputs can be connected to the CargoWatch Data Logger. The optional CargoWatch temperature sensors are separate sensors installed as required by each user. The CargoWatch Data Logger records CargoWatch temperature sensors, unit setpoint, unit operating condition, and shutdown alarms.

The Countdown and Conservative features allow the CargoWatch Data Logger to continue to log after the unit is turned off. See CargoWatch Sensor Configuration in Section 3 for details of operation.

SB Units: CargoWatch Data Logger sensors are not included with the unit.

SLX Units: Two CargoWatch Data Logger sensors are included with the unit. One CargoWatch Sensor is factory mounted in the return air inlet. The other sensor is shipped loose and is intended to be installed in the discharge air outlet or discharge air chute.

Programmable Features

The settings of all programmable features are held in non-volatile memory in the Base Controller. The settings are supplied to the HMI Control Panel each time the unit is turned on. If the HMI Control Panel is changed, the current programmable feature settings will be supplied to the HMI Control Panel when the unit is turned on.

Display Heater

The HMI Control Panel is equipped with a display heater. This heater is necessary to make the display quickly visible in cold ambient temperatures.

The HMI has its own internal temperature sensor for the display heater. The display heater is energized when the unit is turned on and the temperature sensed by the internal sensor is below 29°F (-2°C). The display heater turns off when the temperature sensed by the internal sensor rises above 37°F (+3°C). The display heater draws from 1.4 to 1.7 amps when energized.

The colder the ambient temperature the longer it will take for the heater to make the display visible on a cold startup. It may take 10-15 seconds for the display to appear with very cold ambient temperatures.

SR-3 HMI Control Panel Connector Maps (1E64645 Rev A)

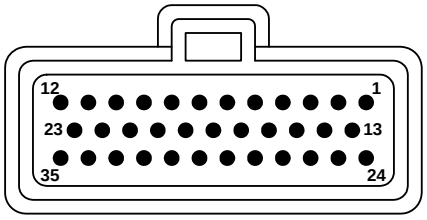
HMI Control Panel Connector – arranged by use

Pin #	Wire #	Description
22	CANH-RED1-01	HMI Control Panel CAN bus
10	CANL-BLK1-01	HMI Control Panel CAN bus
33	OFF	SR-3 HMI Off Line
34	ON-RED2-01	HMI Control Panel On Line
06	8XP-BLK3-01	8F power
12	BLK2-02	2P power **NOTE 2**
35	CH-RED3-01	HMI Control Panel chassis ground
23	SHLD	HMI Control Panel shield
21	RXD1-01	CargoWatch receive
32	TXD1-01	CargoWatch transmit
19	COM-01	CargoWatch/Printer Port Chassis Ground **NOTE 1**
09	DPDI-01	CargoWatch Data Pak Detect
20	RXD2-01	Printer port receive
31	TXD2-01	Printer port transmit
19	COM2	CargoWatch/Printer Port Chassis Ground **NOTE 1**
29	D14-01	Printer port print
12	(2P) BLK2-02	Printer port printer power **NOTE 2**
18	RXD3	Receive 3
30	TXD3	Transmit 3
7	DPD3	Data Pak Detect 3
04	S1P-01	CargoWatch sensor 1 positive
16	S1N-01	CargoWatch sensor 1 negative
27	S2P-01	CargoWatch sensor 2 positive
15	S2N-01	CargoWatch sensor 2 negative
03	S3P-01	CargoWatch sensor 3 positive
14	S3N-01	CargoWatch sensor 3 negative
26	S4P-01	CargoWatch sensor 4 positive
25	S4N-01	CargoWatch sensor 4 negative
02	S5P-01	CargoWatch sensor 5 positive
13	S5N-01	CargoWatch sensor 5 negative
01	S6P-01	CargoWatch sensor 6 positive
24	S6N-01	CargoWatch sensor 6 negative

NOTE 1 – COM1-01 ground and COM2-01 ground are connected by splice in the harness.

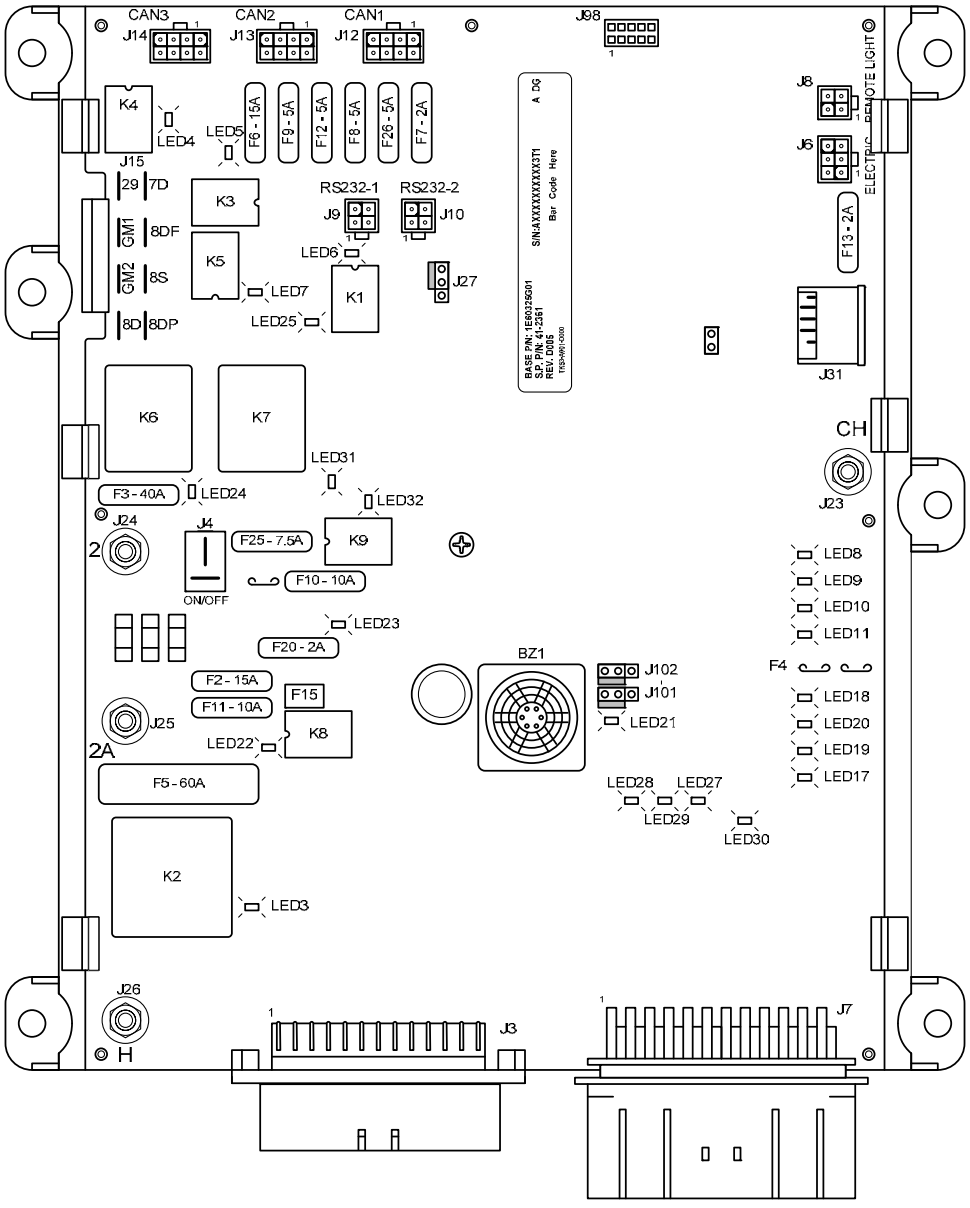
NOTE 2 – 2PA-01 power and 2-BLK2-01 power are connected by splice in the harness.

HMI Control Panel J1 Connector – shown from pin side



SR-3 BASE CONTROLLER

The SR-3 Base Controller is located on the rear panel of the control box. The SR-3 Base Controller is a single PC board that consists of an integrated base controller and interface board. The SR-3 Base Controller is mounted on a molded plastic mounting base that is secured to the back of the control box. The mounting hole pattern is exactly the same as the SR-2 Base Controller.



SR-3 Base Controller (Part Number 45-2361) and Mounting Base

Base Controller Hardware Versions

As of this date there are two Base Controller hardware versions.

- ✓ SR-3 Base Controller Part Number 45-2361 features a USB Port and uses Software Revision D005. This Base Controller is used for SB Trailer and Rail units starting in February 2011.

- ✓ SR-3 Base Controller Part Number 45-2362 does not have a USB Port and features Damper Gear Motor Provisions and uses Software Revision D000. This Base Controller is used for European SLX units only starting in September 2010.

For complete details of SR-3 Base Controller hardware versions and software requirements see Section 7 of this manual.

Base Controller Software Revisions

SR-3 Single Temperature Base Controllers require Base Controller Software Revision D0xx.

- ✓ SR-3 SB Trailer and Rail units use Software Revision D005.

- ✓ SR-3 European SLX Trailer units use Software Revision D000.

For complete details of Base Controller software revisions and hardware requirements see Section 7 of this manual.

Real Time Clock

The real time clock is located in the HMI Control Panel. The system time is supplied to the Base Controller each time the unit is turned on. If the Base Controller is changed the clock setting will be automatically supplied to the Base Controller when the unit is turned on. If the HMI Control Panel is changed the clock setting should be verified.

ServiceWatch Data Logger

The Base Controller contains the ServiceWatch Data Logger. The ServiceWatch Data Logger is a diagnostic data logger. This data logger records unit temperature sensors, unit setpoint, unit operating conditions, alarms and conditions that exist when an alarm is set.

Programmable Features

The settings of all programmable features are held in non-volatile memory in the Base Controller. The settings are supplied to the HMI Control Panel each time the unit is turned on. If the Base Controller is changed, all programmable features must be reprogrammed. See Section 3 of this manual for programmable feature details.

Base Controller Operation

The Base Controller is the heart of the SR-3 Control System. It consists of the Base Controller, Base Controller software, memory, inputs and outputs. The Base Controller also provides the interface between the controller inputs and outputs and the unit control components. The inputs are used to supply power and system information to the Base Controller. The Base Controller and software examine the status of the inputs and turn the outputs to the solenoids, valves and motor contactors on and off as required to control the operation of the unit. The Base Controller also provides over-current and short circuit protection for the control circuits.

The only user serviceable components on the Base Controller are the fuses and the Cold Start jumper.

The Base Controller controls the operation of the unit using control relays or Smart FETs. The relays control power to the high amperage loads such as the preheat relay, fuel solenoid pull-up coil and starter. The Smart FETs control power to the lower amperage loads such as solenoids and valves. Each relay is individually fuse protected. The Smart FETs are self-protecting. An LED next to each relay or Smart FET is illuminated when the relay or FET is energized by the Base Controller. With relays the LED lights only when the relay coil is energized and the relay contacts have transferred to the energized position.

Relay Functions

IMPORTANT: Do not attempt to remove the relays from the Base Controller, they are soldered in place.

Relay	Function
K1	Run Relay
K2	Preheat Relay
K3	High Speed Relay
K4	Damper Relay
K5	Diesel/Electric Relay
K6	Fuel Solenoid Pull-In Relay
K7	Starter Solenoid Relay
K8	Fresh Air Exchange (Optional)
K9	On/Off Relay

Fuse Size & Function

Fuse	Size	Function
F2	15A	Power to On/Off Switch
F3	40A	Fuel Sol Pull-In/Starter Circuit
F4	None or 2A	No fuse - all Bosch and TK alternators **(NOTE 1)** 2A fuse - all Prestolite alternators
F5	60A	Preheat Circuit **(NOTE 2)**
F6	15A	Damper and High Speed Circuits
F7	2A	8XP Circuit – Controller On Feedback to HMI
F8	5A	2A power to CAN Connector J12
F9	5A	2A power to CAN Connector J14
F10	10A	8X Power - install in right position
F11	10A	Fresh Air Exchange (Optional)
F12	5A	2A power to CAN Connector J13
F13	2A	8FC Circuit (Remote Status Light/Optional Power)
F15	P/S	On/Off Relay **(NOTE 3)**
F20	2A	Alternator Sense
F25	7.5A	HPCO Switch Circuit
F26	5A	Power to CAN Connector J98

NOTE 1: Fuse F4 fuse must be in place for Prestolite alternators to charge. Fuse F4 must be removed for Bosch and Thermo King alternators. Service Parts Base Controllers are shipped without the F4 fuse.

NOTE 2: The F5 preheat fuse is a “slow blow” type fuse. It is designed for use with the Yanmar trailer engine air pre-heater. Always replace the fuse with the TK specified fuse. Service Parts Base Controllers are shipped without the F5 fuse.

NOTE 3: The device identified as F15 is a polyswitch. This polyswitch provides over-current protection for the On/Off relay. The polyswitch will reset automatically and is not field repairable.

Fuse F10

There are three in-line fuse clips that allow for two configurations of the F10 fuse. The right position is the normal position. This position has a white bar below it on the circuit board. When fuse F10 is installed in the right position, control power is routed to the K9 On/Off Relay contacts. The On/Off keys on the HMI Control Panel energize and de-energize the K9 On/Off Relay. When the K9 On/Off Relay is energized power is supplied through the normally open K9 contacts to turn the unit on.

When fuse F10 is installed in the left position power bypasses the K9 On/Off relay contacts and the unit will start and run without the HMI Control Panel connected. *This fuse position is for emergency bypass operation only.* Do not operate the unit with the F10 fuse installed in the left position unless absolutely necessary.

IMPORTANT: If fuse F10 is installed in the left position the unit may start and run. If the HMI Control Panel is connected and functional, the On and Off keys will still work. The Off key will turn the unit off if Fuse F10 is in the left position, but the Base Controller will remain powered up.

IMPORTANT: If fuse F10 is installed in the left position and the unit is turned off using the Off key the unit will shut down but the Base Controller will remain powered up. Leaving the unit turned off in this manner for an extended period may result in a dead battery.

Fuse F15

The device identified as F15 is a poly switch. This over-current device resets automatically and is not replaceable.

Smart FET Outputs

A Smart FET is a self protecting output device used for the functions shown in the table below. If an over-current condition occurs, the Smart FET will turn off until the over-current condition no longer exists. It will then resume normal operation. A fuse is not required.

Not all Smart FETs shown below are used on single temperature trailer units.

Output	Function
EVA, EVB, EVC, EVD	ETV Outputs
PS	Pilot Sol
HGS	Hot Gas/Hot Gas Bypass Sol
LV1	Not Currently Used
EXC	Alternator Excite
WV	Not Currently Used
LQI	Liquid Injection Valve
LLS	Not Currently Used
GM1, GM2	Damper Gear Motor **(NOTE 1)**
CIS	Condenser Inlet Solenoid
RTPS	Receiver Tank Press Sol
PV	Purge Valve

NOTE 1: Gear motor circuitry is not present on all Base Controllers.

LED Functions

The LED is illuminated when the associated circuit output is energized. Not all output LEDs shown below are used on single temperature trailer applications.

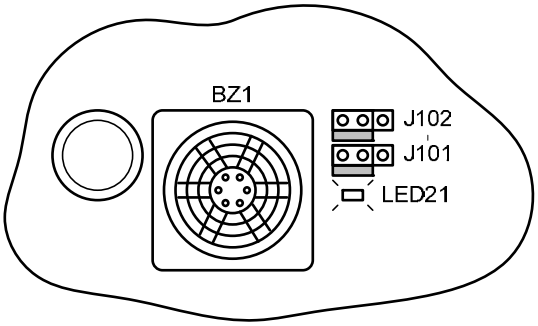
LED #	Function
LED3	K2 Preheat Circuit
LED4	K4 Damper Circuit
LED5	K3 High Speed Circuit
LED6	K1 Run Relay Circuit
LED7	K5 Diesel/Electric Relay
LED 8	Pilot Solenoid or Condenser Inlet Solenoid Circuit
LED 9	Receiver Tank Pressure Sol Circuit
LED10	Hot Gas Bypass Valve Circuit
LED11	Purge Valve Solenoid Circuit
LED17	Not Currently Used
LED18	Alternator Excite
LED19	Liquid Injection Valve Circuit
LED20	Not Currently Used
LED21	Status – **(NOTE 1)**
LED22	K8 Fresh Air Exchange (Optional)
LED23	K9 On/Off Circuit
LED24	K6 Fuel Solenoid Pull-In Circuit
LED25	K7 Starter Solenoid Circuit
LED27	ETV – D **(NOTE 2)**
LED28	ETV – B **(NOTE 2)**
LED29	ETV – A **(NOTE 2)**
LED30	ETV – C **(NOTE 2)**
LED31	Damper Gear Motor Close
LED32	Damper Gear Motor Open

NOTE 1 The Status LED flashes once per second when the Base Controller is powered and operating normally. The Status LED flashes several times per second during a flash load. The Status LED is on without flashing during reboot and when the Base Controller is under test. The Status LED flashes twice within 1 second followed by 1 second off if a CAN communication error is present.

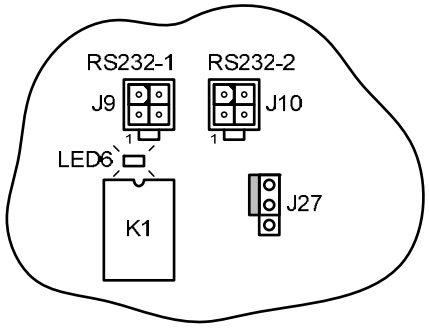
NOTE 2 ETV LED's are illuminated when the respective ETV output is energized. Note that on applications without ETV that the ETV LED's may be illuminated even though there is no ETV present.

Board Jumpers

Three sets of jumper pins are located on the Base Controller. Each set consists of a jumper and three pins. A white bar next to each set of pins on the circuit board shows the usual jumper placement. For normal operation, the jumpers must be installed as shown below.



J101 Cold Start Jumper and J102 Jumper



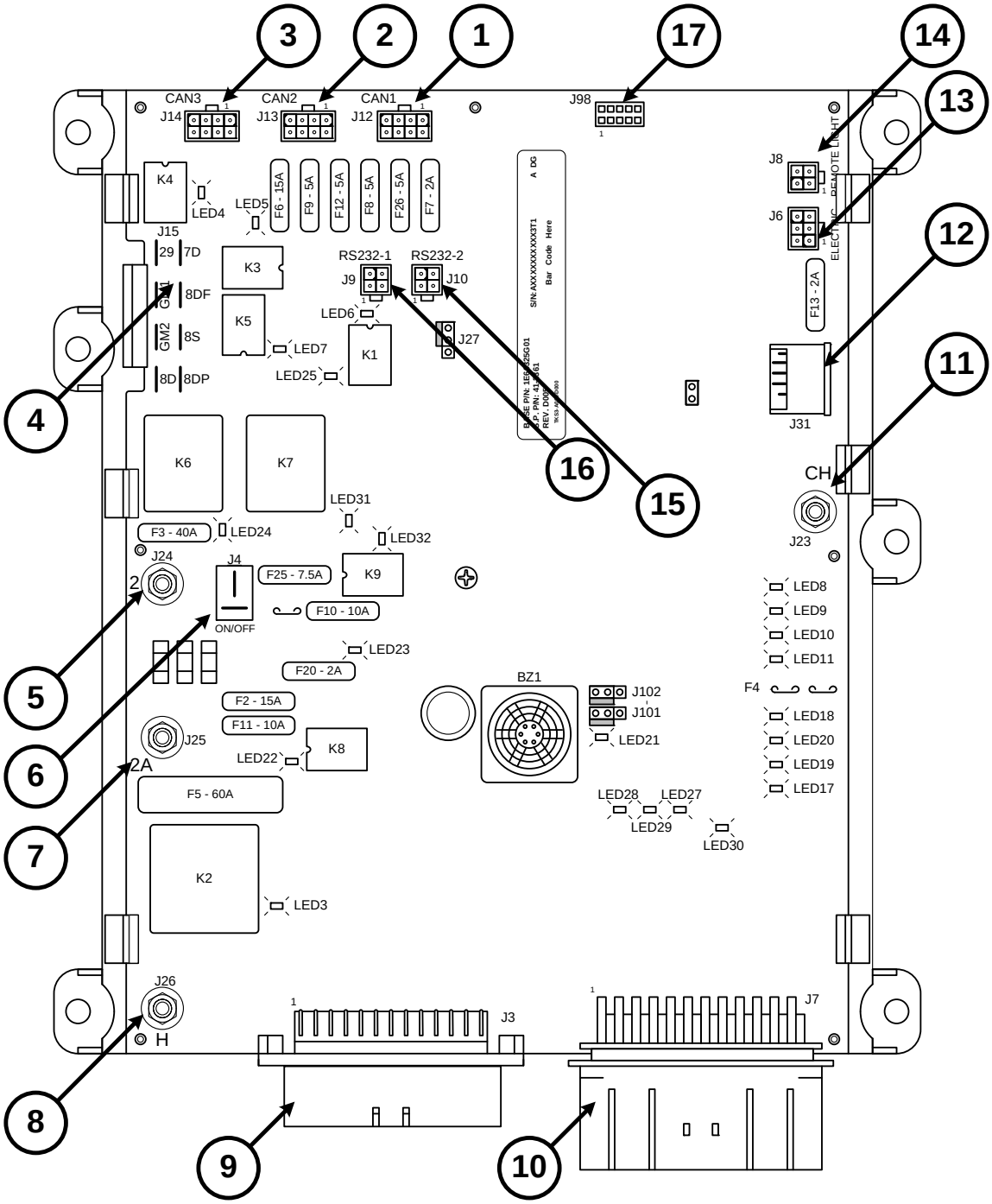
J27 CAN Bus Terminator Jumper

The J101 jumper is used to perform a Base Controller Cold Start. For details see Service Procedure A07A Performing a Base Controller Cold Start. The J27 and J102 jumpers should not be moved.

Jumper Functions

Jumper	Function
J27	CAN Bus Terminator – Do Not Move
J101	Cold Start Jumper
J102	Not Used – Do Not Move

Connector Locations



Connector Usage

See the following pages for individual connector maps.

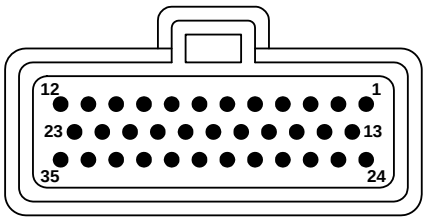
Number	Connector	Circuit
1	J12	CAN connection.
2	J13	CAN Connection. 2P Power, Chassis Ground, and On Line are used for the optional Remote Control Panel, if installed. Can H and Can L are not currently used.
3	J14	CAN connection to HMI Control Panel
4	J15	Connections to unit engine and damper (and defrost gear motor – if so equipped)
5	J24	“2” circuit to fuse link
6	J4	Connections to Base Controller On/Off Switch
7	J25	“2A” circuit to alternator
8	J26	“H” circuit to air intake heater
9	J3	Connections to unit Sensor Harness
10	J7	Connections to unit Main Harness
11	J23	“CH” chassis ground to unit ground plate
12	J31	USB Connector to USB Connector on Front Panel
13	J6	Connections to optional Electric Standby
14	J8	Connections to optional Remote Status Light
15	J10	RS-232 Serial Port 2 connection to optional Remote Control Panel
16	J9	RS-232 Serial Port 1 connection to ServiceWatch connector
17	J98	CAN connector for future use

SR-3 Base Controller Connector Maps (1E64645 Rev A)

J3 - Base Controller Sensor – arranged by use – Single Temperature Applications

Pin #	Wire #	Description
1	RTP-01	Control return air temperature sensor positive (blue sensor wire)
2	RTN-01	Control return air temperature sensor negative (brown sensor wire)
21	RTRP-01	Display return air temperature sensor positive (blue sensor wire)
32	RTRN-01	Display return air temperature sensor negative (brown sensor wire)
24	DTP-01	Control discharge air temperature sensor positive (blue sensor wire)
13	DTN-01	Control discharge air temperature sensor negative (brown sensor wire)
22	DTRP-01	Display discharge air temperature sensor positive (blue sensor wire)
33	DTRN-01	Display discharge air temperature sensor negative (brown sensor wire)
25	CTP-01	Coil temperature sensor positive (blue sensor wire)
14	CTN-01	Coil temperature sensor negative (brown sensor wire)
3	ATP-01	Ambient temperature sensor positive (blue sensor wire)
4	ATN-01	Ambient temperature sensor negative (brown sensor wire)
26	WTP-01	Water temperature sensor positive (blue sensor wire)
15	WTN-01	Water temperature sensor negative (brown sensor wire)
27	ST1P-01	Spare 1 temperature sensor positive (blue sensor wire)
16	ST1N-01	Spare 1 temperature sensor negative (brown sensor wire)
9	DPI-01	Signal from discharge pressure transducer (white wire) (DPT)
10	SPI-01	Signal from suction pressure transducer (white wire) (DPT)
23	FLL-01	Optional fuel level sensor
35	FUELN-01	Optional fuel level sensor
12	2PL-01	Optional solid state fuel level sensor

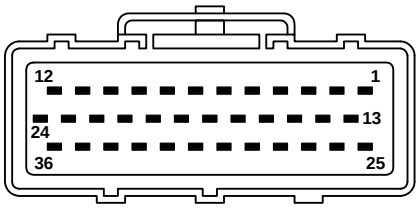
J3 Sensor Harness Connector – shown from pin side



J7 – 36 pin Base Controller to Main Harness Connector – <u>Single Temperature Applications</u>

Pin #	Wire #	Description
2	2-01	Power to the alternator sense circuit.
3	26-01	Power to energize pilot solenoid (PS)
5	HG-01	Power to energize hot gas solenoid (HG)
11	EVC-01	To electronic throttling valve (ETV)
12	EVD-01	To electronic throttling valve (ETV)
13	SPP-02	Power to suction pressure transducer (red wire) (SPT)
14	DPP-02	Power to discharge pressure transducer (red wire) (DPT)
15	CLP-01	Power to coolant level sensor (red wire) (CLS)
16	CLS-01	Signal from coolant level sensor (white wire) (CLS)
17	PHPCO-01	Power from high pressure cutout switch (HPCO)
18	HPCO-01	Power to high pressure cutout switch (HPCO)
20	DSP-01	Power to the optional door switch (red wire) (DS)
21	DS-01	Signal from the optional door switch (white wire) (DS)
22	FP-01	To fuel pressure switch (FPS)
23	EVB-01	To electronic throttling valve (ETV)
24	EVA-01	To electronic throttling valve (ETV)
25	SPN-02	Ground to suction pressure transducer (black wire) (SPT)
26	DPN-02	Ground to discharge pressure transducer (black wire) (DPT)
28	20B-01	To engine low oil pressure switch (LOPS)
29	OLS-01	To engine low oil level switch (OLS)
32	FLS-01	To optional fuel level switch (FLS)
33	EXC-01	Power to the alternator excite circuit
34	W-04	To the alternator “W” circuit
35	FS1-01	To flywheel sensor (FW)
36	FS2-01	To flywheel sensor (FW)

J7 Base Controller Harness Connector – shown from pin side



J6 - Electric Connector – arranged by pin number

Pin #	Wire #	Description
1	7E-01	To 7EA terminal on phase select module (PSM)
2	EOL-01	To normally closed contact pin 95 on overload relay (OLR)
3	8-01	To 8 terminal on phase select module (PSM)
4	CHHV	To chassis ground
5	ER-01	To ER terminal on phase select module (PSM)
6	26E-01	Power to heater contactor (HC)

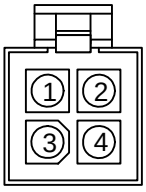
J8 - Remote Light Connector – arranged by pin number

Pin #	Wire #	Description
1	ALM-01	To white wire on remote light option
2	8FC-01	To red wire on remote light option
3	ALPC-01	To black wire on remote light option
4	8FC-01	Option Power

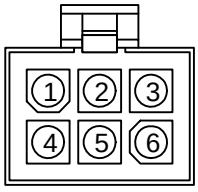
J9 – SERVICE WATCH Download Connector – arranged by pin number

Pin #	Wire #	Description
1	RXD-RED1-08	To J52 controller download connector pin A
2	TXD-BLK2-06	To J52 controller download connector pin B
3	COM-BLK1-09	To J52 controller download connector pin C
4	DPD-RED2-05	To J52 controller download connector pin E

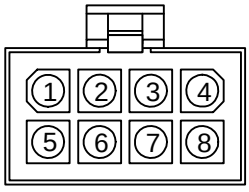
Mini Mate-N-Lok Harness Connectors – shown from pin side of harness connector



4 Pin Connectors



6 Pin Connectors



8 Pin Connectors

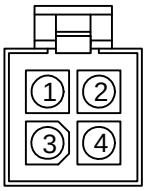
J10 – Remote Controller Connector – arranged by pin number

Pin #	Wire #	Description
1	RXD-BLK	To Remote Controller Panel Pin 7
2	TXD-RED	To Remote Controller Panel Pin 8
3		
4	REM-ON-BRN	To Remote Controller Panel Pin 6

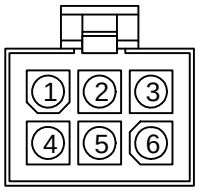
J12 – CAN 1 – arranged by pin number

Pin Number	Wire Number	Description
1	CANL-BLK1	To iBOX Option
2	CANH-RED1	To iBOX Option
3	DRAIN-WHT	To iBOX Option
4	ON_OFF-RED2	To iBOX Option
5	2P-BLK2	To iBOX Option
6	8XP-BLK3	To iBOX Option
7	None	Not Used
8	CH-RED3	Chassis ground to iBOX Option

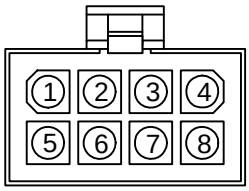
Mini Mate-N-Lok Harness Connectors – shown from pin side of harness connector



4 Pin Connectors



6 Pin Connectors



8 Pin Connectors

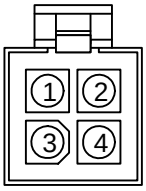
J13 – CAN 2 – Remote Controller Connector – arranged by pin number

Pin Number	Wire Number	Description
1	CANL	Not Used
2	CANH	Not Used
3	SHLD	Not Used
4	ON-ORN	To Remote Controller Panel Pin 4
5	2-BLU	To Remote Controller Panel Pin 1
6	8XP	Not Used
7	None	Not Used
8	DRAIN/CH/GRE	To Remote Controller Panel Chassis Ground Pin 2

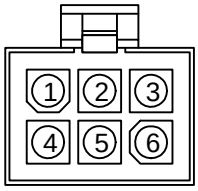
J14 – CAN 3 – HMI Connector – arranged by pin number

Pin Number	Wire Number	Description
1	CANL-BLK1-01	To HMI Control Panel Pin 10
2	CANH-RED1-01	To HMI Control Panel Pin 22
3	SHLD	To HMI Control Panel Pin 23
4	ON-RED2-01	To HMI Control Panel Pin 34
5	2-BLK2-01	To HMI Control Panel Pin 12
6	8XP-BLK3-01	To HMI Control Panel Pin 6
7	OFF	To HMI Control Panel Pin 33
8	CH-RED3-01	To HMI Control Panel Pin 35

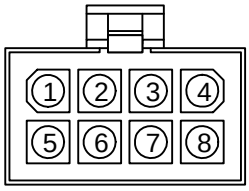
Mini Mate-N-Lok Harness Connectors – shown from pin side of harness connector



4 Pin Connectors



6 Pin Connectors



8 Pin Connectors

J4 - Power Switch Connector – arranged by pin number

Pin #	Wire #	Description
1	2AB-01	2AB Power
2	8-02	8 Power

J15 - Engine Connector – arranged by pin number

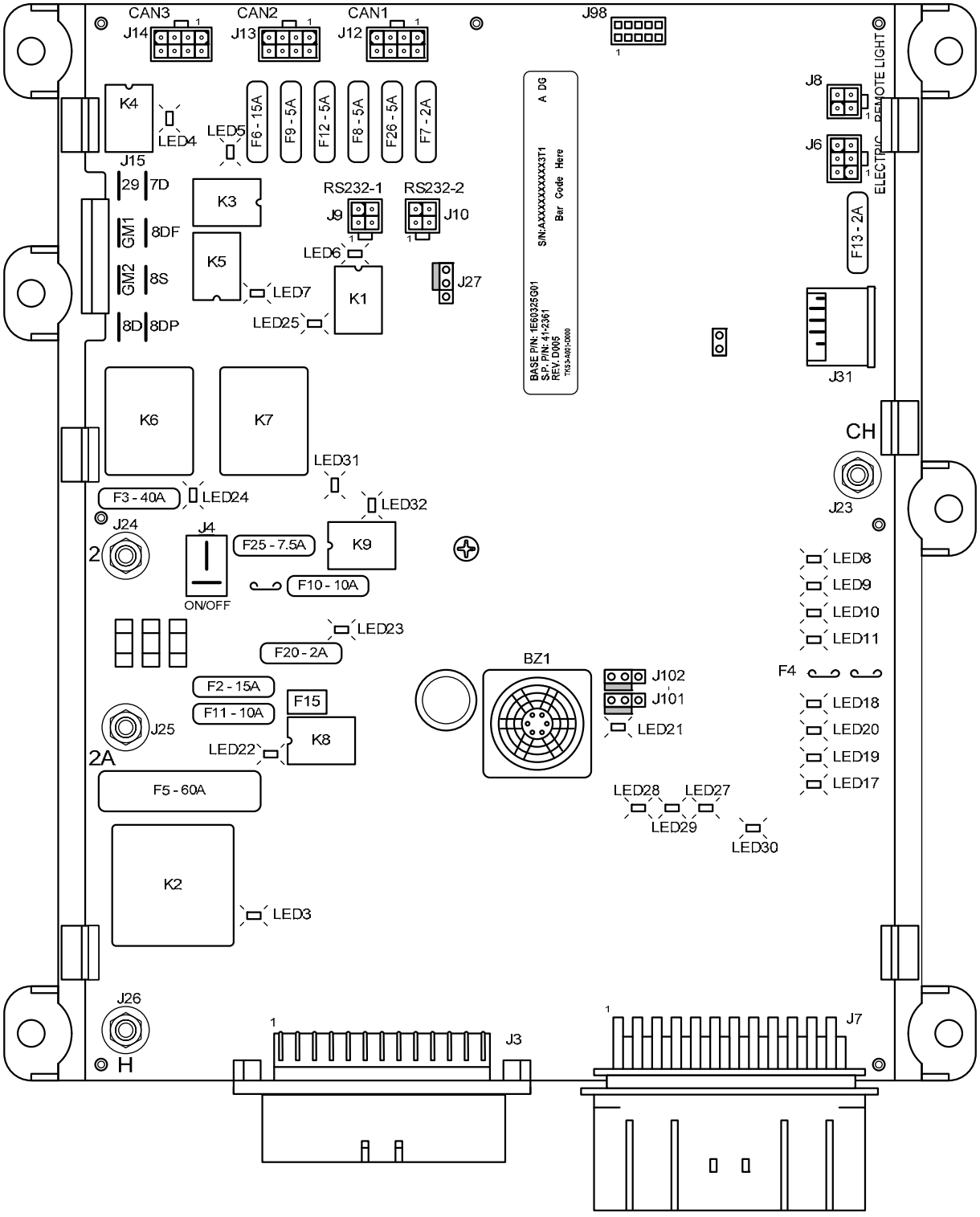
Pin #	Wire #	Description
1	8DP-01	Power to energize fuel solenoid pull-in coil (white wire) (FSP)
2	8S-01	Power to energize starter solenoid (SS)
3	8DF	Power to 8DF circuit
4	7D-01	Power to energize high speed solenoid (HS)
5	8D-01	Power to energize fuel solenoid hold coil (red wire) (FSH)
6	GM2	Power to Defrost Gear Motor
7	GM1	Power to Defrost Gear Motor
8	29-01	Power to energize damper solenoid (DS)

Screw Terminal Power Connections

Terminal Number	Wire Number	Description
J24 (2)	RED	From fusible link (battery power)
J25 (2A)	2A	From alternator
J26 (H)	H	To air intake heater or glow plugs
J23 (CH)	CHP	Chassis ground

J31 - USB Connector – arranged by pin number

Pin #	Wire #	Description
1	RED	To Front Panel USB Connector
2	WHITE	To Front Panel USB Connector
3	GREEN	To Front Panel USB Connector
4		
5		
6	BLACK	To Front Panel USB Connector



COMPLETE SR-3 CONTROL SYSTEM

UNIT SENSORS

The sensors monitor air temperatures at various points in the system, as well as the engine oil pressure, engine oil level, engine coolant level, engine coolant temperature, engine speed, alternator frequency and fuel level. Refrigerant pressures are also monitored on ETV units. Sensors are connected to the Base Controller via the J3 Sensor Connector.

AIR TEMPERATURE SENSORS

Graded and Un-graded Air Temperature Sensors

The dual Return Air and Discharge Air sensors are graded sensors. Sensor grading allows maximum accuracy without the need for ice water calibration. The sensor grade (from 1L through 9H) is stamped on the sensor and must be entered into the Base Controller when a sensor is changed, in order to properly calibrate the sensor for accurate temperature readings. If the grade is not changed from the factory setting of 5H, then Alarm Code 92 Sensor Grades Not Set will occur. Always update the sensor grade nameplate when graded sensors are changed. The nameplate is mounted on the side of the control box.

Un-graded sensors are used to measure the evaporator coil temperature and ambient temperature, since these temperatures are not as critical as the return and discharge air temperatures.

Do not replace a graded sensor with an un-graded sensor.

Dual Sensors

Dual temperature sensors are provided for both return air temperature and discharge air temperature. The sensors are located next to each other to insure common readings. One sensor is the control sensor and the other sensor is the display sensor. The return and discharge control sensors are used for unit control. The return and discharge display sensors are used by the HMI Control Panel to display the temperature.

Control and Display Return Air Sensors

These sensors monitor the temperature of the air returning to the evaporator coil. The sensors are located in the return air flow and are connected directly to the Base Controller connector J3. These sensors are graded sensors and must be replaced with graded sensors. The Base Controller must be calibrated to the respective grade of the installed sensor in order to operate properly. The Control Return Air Sensor is marked with one yellow cable tie and is connected to the Base Controller via the RTP and RTN wires. The Display Return Air Sensor is marked with two yellow cable ties and is connected to the Base Controller via the RTRP and RTRN wires.

Return Air Sensor Clamp

A brass clamp should be installed between the two return air sensors. This clamp increases the thermal coupling between the sensors to provide more accurate temperature readings when the temperature is changing rapidly. Rapid temperature changes may occur during pulldown or when the door has been opened. This clamp is not required on the discharge air sensors.

Control and Display Discharge Air Sensors

These sensors monitor the temperature of the air leaving the evaporator coil. The sensors are located in the evaporator discharge air path and are connected directly to the Base Controller via connector J3. These sensors are graded sensors and must be replaced with graded sensors. The Base Controller must be calibrated to the respective grade of the installed sensor, in order to operate properly. The Control Discharge Air Sensor is marked with one red cable tie and is connected to the Base Controller via the DTP and DTN wires. The Display Discharge Air Sensor is marked with two red cable ties and is connected to the Base Controller via the DTRP and DTRN wires.

Coil Temperature Sensor

This sensor monitors the temperature of the evaporator coil. The sensor is located on the evaporator coil header plate and is connected directly to the Base Controller via connector J3. This is an un-graded sensor. It is connected to the Base Controller via the CTP and CTN wires.

Ambient Temperature Sensor

This sensor monitors the ambient air temperature. The sensor is located in the main unit adjacent to the condenser coil and is connected directly to the Base Controller via connector J3. This is an un-graded sensor. It is connected to the Base Controller via the ATP and ATN wires.

Spare 1 Temperature Sensors

This optional sensor monitors a temperature as selected by the customer. This optional sensor must be installed as required by the customer. This is a graded sensor. It is connected to the Base Controller via the STIP and STIN wires.

Alarm Code 92 Sensor Grades Not Set is not used with spare sensors. However, when used spare sensors should be calibrated to achieve maximum accuracy.

CARGOWATCH SENSORS

The CargoWatch Data Logger is part of the HMI Control Panel. The CargoWatch Data Logger conforms to European standard EN12830. The Data Logger supports up to 6 temperature sensors and 4 digital inputs.

The sensors used for the CargoWatch Data Logger are RTD thermistor-type sensors that differ from the sensors used for unit control. The CargoWatch sensors are connected directly to the HMI Control Panel.

CargoWatch sensors can be identified by:

- No shrink tubing over sensor barrel
- Shorter sensor barrel than unit sensors
- No sensor grades
- The sensor is not polarity sensitive
- Both wires are black

CargoWatch Sensor
No Shrink Tubing

IMPORTANT: The CargoWatch sensors ARE NOT interchangeable with the unit temperature sensors.

These thermistor sensors change resistance as the temperature changes. Resistance values can be measured using a high quality ohmmeter and compared to a table to directly determine the temperature. Note that these resistance values only apply to CargoWatch sensors.

CargoWatch Sensor Resistance vs Temperature

°F	°C	Ohms
-20°F	-29°C	166,356
-10°F	-23°C	115,757
0°F	-18°C	86,501
10°F	-12°C	61,737
20°F	-7°C	47,070
30°F	-1°C	34,374
32°F	0°C	32,650
40°F	4°C	26,688
50°F	10°C	19,904
60°F	16°C	15,002
70°F	21°C	11,944
80°F	27°C	9,166
90°F	32°C	7,402
100°F	38°C	5,775

For testing and replacement of the CargoWatch Sensors see Service Procedure D04A Checking CargoWatch Sensors.

REFRIGERATION CONTROL COMPONENTS

These components are used by the Base Controller to sense conditions or control operation of the refrigeration system. The Base Controller determines the necessary requirements by considering the setpoint, the software, the programmable feature and OptiSet® settings, and the information supplied by the sensors.

Discharge Pressure Transducer (DPT)

This transducer supplies the compressor discharge pressure to the Base Controller. The sense wire is connected to the Base Controller at J3 via the DPI wire. The DPP and DPN wires supply power to the sensor. This sensor is installed on ETV-equipped units only.

Suction Pressure Transducer (SPT)

This transducer supplies the compressor suction pressure to the Base Controller. The sense wire is connected to the Base Controller at J3 via the SPI wire. The SPP and SPN wires supply power to the sensor. This sensor is installed on ETV equipped units only.

High Pressure Cutout Switch (HPCO)

The high pressure cutout switch is located on the discharge manifold of four cylinder compressors. The switch is closed with normal pressures and opens with excessive pressures to shut the unit down and prevent damage.

Pilot Solenoid (PS)

The Base Controller energizes (opens) the Pilot Solenoid to shift the 3 way valve to the heat position during heat or defrost mode operation. The normally closed Pilot Solenoid is located near the 3 way valve. The pilot solenoid is energized and LED 8 is lit when the Base Controller energizes the Pilot Solenoid Smart FET. This supplies power via the 26 wire to the pilot solenoid. The circuit is protected by the Smart FET.

Electronic Throttling Valve (ETV)

The Electronic Throttling Valve is capable of opening and closing incrementally and is installed between the evaporator and the compressor.

The ETV is controlled directly by the Base Controller Smart FET outputs. As the temperature approaches setpoint, the ETV begins to close, throttling the suction gas returning to the compressor and thus reducing cooling capacity. As the box temperature approaches setpoint, the ETV becomes more nearly closed. This feature provides very smooth and steady temperature control. The circuit is protected by the ETV Smart FETs.

Hot Gas Solenoid (HG)

The normally closed hot gas bypass solenoid is opened during modulated cool when the temperature is very close to setpoint. This diverts hot gas from the compressor discharge line, through the open hot gas solenoid to the evaporator distributor, to further reduce cooling capacity. The valve also opens if the suction pressure is too low. This valve is supplied on ETV equipped units only. The hot gas solenoid is energized and LED 10 is lit when the Base Controller energizes the Hot Gas Solenoid Smart FET. This supplies power via the HG wire to the hot gas solenoid. The circuit is protected by the Smart FET.

Damper Solenoid (DS)

A damper solenoid is used to open and close the defrost damper doors. Damper solenoids are used on most US domestic units. The Base Controller for units with damper solenoids is different than the one used with defrost damper motors. See the information in Section 7 - Hardware Features and Interchange for Service Parts numbers.

The damper solenoid is energized and LED 4 is lit when the Base Controller energizes the K4 Damper Relay. The K4 Damper Relay normally open contacts supply power via the 29 wire to the damper solenoid. The circuit is protected by the 15 amp fuse F6.

Damper Motor (DM)

European SL units use hermetically sealed defrost damper gear motors to open and close the defrost damper door. The Base Controller for units with damper solenoids is different than the one used with defrost damper motors. See the information in Section 7 - Hardware Features and Interchange for Service Parts numbers.

Fresh Air Exchange Solenoid (FAE) Option

An optional Fresh Air Exchange Feature is available. This allows fresh outside air to be drawn into the trailer and the interior air to be exhausted. This feature is beneficial when hauling loads that release gas as they ripen, such as potatoes.

The Fresh Air Exchange feature should be used exactly as specified by the customer and with fresh loads only. Using the Fresh Air Exchange feature with frozen loads will result in poor refrigeration performance, excessive defrost cycles and may set refrigeration capacity Alarm Codes.

A solenoid is used to open and close the Fresh Air Exchange Door. Note that the Fresh Air Exchange door will only be open when the unit engine is running, as it is held in the open position by the Fresh Air Exchange Solenoid. The door will close when the engine shuts down to preserve unit battery life. The setting of the Fresh Air Exchange door will survive power off / power on cycles – if the door is set “Open” by the operator it will continue to open any time the engine is running until it is set “Close” by the operator.

As of this date, Revision D006 Base Controller Software and Revision 6561 HMI Control Panel are required for the Fresh Air Exchange feature and will be installed only in SR-3 SB units equipped with the Fresh Air Exchange option. Revision D006 Base Controller Software is a direct descendent of Revision D007 Base Controller Software and has all the same features as Revision D007 Software.

If installed and enabled, the Fresh Air Exchange is opened and closed from the Mode Menu. See Fresh Air Exchange in Section 4 for details.

ENGINE CONTROL COMPONENTS

These components are used by the Base Controller to sense conditions and control operation of the diesel engine (or electric motor, if present).

Coolant Temperature Sensor

This sensor monitors the temperature of the coolant in the diesel engine. It is located on the diesel engine thermostat housing and is connected to the Base Controller via the J3 connector WTP and WTN wires.

Coolant Level Sensor (CLS)

This sensor monitors the engine coolant level. It consists of a magnetic reed switch located on the radiator expansion tank. The magnetic reed switch is a press-in miniature reed switch and a captive magnetic float inside the radiator expansion tank. If the coolant level is low for a specified period of time a low coolant condition is assumed to exist. The switch is connected to the Base Controller connector J7 via the CLS and CLP wire. The switch is closed with adequate coolant level and open with low coolant level.

Oil Pressure Switch (LOPS)

The normally closed low oil pressure switch monitors the oil pressure of the diesel engine. It is located on the engine side of the unit frame. It is connected to the Base Controller via J7 connector 20B and CH wires. The switch is open when the oil pressure is adequate.

Oil Level Switch (OLS)

The normally open oil level switch monitors the oil level in the diesel engine. It is located above the oil pan on the door side of the engine. It supplies information on the oil level to the Base Controller via the J7 connector OLS wire. The switch is closed when the oil level is low.

Flywheel Sensor (FW)

This sensor monitors the RPM of the diesel engine. The flywheel sensor is located on the door side of the engine just under the starter. It supplies engine speed information to the Base Controller connector J7 via the FS1 and FS2 wires.

Intake Air Heater

The intake air heater is located at the inlet to the intake manifold of the diesel engine. The intake air heater is energized and LED 3 is lit when the Base Controller energizes the K2 Preheat Relay. The K2 Preheat Relay normally open contacts supply power via the H wire to the intake air heater to preheat the engine before starting. The circuit is protected by the 60 amp fuse F5.

Starter Motor (SM)

The starter motor is located on the door side of the engine. The starter motor is energized and LED 25 is lit when the Base Controller energizes the K7 Starter Relay. The K7 Starter Relay normally open contacts supply power via the 8S wire to the starter solenoid to crank the engine. The circuit is protected by the 40 amp fuse F3.

Fuel Solenoid (FSH, FSP)

The fuel solenoid is located at the rear of the injector pump and is used to start and stop the flow of fuel to the diesel engine during diesel mode operation. The fuel solenoid features two coils, a pull-in coil and a hold coil. The pull-in coil transfers the fuel solenoid to the open position. The hold coil maintains the fuel solenoid in the open position.

The hold coil is energized in Diesel Mode when the Base Controller energizes the K1 Run Relay. LED 6 is lit when the Run Relay is energized and the contacts have transferred. The K1 Run Relay normally open contacts supply power from the 8 wire thru the normally closed Diesel/Electric relay to the 8D wire to energize the fuel solenoid hold coil. The circuit is protected by the 7.5 amp fuse F25.

The pull-in coil is momentarily energized and LED 24 is momentarily lit in Diesel Mode when the Base Controller energizes the K6 Fuel Solenoid Pull-in Relay for 2 seconds. The K6 Fuel Solenoid Pull-in Relay normally open contacts supply power via the 8DP wire to the fuel solenoid pull-in coil to positively open the fuel solenoid. The circuit is protected by the 40 amp fuse F3.

High Speed Solenoid (HS)

The high speed (throttle) solenoid is located behind the fuel injection pump. The high speed solenoid is energized and LED 5 is lit when the Base Controller energizes the K3 High Speed Relay. The K3 High Speed Relay contacts supply power to the 7D wire to the high speed solenoid to enable high speed operation. The circuit is protected by the 15 amp fuse F6.

Alternator Frequency

Alternator frequency is monitored by the microprocessor via the “W” wire. When a unit equipped with optional Electric Standby is running in Diesel Mode, the ratio between the engine RPM and alternator frequency is monitored. If these values are not in the proper ratio it is an indication that drive belt slippage is occurring. If this occurs then Alarm Code 48 is set as a shutdown alarm.

COMMUNICATION PORTS

The SR-3 features three communication ports. On SB units the CargoWatch and ServiceWatch ports are located on the control panel and the Printer port is inside the control box. On SL and SLX units the CargoWatch port and Printer ports are located on the control panel and the ServiceWatch port is located inside the control box. The port inside the control box may be swapped with one of the ports on the control panel if required by the end user.

CargoWatch Port

The CargoWatch port is used to download the CargoWatch Data Logger and to flash load software to the HMI Control Panel. It is located on the Control Panel.

USB Port

Thermo King SR-3 Trailer Units provide a USB (Universal Serial Bus) Port located on the unit control panel. If a USB Flash Drive is connected to the Control Panel USB connector, this menu item allows the operator to select the desired Flash Drive function.

IMPORTANT: The Flash Drive must be properly configured and the desired features must be enabled using Wintrac 5.1 or later.

Using a properly configured and enabled flash drive, the following functions may be available:

- ✓ Download the ServiceWatch Data Logger
- ✓ Download the CargoWatch Data Logger
- ✓ Flash load Base Controller Software
- ✓ Flash load HMI Control Panel Software
- ✓ Send OptiSet Plus Files
- ✓ Retrieve OptiSet Plus Files

For Flash Drive details see USB Flash Drive in Section 4 of this manual.

ServiceWatch Port

The ServiceWatch port is used to download the ServiceWatch data logger and to flash load software to the Base Controller. On SB units the ServiceWatch port is located on the control panel. On SLX units the ServiceWatch port is located inside the control box.

Printer Port

This port is used to print trip records from the CargoWatch Data Logger. On SB units the Printer port is located inside the control box. On SLX units the Printer port is located on the control panel below the CargoWatch download port.

OPTIONAL ELECTRIC STANDBY

(Model 50 units only)

The Electric Standby option allows the unit to be operated on either the diesel engine or external electric power. The units are supplied to operate on three phase power.

CAUTION

High voltage AC power is present whenever the unit is operating in Electric mode and whenever the unit is connected to external standby power. Voltages of this magnitude can be lethal. Exercise extreme caution when working on the unit.

Model 50 Features

The following features are standard equipment on units equipped with Electric Standby.

- **Automatic Diesel/Electric Selection** – The unit can be programmed to automatically switch to electric operation when a power cord is connected and the standby power is switched "on". The unit can also be programmed to automatically switch back to diesel power if the standby power is switched off or fails. The HMI Control Panel will prompt for electric or diesel switchover if the respective autoswitch feature is not enabled.

  Note: Auto-switch from electric to diesel is not recommended when the unit is running in electric mode indoors or when below deck on a ferry.

  Note: The unit will automatically switch to Cycle Sentry when the unit is manually switched or autoswitched to electric mode.

- **Automatic Overload Reset** - The overload relay resets automatically after the motor cools. When the overload trips, it interrupts power to the motor contactor coil.

- **Electric Heat** – Both hot gas and electric heat is utilized on model 50 units. The electric heaters are also used during defrost.

- **Automatic Phase Correction -** The control system features two motor contactors. One of the connectors is energized by the phase detection module to insure correct motor rotation, regardless of phase rotation on the incoming power. The motor contactors are also mechanically interlocked.

- **Low Voltage Detection –** The phase detection modulation will not allow the unit to run if the supply voltage is too low.

- **Single Phase Protection –** The phase detection modulation will not allow the unit to run if it detects a single phase condition.

High Voltage Components

The high voltage enclosure or tray contains the motor contactors, overload relay, heater contactor and phase select module used to operate the drive motor on units equipped with Electric Standby. The contactors are controlled by +12 volt dc control signals from the Base Controller. SB units have a separate control box located on the compressor side of the unit for these high voltage components. SL units utilize a high voltage tray located inside the unit control box.

Optional Remote Mount Power Receptacle

An optional Remote Power Receptacle is available. This Remote Power Receptacle is located and installed as specified by the customer. If an Optional Remote Power Receptacle is installed, a Standby Power Disconnect Switch is required in the high voltage enclosure for safety reasons.

Standby Power Disconnect Switch

A Standby Power Disconnect Switch is installed on all Electric Standby equipped units featuring the Remote Mount Power Receptacle. The Standby Power Disconnect Switch is located in the high voltage enclosure.

Diesel/Electric Relay K5

The Diesel/Electric Relay K5 is present on all units. If the Electric Standby option is not present or if the unit is running in Diesel Mode then control power is routed through the Diesel/Electric Relay normally closed contacts.

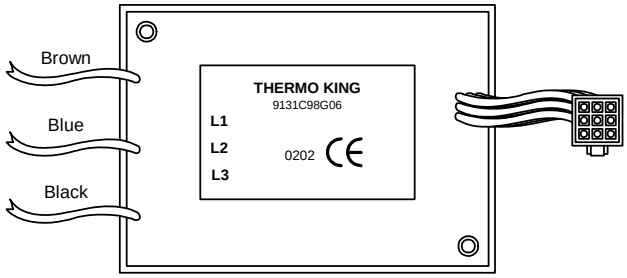
The Diesel/Electric Relay is energized and LED 7 is lit when the Base Controller requests Electric Mode operation. The K5 Diesel/Electric Relay normally open contacts supply power to the 7E circuit to enable Electric Mode operation.

Heater Contactor HC

The heater contactor is used to supply standby power to the electric heaters during heat and defrost mode electric operation. The heater contactor is energized and LED 5 is lit when the Base Controller energizes the K3 High Speed Relay during electric mode operation. The K3 High Speed Relay Smart FET supplies chassis ground via the 26E wire to the heater contactor. The circuit is protected by the Smart FET.

Phase Detect Module

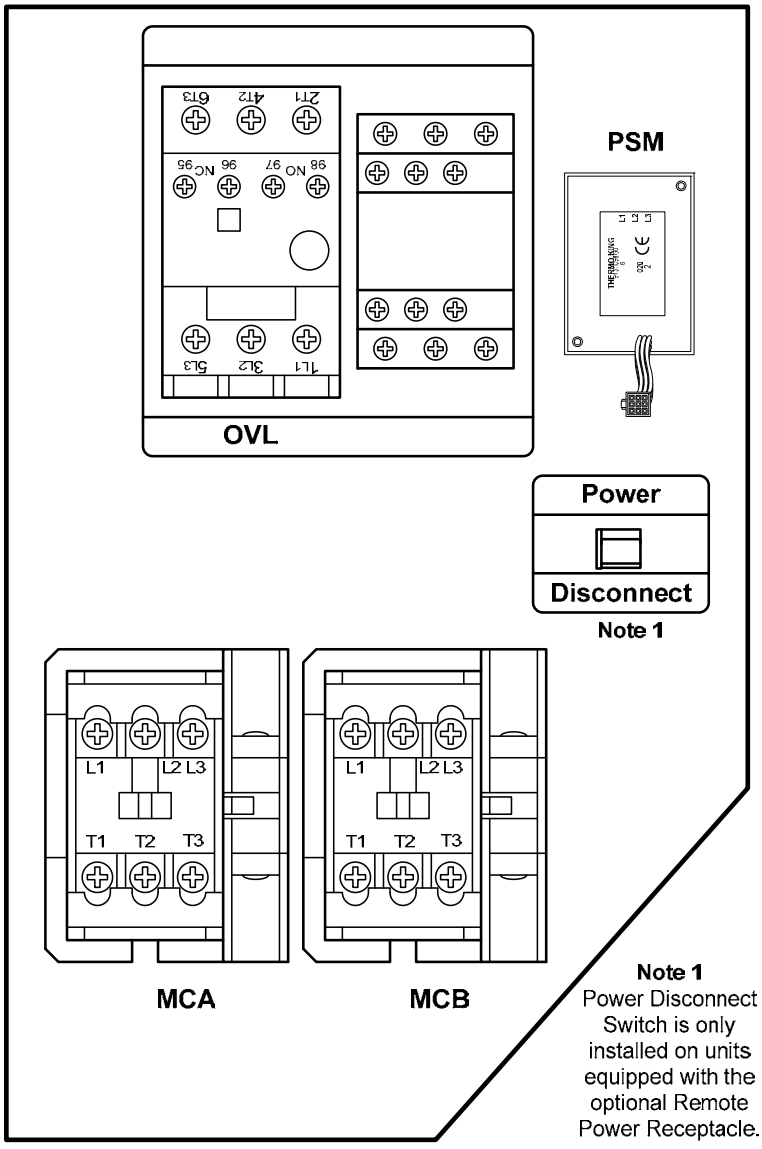
The phase detect module is designed to monitor 3 phase voltages from 160 volts AC through 510 volts AC. The phase detect module detects missing phases, automatically corrects phase rotation, and provides low voltage protection. See Section 6 for operation and diagnostics.



Phase Detect Module

SB Unit Electric Standby Components

These components are located in a separate control box on the compressor side of the unit.



SLX Unit Electric Standby Components

These components are located near the top of the unit control box.

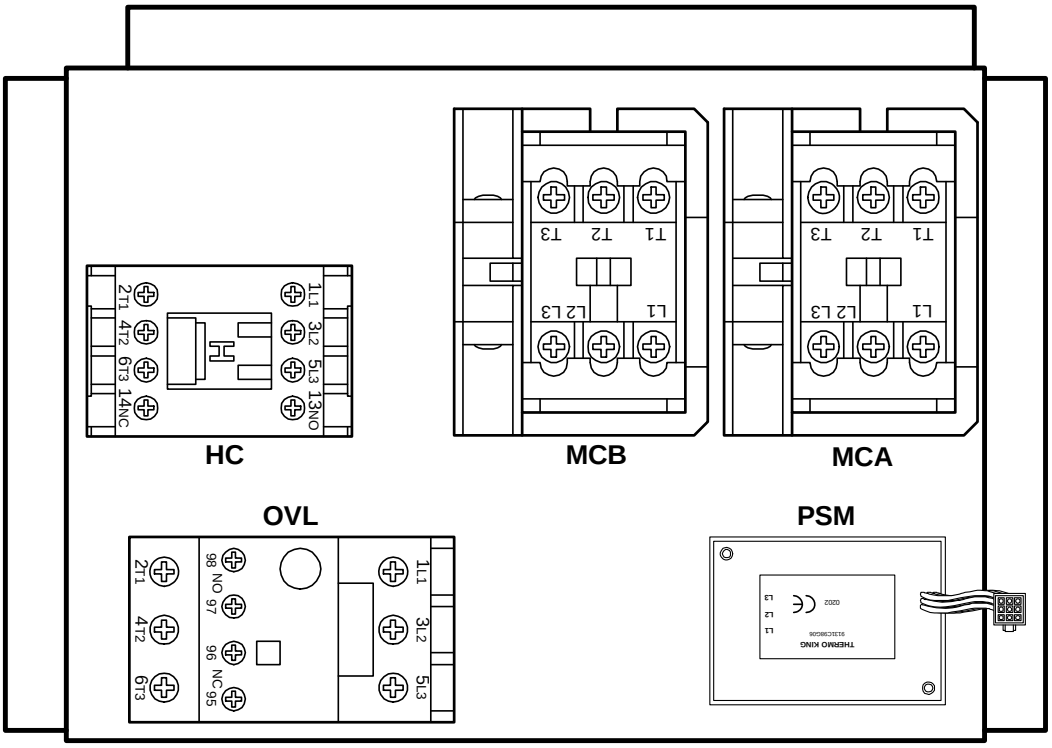


TABLE OF CONTENTS SECTION 3

SOFTWARE OPERATION

The software is a very complex set of instructions used by the Base Controller and HMI Control Panel to control the refrigeration system and interface with the operator. The Base Controller and HMI Control Panel microprocessors examine the conditions of all the inputs and compare them to the instructions contained in the software. The outputs are then energized as specified by the software instructions.

There is no way to determine from the schematic or wiring diagrams what conditions will cause the unit to operate in a particular mode. This decision is made by the software after examining all the input conditions and setpoint. However, operating mode can generally be deduced from the existing conditions. As an example, if a 35°F (2°C) setpoint is selected and the box temperature, as indicated by the return air sensor is 60°F (16°C), the unit should operate in Cool mode when turned on.

The SR-3 system utilizes several different software sets.

Base Controller software family D0xx is used for single temperature applications.

HMI Control Panel software (6560, 6660, 6760, 6860 or later) is used for all SR-3 applications. Supervisor software is part of the HMI Control Panel software and cannot be changed independently.

The software is flash loaded using a PC computer or a USB Flash Drive. See Service Procedures A46A and A46B in Section 6 for details using a PC computer. See Section 4 for details using a USB Flash Drive.

To check the Base Controller, Supervisor or HMI Control Panel software revisions see Section 4 of this manual.

For software revision details see Section 7 of this manual.

HARDWARE AND SOFTWARE COMPATIBILITY

SR-3 Base Controller

The SR-3 Base Controller is compatible with and may be used to replace the combined SR-2 Base Controller and Interface Board assembly. The SR-3 Base Controller mounting base uses the same mounting hole pattern as did the SR-2 Base Controller. The connectors on the SR-3 Base Controller are located in approximately the same positions as they are on an SR-2 Interface Board. However, when replacing an SR-2 Base Controller/Interface Board with an SR-3 Base Controller the wiring harness may need to be relocated slightly to reach the some of the connectors.

It is critical that the correct software be used.

- ✓ Single temperature applications with SR-3 Base Controllers must use Base Controller Software Revisions D0xx.

See Section 7 of this manual for additional hardware and software details and requirements.

HMI-3 Control Panel

The SR-3 Control System uses essentially the same HMI Control Panel as does the SR-2 Control System. However, SR-3 HMI Control Panels feature 8 MB of memory and are marked Smart Reefer 3 on the lower front panel as shown below.

The SR-2 HMI Control Panels feature 4 MB of memory. Other than memory, the SR-3 HMI Control Panel is compatible with and may be used to replace the SR-2 HMI Control Panel.

- ✓ SR-3 HMI Control Panels used on SR-3 applications without USB capability must use HMI Control Panel Software Revision 6550 or later.

- ✓ SR-3 HMI Control Panels used on SR-3 applications with USB capability must use HMI Control Panel Software Revision 6560 or later.

See Section 7 for hardware and software details.

MENU STRUCTURE

The basic HMI Control Panel menu structure consists of the Standard Display, the TemperatureWatch® Display and three menus. See the following material for a general description of each menu and feature. See Section 4 for complete operating instructions.

Standard Display

The Standard Display shows the box temperature and setpoint. The box temperature is usually return air temperature, but can be discharge air temperature if some features are enabled. The setpoint can be changed from the Standard Display using the SETPOINT soft key. The readings of the unit gauges and temperature sensors can be shown from the Standard Display using the GAUGES and SENSORS soft keys. The Main Menu is accessed from the Standard Display using the MENU soft key.

TemperatureWatch Display

The TemperatureWatch Display shows the return air temperature and setpoint using large numbers that allow unit conditions to be checked from a distance. If there are no alarms other than Log Alarms present then the TemperatureWatch Display will appear 2½ minutes after the last key is pressed. The Standard Display is accessed by pressing any soft key.

Main Menu

The Main Menu is made up of informational and operational items intended for the driver or unit operator. The Main Menu is directly accessible from the Standard Display using the MENU soft key. This soft key is at the bottom right of the display.

Maintenance Menu

The Maintenance Menu is made up of informational, operational, control, and diagnostic items used to help the service technician maintain and diagnose the unit. The Maintenance Menu is indirectly accessible from the Main Menu.

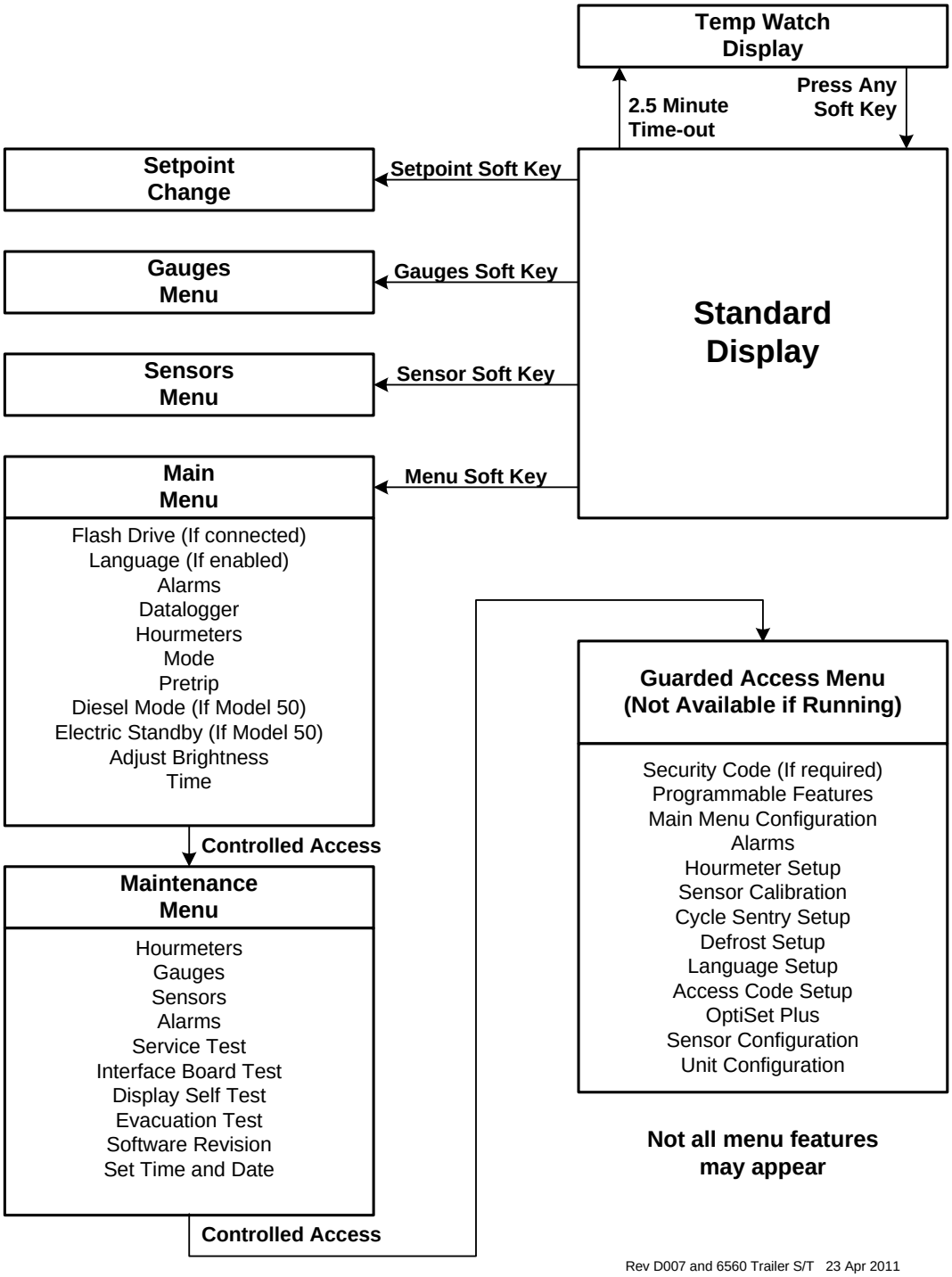
Guarded Access Menu

The Guarded Access Menu is made up of programmable settings that configure the unit, set sensor grades, enable options, and allow the customer to tailor unit operation to his particular requirements. The CargoWatch data logger is configured from this menu. The Guarded Access Menu is indirectly accessible from the Maintenance Menu.

MENU OVERVIEW FLOWCHART

D007 and 6560 SR-3 Trailer S/T Menu Overview

Features shown are for units configured <u>Trailer</u>



OPERATOR FEATURES

The Thermo King SR-3 control system features many special operator functions. These functions are available from the Standard Display. A brief explanation of each menu is included here. For complete details see Section 4 of this manual.

Standard Display

The Standard Display is the default display that appears if no other display function is selected. The Standard Display shows the box temperature and setpoint. The box temperature is usually return air temperature, but can be discharge air temperature if some features are enabled. The Standard Display soft keys provide direct operator access to change the setpoint and to select the Gauges Menu, Sensors Menu or Main Menu. If a USB Flash Drive is connected to the unit a USB Flash Drive Icon will appear in the display.

Setpoint Change

The setpoint menu can be directly accessed from the Standard Display using the Setpoint soft key.

Gauges

The unit Gauges Menu can be directly accessed using a soft key from the Standard Display. For a list of gauges available see the Operator Menus Flowchart on the next page.

Sensors

The unit Sensors Menu can be directly accessed using a soft key from the Standard Display. For a list of sensors available see the Operator Menus Flowchart on the next page.

Main Menu

The unit Main Menu can be directly accessed using a soft key from the Standard Display. For a list of Main Menu functions see the Operator Menu Flowchart and the material on the following pages.

TemperatureWatch®

The TemperatureWatch Display shows the return air temperature and setpoint using large numbers that allow unit conditions to be checked from a distance. If there are no alarms other than Log Alarms present then the TemperatureWatch display appears 2½ minutes after the last key is pressed and will remain until any soft key is pressed. To return to the Standard Display press any soft key.

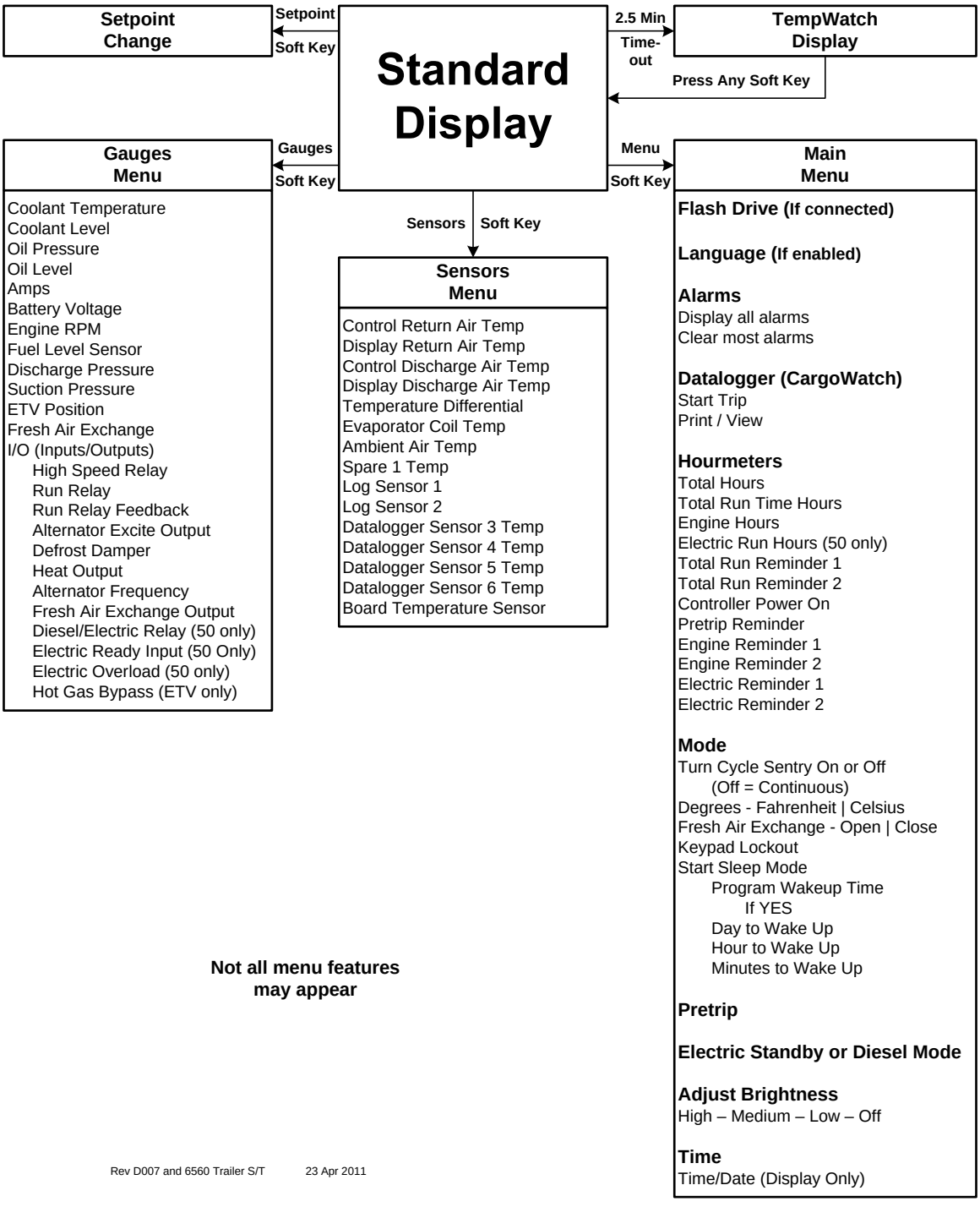
The TemperatureWatch display will not appear if any Check, Prevent or Shutdown alarms are present or if the CargoWatch -15°C Alarm is active. If the TemperatureWatch display is active and any of these alarm conditions occur the display will return to the Standard Display. If a shutdown alarm is present the display will flash. This provides a quick method to check for units that may have an alarm set.

If a USB Flash Drive is connected to the unit a USB Flash Drive Icon will appear in the display.

MAIN MENU FLOWCHART

D007 and 6560 SR-3 Trailer S/T Operator & Main Menu

Features shown are for units configured Trailer



Not all menu features may appear

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MAIN MENU FEATURES

The Main menu allows the operator to check other unit conditions, change operating modes and perform other operator functions. The Main menu is accessed from the Standard Display by means of the Menu soft key. The sub-menus show below may be available. For additional details see Section 4 of this manual.

Flash Drive

If a USB Flash Drive is connected to the Control Panel USB connector, this menu item allows the operator to select the desired Flash Drive function.

IMPORTANT: The Flash Drive must be properly configured and the desired features must be enabled using Wintrac 5.1 or later.

Using a properly configured and enabled flash drive, the following functions may be available:

- ✓ Download the ServiceWatch Data Logger
- ✓ Download the CargoWatch Data Logger
- ✓ Flash load Base Controller Software
- ✓ Flash load HMI Control Panel Software
- ✓ Send OptiSet Plus Files
- ✓ Retrieve OptiSet Plus Files

For Flash Drive details see USB Flash Drive in Section 4 of this manual.

Language

If more than one language is enabled, this menu item allows the operator to select a language from a list of up to 11 languages at one time. All subsequent displays are shown in the selected language. Four different language packages with a total of 24 languages are available. English is the default language and is provided in each of the packages.

Alarms

The Alarms display allows the operator to display any existing alarms. The operator can also clear most alarms from this menu

A simplified list of Alarm Codes is presented in Section 4 of this manual. A list of Alarm Codes including diagnostic procedures for each code is presented in Section 5 of this manual.

NOTE: Some alarms are clearable in Guarded Access only. Alarms with this feature will not provide a soft key "Clear" function. See Section 4 for additional details

Data Logger

This menu allows the operator to send a Start of Trip marker to the ServiceWatch and CargoWatch Data Loggers. It can also be used to print the contents of the CargoWatch Data Logger.

The unit can also be programmed such that every time the setpoint is changed a Start of Trip Marker is sent to the ServiceWatch and CargoWatch Data Loggers.

ServiceWatch and CargoWatch information can be downloaded and viewed by connecting a PC computer loaded with WinTrac 5.1 or later software. For details see Service Procedure A50A ServiceWatch Data Logger in Section 6 of this manual.

ServiceWatch and CargoWatch information can also be downloaded by connecting a properly configured and enabled Universal Flash Drive to the USB Connector on the unit Control Panel. The Flash Drive is then connected to a PC computer loaded with WinTrac 5.1 or later software to save and view the information. For Flash Drive details see USB Flash Drive in Section 4 of this manual.

Hourmeters

The Hourmeters menu allows the operator to view the unit hourmeters that have the view feature enabled in the Guarded Access menu. If the view feature for a particular hourmeter is not enabled then that hourmeter cannot be viewed from the Main Menu.

NOTE: All active hourmeters are available for viewing in the Maintenance Menu.

Mode

The Mode menu allows the operator to change the unit operating modes if allowed. Not all modes may appear depending on the settings selected from the Guarded Access menu.

- ✓ Turn Off Cycle Sentry Mode/Turn On Cycle Sentry Mode (If Cycle Sentry Mode is turned Off then the unit runs in Continuous Mode).
- ✓ Select temperature displays in either degrees Fahrenheit or degrees Celsius (if enabled).
- ✓ Open or close the optional Fresh Air Exchange vents (if feature is installed and enabled).
- ✓ Allow Keypad Lockout to be selected (if enabled).
- ✓ Start Sleep Mode (if enabled).

Pretrip

A Pretrip Test is used to confirm unit operation. This menu allows a Pretrip Test to be initiated by the operator. If the test is started with the engine or motor off a full test including the non-running amp checks and the running performance tests are performed. If the test is started with the engine or motor running only the running tests are performed. Test results are reported as PASS, CHECK or FAIL.

Electric Standby (Model 50 units only)

If the Electric Standby option is present and the Diesel to Electric Auto-switch feature is set NO, this feature allows the operator to manually select electric mode operation. This feature does not appear if the unit does not have the optional Electric Standby or if the Diesel to Electric Auto-switch feature is set YES.

Diesel Mode (Model 50 units only)

If a unit equipped with electric standby is running in electric mode and the Electric to Diesel Auto-switch feature is set NO, this feature allows the operator to manually select diesel mode operation. This feature does not appear if the unit does not have optional Electric Standby or if the Electric to Diesel Auto-switch feature is set YES.

Note: Auto-switch from electric to diesel is not recommended when the unit is running in electric mode indoors or when below deck on a ferry.

Adjust Brightness

This menu allows the operator to adjust the HMI Control Panel display backlight intensity as required by local conditions. If desired, the backlight can also be turned off.

Time

This menu allows the operator to view the unit time and date. The time and date cannot be changed from this menu. The time and date is loaded from the HMI Control Panel to the Base Controller each time the unit is turned on.

MAINTENANCE MENU FLOWCHART

D007 and 6560 SR-3 Trailer S/T Maintenance Menu (1 of 2)

Features shown are for units configured <u>Trailer</u>

Maintenance Menu
1 of 3

Hourmeters - View and Reset Time
- Total Hours
- Total Run Time Hours
- Engine Hours
- Electric Run Hours
- Total Run Time Reminder #1 Hours
- Total Run Time Reminder #2 Hours
- Controller Power On Hours
- Pretrip Reminder Hours
- Engine Run Time Reminder #1 Hours
- Engine Run Time Reminder #2 Hours
- Electric Run Time Reminder #1 Hours
- Electric Run Time Reminder #2 Hours

Gauges
- Coolant Temperature
- Coolant Level
- Oil Pressure
- Oil Level
- Amps
- Battery Voltage
- Engine RPM
- Fuel Level Sensor
- Discharge Pressure
- Suction Pressure
- ETV Position
- Fresh Air Exchange
- I/O (Input/Output State)
  - High Speed Relay
  - Run Relay
  - Run Relay Feedback
  - Alternator Excite Output
  - Defrost Damper
  - Heat Output
  - Alternator Frequency
  - Fresh Air Exchange Output
  - Diesel/Electric Relay (50 only)
  - Electric Ready Input (50 Only)
  - Electric Overload (50 only)
  - Hot Gas Bypass (ETV only)

Not all menu features may appear

Maintenance Menu
2 of 3

Sensors
- Control Return Air Temperature
- Display Return Air Temperature
- Control Discharge Air Temperature
- Display Discharge Air Temperature
- Temperature Differential
- Evaporator Coil Temperature
- Ambient Air Temperature
- Spare 1 Temperature
- Log Sensor 1
- Log Sensor 2
- Datalogger Sensor 3 Temperature
- Datalogger Sensor 4 Temperature
- Datalogger Sensor 5 Temperature
- Datalogger Sensor 6 Temperature
- Board Temperature Sensor

Alarms
- Display all alarms
- Clear most alarms

Service Test
- Test with Unit Running?
  - Off
  - Null
  - High Speed Cool
  - Low Speed Cool
  - Low Speed Heat
  - High Speed Heat
  - Defrost
  - Cool Bypass
  - Mod Cool /HGB
  - Modulation Cool
  - Modulation Heat

Interface Board Test
- Preheat Relay
- Buzzer
- Run Relay
- Alternator Excite Output
- Heat Output
- Damper Relay
- Indicator Light
- Alarm Light
- Diesel/Electric Relay
- Electric Heat
- High Speed Relay
- Hot Gas Bypass Valve
- Fresh Air Exchange

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D007 and 6560 SR-3 Trailer S/T Maintenance Menu (2 of 2)

Features shown are for units configured Trailer

Maintenance Menu
3 of 3

Display Self Test
- LCD Test
- Keypad Test
- Backlight Test
- Brightness Test
- Buzzer Test
- Heater Output
- Serial E2
- Datalog Flash
- RTC Update

Evacuation Test
- Connect Battery Charger

Software Revision
- Display Software Rev
- Controller Software Rev
- Supervisor Software Revision

Set Time and Date
- Hour
- Minutes
- Date
- Month
- Year

Not all menu features may appear

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MAINTENANCE MENU FEATURES

The Thermo King SR-3 control system features many special technician functions. These functions are available from the Maintenance Menu. A brief explanation of each menu is included here.

For complete details see Section 4 of this manual.

Accessing the Maintenance Menu

The Maintenance Menu is accessible from the Main Menu. From the Standard Display press the MENU key. The controller will display the Main Menu. From the first Main Menu display (either Alarms or Language) press and hold both the EXIT key and the key with no label above it for 5 seconds. After 5 seconds the HMI will display the Maintenance Menu.

MAINTENANCE MENU FEATURES

A brief explanation of each menu is shown here. For complete operating details see Section 4.

Hourmeters

This menu allows the technician to view all the active unit hourmeters, even if the Main Menu view has been disabled. The Maintenance Menu Hourmeter Display also allows the technician to reset the time on hourmeters with a programmed time limit.

Gauges

The Gauges menu allows the technician to display operating information such as coolant level and temperature, engine RPM, battery amps, battery volts, and suction and discharge pressure. The I/O selection under Gauges indicates the named outputs as either On or Off. Some Gauges can also be viewed from the Service Test Mode and Interface Board Test Mode displays.

NOTE: This menu contains the same information as the Standard Display Gauge Menu.

Sensors

The Sensors menu allows the technician to display the reading of all unit temperature sensors as well as the calculated temperature differential.

NOTE: This menu contains the same information as the Standard Display Sensors Menu.

Alarms

The Alarms display allows the technician to display any existing alarms. The technician can also clear most alarms from this menu

A simplified list of Alarm Codes is presented in Section 4 of this manual. A list of Alarm Codes including diagnostic procedures for each code is presented in Section 5 of this manual.

NOTE: Some alarms are clearable in Guarded Access only. Alarms with this feature will not provide a soft key "Clear" function. See Section 4 for additional details

Service Test Mode

Since the complexity of the control software makes it impossible to predict exact operating conditions, a troubleshooting feature called Service Test Mode has been incorporated. This feature allows the unit to be forced to a known set of operating conditions in diesel or electric mode, regardless of setpoint or temperature sensor inputs. Service personnel can use this mode to troubleshoot the system under defined operating conditions. Service Test Mode can be used with the unit running or non-running. Any shutdown alarms that are present must be cleared before Service Test Mode is available.

Interface Board Test

Interface Board Test Mode allows individual relays or outputs to be energized. This permits service personnel to troubleshoot individual circuits under known conditions. Interface Board Test Mode can only be used with the unit in a non-running condition. If Interface Board Test Mode is entered with the diesel engine or electric motor running the engine or motor will be shut down. Any shutdown alarms that are present must be cleared before Interface Board Test Mode is available.

Display Self Test

This menu allows the operator to perform a series of built in tests on the HMI Control Panel.

Evacuation Test

Evacuation Test allows a full system evacuation to be performed. All normally closed valves are opened to allow the entire system to be completely evacuated before charging with refrigerant. If present, the ETV will be fully opened.

If the battery voltage falls below acceptable limits, the operator is prompted to connect a battery charger to maintain sufficient battery voltage to hold all necessary valves open during the procedure. If the voltage from the battery charger rises above acceptable limits, the controller will be turned off to prevent damage to the electronics and/or system components.

Software Revision

The Software Revision menu shows the software revision of the HMI Control Panel software, Base Controller software and the Supervisor software.

Set Time and Date

The Set Time and Date menu allows the system time and date to be checked and changed as required. The time and date is loaded from the HMI Control Panel to the Base Controller each time the unit is turned on.

GUARDED ACCESS MENU FLOWCHART

D007 and 6560 SR-3 Trailer S/T Guarded Access Menu (1 of 2)

Features shown are for units configured Trailer

Guarded Access Menu
1 of 4

Security Code (if enabled)
- Enter Access Code

Programmable Features
- Temperature Units (F)
- Pressure Units (PSIG)
- Restart Unit After Shutdown (Enabled)
- Setpoint High Limit (80°F)
- Setpoint Low Limit (-20°F)
- Fuel Saver II (Enabled)
- High Speed Pulldown (Enabled)
- Fresh Frozen Range (15°F)
- Door Open Forces (Log Only)
  - Door Open Timeout (HRS:MIN)
- Sleep Mode After Pretrip(Disabled)
- Rail Option (Disabled)
  - Rail Alternate (Disabled)
- Blocked Air Chute Detect (Disabled)
  - Temperature Differential (9.9)
  - Time to Alarm (0:30)
  - Door Open Override (Disabled)
- Discharge Pressure Setpoint (415 PSI)
- Water Temperature Setpoint (210°F)
- Limited Alarm Restarts (Disabled)
- Remote Device (Disabled)
- COM 1 Default Baud Rate (1200
- COM 2 Default Baud Rate (9600)
- COM 3 Default Baud Rate (9600)
- High Temperature Defrost (Disabled)
- Local Authorization of OS+ Upload (Enabled)
- Local Authorization of Flash Load (Enabled)

Main Menu Configuration
- Add Keypad Lockout to Mode Menu (Disabled)
- Add Sleep to Mode Menu (Disabled)
- Add Temperature Units to Mode Menu (Disabled)

Alarms
- Display all alarms
- Clear most alarms

Not all menu features may appear

Guarded Access Menu
2 of 4

Hourmeter Setup

Program Hourmeter
- Total Run Time Reminder #1 Hours (Off)
- Total Run Time Reminder #2 Hours (Off)
- Controller Power On Hours (Off)
- Pretrip Reminder Hours (Off)
- Engine Run Time Reminder #1 Hours (Off)
- Engine Run Time Reminder #2 Hours (Off)
- Electric Run Time Reminder #1 Hours (Off)
- Electric Run Time Reminder #2 Hours (Off)

Viewable Hourmeter Setup
- Total Hours (Disabled)
- Total Run Time Hours (Enabled)
- Engine Hours (Enabled)
- Electric Run Hours (Enabled)
- Total Run Time Reminder #1 Hours (Disabled)
- Total Run Time Reminder #2 Hours (Disabled)
- Controller Power On Hours (Disabled)
- Pretrip Reminder Hours (Disabled)
- Engine Run Time Rem #1 Hours (Disabled)
- Engine Run Time Rem #2 Hours (Disabled)
- Electric Run Time Rem #1 Hours (Disabled)
- Electric Run Time Rem #2 Hours (Disabled)

Program Service Due Date
- Engine Run Time Service Due Date (Disabled)

Sensor Calibration
- Control Return Air Sensor Grade (5H)
- Control Discharge Air Sensor Grade (5H)
- Display Return Air Sensor Grade (5H)
- Display Discharge AIr Sensor Grade (5H)
- Spare 1 Sensor Grade (5H)

Cycle Sentry Setup
- Cycle Sentry Amps Level (5)
- Battery Sentry Voltage Level (12.2)

Defrost Setup
- Defrost Interval In Range w Fresh Setpoint (6)
- Defrost Interval Not In Range w Fresh Setpoint (4)
- Defrost Interval In Range w Frozen Setpoint (6)
- Defrost Interval Not In Range w Frozen Setpoint (4)
- Maximum Defrost Duration (45)

Rev D007 and 6560 Trailer S/T 23 Apr 2011

D007 and 6560 SR-3 Trailer S/T Guarded Access Menu (2 of 2)

Features shown are for units configured Trailer

Guarded Access Menu
3 of 4

Language Setup

HMI Rev 65xx	HMI Rev 66xx	HMI Rev 67xx
English	English	English
Spanish	Danish	Japanese
French	Russian	Chinese
German	Norwegian	
Italian	Swedish	
Dutch	Finnish	**HMI Rev 68xx**
Portuguese	Polish	Mix and Match
Greek	Hungarian	Languages
Turkish	Romanian	
Hebrew	Bulgarian	
Arabic	Czech	

Access Code Setup
- Enter Access Code

OptiSet Plus
- OptiSet Plus Reset
- Temperature Profile Selection (Numeric Setpoint)

Sensor Configuration (CargoWatch)
(See Cargo Watch description in Diagnostic Manual)
- Logging Interval (15 Minutes)
- Log Sensor 1(On)
  - Independant Sensor #1 Name (Log Sensor 1)
  - Out of Range Checking (Off)
    - Low (-10.8°F)
    - High (10.8°F)
  - Italian Option - Available with Sensor 1 only (Off)
  - Sensor Averaging (Off)
- Log Sensor 2 (On)
  - Independent Sensor #1 Name (Log Sensor 2)
  - Out of Range Checking (Off)
    - Low (-10.8°F)
    - High (10.8°F)
  - Sensor Averaging (Off)
- Log Sensor 3 (Off) Same features as Sensor 2 if On
- Log Sensor 4 (Off) Same features as Sensor 2 if On
- Log Sensor 5 (Off) Same features as Sensor 2 if On
- Log Sensor 6 (Off) Same features as Sensor 2 if On
- Digital In 1 (On)
  - Door Open Logging (On)
  - Digital Input #1 Name (Digital Input #1)
- Digital In 2 (Off) Same as Digital Input 1 if On
- Digital In 3 (Off) Same as Digital Input 1 if On
- Countdown Timer (Off)
- Conservative Log Count (Off)
- SOT on Setpoint (Disabled)

Guarded Access Menu
4 of 4

Unit Configuration
- Unit Type (Truck - Trailer)
- Engine Type (Yanmar 2.1)
- Compressor Type (Recip, Screw)
- ETV Configured (Yes)
- Electric Standby Equipped? (Yes)
- Electric Heat Option (Yes)
- Electric Motor Type (14 HP Type, 24 HP Type)
- Diesel to Electric Autoswitch Enabled? (No)
- Electric to Diesel Autoswitch Enabled? (No)
- Unit Model (SB, Super-II, SL-400, SLX-100, SLX-200, SLX-300, SLX-400, SLX-LDB)
- High Capacity Unit? (No)
  - High Capacity Fresh? (No)
- Defrost Motor Equipped? (No)
- Fuel Sensor Type (None)
- Rear Remote Control (None)
  - Rear Remote Control Action (Stand By)
- Pretrip/Sleep Switch Options (Disabled)
- 3rd Party Device Control (None, COM 1, COM 2)
- Low Fuel Shutdown (Disabled)
- Fresh Air Exchange (Disabled)

Not all menu features may appear

Rev D007 and 6560 Trailer S/T 23 Apr 2011

GUARDED ACCESS MENU FEATURES

The Guarded Access Menu allows unit operation to be configured to user requirements.

Security Code Protection

A security code can be set to restrict access to the Guarded Access Menu. If a security code is set the technician will be prompted to enter the correct code when accessing the Guarded Access Menu. The security code is defaulted to No Code.

Accessing the Guarded Access Menu

From the Standard Display press the MENU key. The controller will display the Main Menu. From the first Main Menu display (either Language or Alarms) press and hold both the EXIT key and the key with no label above it for 5 seconds.

After 5 seconds the controller will display the Maintenance Menu. Press the NEXT key until the Set Time and Date Menu appears. From the Set Time and Date Menu press and hold both the EXIT key and the key with no label above it for 5 seconds.

The controller may display a Security Code challenge. If a Security Code has been set the operator is prompted to enter the correct code using the "+" and "-" keys. When the correct code is set press the YES key to enter the Guarded Access Menu. If the correct Security Code is not entered access to the Guarded Access Menu will be denied.

If no Security Code has been set the controller will enter the Guarded Access Menu directly.

Bypassing the Security Code

If a Security Code is set and the Guarded Access Menu must be accessed, the Security Code can be bypassed by entering "4444".

Leaving the Guarded Access Menu

When leaving the Guarded Access Menu the base controller will automatically turn the controller off and then restart the controller in order to configure the changes that may have been made. This power cycle is termed a controller "warm restart".

PROGRAMMABLE FEATURES MENU

The Programmable Features Menu allows overall unit operation to be configured to specific end user requirements. These features are set to factory defaults when shipped, but can easily be changed to suit the end user's needs. Programmable features are designed to allow the user to customize some unit operating parameters without using OptiSet Plus

IMPORTANT

If a feature has been programmed in OptiSet Plus, the HMI will display "programmed in OptiSet Plus", and the feature cannot be updated from this menu.

Temperature Units

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	FAHRENHEIT or CELSIUS
Factory Set	FAHRENHEIT
Exceptions	The setting selected is used for all ranges.
Description	The controller can be set to display temperatures in either degrees FAHRENHEIT or degrees CELSIUS.

Pressure Units

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	PSIG, KPa or BARS
Factory Set	PSI
Exceptions	
Description	The controller can be set to display system refrigerant pressures in PSIG, kPa or BARS.

Restart Unit After Shutdown

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED, DISABLED, or CONTINUOUS
Factory Set	ENABLED
Exceptions	Use the CONTINUOUS option for rail applications only.

Description Standard restart alarms become permanent shutdown alarms after several attempts to start and run. The CONTINUOUS feature is designed for rail applications where the unit runs unattended or is inaccessible for service. It allows unlimited restart attempts to be made if the following restart alarms occur.

- Alarm Code 10 High Discharge Pressure
- Alarm Code 18 High Engine Coolant Temp
- Alarm Code 63 Engine Stopped
- Alarm Code 82 High Compressor Temp

If restarts are disabled, the unit will shut down on the first alarm event. The following differences exist between a Standard Restart and a Continuous Restart alarm:

- Standard Restart alarms force a permanent shutdown if the alarm occurs a pre-determined number of times (usually 3). Continuous Restart alarms allow an unlimited number of restarts for the four alarm codes listed above.
- Standard Restart alarms typically use a 15 minute timer before a restart is allowed. Continuous Restart alarms use a 1-hour timer before a restart is allowed.
- With Continuous Restart alarms ETV Head Pressure Setpoint is lowered based on the alarm type and number of occurrences.

Setpoint High Limit

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Maximum is 90°F (32°C) Minimum is Setpoint Low Limit
Factory Set	80°F (27°C)
Exceptions	If OptiSet Plus is active the HMI Control Panel will display [Programmed in OptiSet Plus] and this feature cannot be changed from the Guarded Access Menu. The Setpoint High Limit setting selected is used for all ranges.
Description	Setpoint High Limit allows the upper setpoint limit to be set to a maximum of 90°F (32°C) in one degree increments. The minimum setting is determined by the setting of Setpoint Low Limit. If the driver attempts to select a setpoint higher than the Setpoint High Limit, the display will show Setpoint Limit, indicating that the selected Setpoint High Limit has been reached. Setting Setpoint High Limit and Setpoint Low Limit to the same temperature results in a single setpoint temperature available.

Setpoint Low Limit

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Minimum is -30°F (-34°C) Maximum is Setpoint High Limit
Factory Set	-20°F (-29°C)
Exceptions	If OptiSet Plus is active the HMI Control Panel will display [Programmed in OptiSet Plus] and this feature cannot be changed from the Guarded Access Menu. The Setpoint Low Limit setting selected is used for all ranges.
Description	Setpoint Low Limit allows the lower setpoint limit to be set to a minimum of -30°F (-34°C) in one degree increments. The maximum setting is determined by the setting of Setpoint High Limit. If the driver attempts to select a setpoint lower than the Setpoint Low Limit, the display will show Setpoint Limit, indicating that the selected Setpoint Low Limit has been reached. Setting Setpoint High Limit and Setpoint Low Limit to the same temperature results in a single setpoint temperature available. Setpoint temperatures lower than -25°F (-32°C) should only be used when absolutely required by the load.

Fuel Saver II

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED or DISABLED
Factory Set	ENABLED
Exceptions	If OptiSet Plus is active the HMI Control Panel will display [Programmed in OptiSet Plus] and this feature cannot be changed from the Guarded Access Menu.
Description	If Fuel Saver II is ENABLED, and the box temperature changes a predetermined amount from setpoint in Cycle Sentry mode operation, or if the box temperature indicates a need for high speed in Continuous mode operation, the unit will first run in low speed. An 8-minute timer is started and the control sensor air temperature is monitored. As long as the temperature falls (in cool mode operation) or rises (in heat mode operation) a specified amount before the timer expires, the 8-minute timer is reset and low speed operation continues. If the temperature has not changed the pre-determined amount when the timer times out, high speed operation is resumed if allowed. This provides fuel savings by delaying high speed operation, yet assures that the temperature continues to fall or rise as required to reach setpoint. If the unit switches to high speed from FS-II, the unit will run in high speed until setpoint is reached. If FS-II is DISABLED, high speed cool and high speed heat are allowed with no delay. The FS-II feature does not apply to modulation operation.

High Speed Pulldown

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED or DISABLED
Factory Set	ENABLED
Exceptions	If OptiSet Plus is active the HMI Control Panel will display [Programmed in OptiSet Plus] and this feature cannot be changed from the Guarded Access Menu.
Description	This feature allows High Speed Pull Down for the selected range to be ENABLED or DISABLED. If High Speed Pull Down is ENABLED, the unit will run in high speed on initial start until setpoint is reached in both cool and heat mode. If High Speed Pull Down is DISABLED, the unit will switch to low speed cool when the return air temperature is below low speed switch point value plus setpoint. ***NOTE: There is a two minute delay on initial startup before high speed operation is allowed.*** If Fuel Saver II is ENABLED, there may be a delay before high speed operation is allowed. This feature does not apply to modulation operation.

Fresh Frozen Range

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	24°F (-4°C) or 15°F (-9°C)
Factory Set	15°F (-9°C)
Exceptions	If OptiSet Plus is active the HMI Control Panel will display [Programmed in OptiSet Plus] and this feature cannot be changed from the Guarded Access Menu. The setting selected is used for all ranges.
Description	One set of general control specifications is used when operating in the Fresh range, and another set of general operating specifications is used when operating in the Frozen range. This feature allows the line between Fresh and Frozen ranges to be selected as either 15°F (-9°C) or 24°F (-4°C). All setpoints less than or equal to this value will be treated as frozen ranges. All setpoints greater than this value will be treated as Fresh ranges. The Frozen setpoint range is from the limit of the Setpoint Limit Low setting to the Fresh Frozen range setting. The Fresh setpoint range is from the limit of the Fresh Frozen range + 1 degree to the setpoint high limit setting. When programming OptiSet Plus, no range may include both Frozen and Fresh range setpoints. This value is the high value of the last frozen range programmed. The next range programmed will start at this value + 1-degree depending on the selection made above. Changing this feature will reset all OptiSet Plus range values to default.

Door Open Forces

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	LOG ONLY, UNIT NULL or UNIT NULL – NO ALARM
Factory Set	LOG ONLY
Exceptions	If OptiSet Plus is active the HMI Control Panel will display [Programmed in OptiSet Plus] and this feature cannot be changed from the Guarded Access Menu. The optional door switch must be installed.
Description	This feature allows the Door Open action to be set. If this feature is set LOG ONLY the door opening will be logged after 4 seconds but the unit will continue to run. Door openings are logged in both the CargoWatch and ServiceWatch data loggers. The door switch must be open or closed for 4 seconds before the event is logged to prevent false readings. If this feature is set UNIT NULL the base controller shuts the unit down and logs the door opening 4 seconds after the door is opened. If the unit is in defrost when the door is opened, the defrost cycle will be completed before the unit shuts down. If the Door Open Timeout feature has been set for a door open time, the unit will restart and run if the time specified by Door Open Timeout is exceeded. The unit will continue to run even if the door is still open. The event is logged in both the CargoWatch and ServiceWatch data loggers. If this feature is set UNIT NULL – NO ALARM unit operation is the same as UNIT NULL above, but Alarm Code 108 Door Open Timeout is not set.

Door Open Timeout

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	1:00 to 4:00 (Hours) in 10 Min Increments or OFF
Factory Set	OFF
Exceptions	If OptiSet Plus is active the HMI Control Panel will display [Programmed in OptiSet Plus] and this feature cannot be changed from the Guarded Access Menu. The optional door switch must be installed. Only appears if the DOOR OPEN FORCES feature is set to UNIT NULL or UNIT NULL – NO ALARM.
Description	This feature allows the unit to restart if the door open time exceeds the set limit. Door Open Timeout can be set to OFF or for a time limit from 1 to 4 hours, in 10-minute increments. If set to OFF the unit will remain off until the door is closed. If the Door Open Timeout feature has been set for a door open time, the unit will restart and run and Alarm Code 108 Door Open Timeout will be set as a Check Alarm if the time specified by Door Open Timeout is exceeded. The unit will continue to run even if the door is still open. The event is logged in both the CargoWatch and ServiceWatch data loggers.

Sleep Mode After Pretrip

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED or DISABLED
Factory Set	DISABLED
Exceptions	
Description	If the feature is set ENABLED, the unit will enter Sleep Mode after a Pretrip Test. If the feature is set DISABLED, the unit will not enter Sleep Mode after a Pretrip Test.

Rail Option

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED or DISABLED
Factory Set	DISABLED
Exceptions	The optional fuel level switch must be installed in order to use the Fuel Conserve Mode feature.
Description	If the unit is a rail application, this feature is ENABLED. When the optional customer fuel level switch closes (supplies chassis ground to the base controller fuel level input), the unit will enter a Fuel Conserve Mode where the unit is forced to low speed operation only. If the unit is not a rail application this feature should be DISABLED. **IMPORTANT:** If RAIL OPTION is ENABLED, the fuel level switch will cause the unit to enter a full conserve mode only. The Low Fuel Shutdown Feature is not available if RAIL OPTION is ENABLED.

Rail Alternate

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED or DISABLED
Factory Set	DISABLED
Exceptions	Only available if RAIL OPTION is ENABLED.
Description	This feature changes the alerts criteria, defrost allowed temperature and defrost termination temperature. It should only be used when specified by the customer. If rail alternate is enabled a defrost cycle is allowed with an evaporator coil temperature less than or equal to 55 °F (13°C) and terminates at 70°F (21°C).

Blocked Air Chute Detect

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED or DISABLED
Factory Set	DISABLED
Exceptions	The optional Spare Sensor 1 must be installed.

Description The Air Chute Detect feature is designed to detect a blocked or improperly installed trailer air chute. Spare sensor 1 is located at the rear of the trailer and directly in the air flow at the end of the chute. The temperature detected by this sensor is compared to the temperature detected by the control discharge air temperature sensor. This feature functions only during cool mode operation.

If this temperature differential exceeds a user defined number of degrees for a user defined period of time, Alarm Code 46 CHECK AIR FLOW is generated as a check alarm. If the trailer is equipped with a door switch and the feature is enabled, monitoring ceases when the door is opened and is resumed 45 minutes after the door is closed. When the unit enters a defrost cycle, monitoring ceases and is resumed 45 minutes after the defrost cycle terminates. Should the control discharge temperature sensor or Spare sensor 1 fail the Air Chute Detect feature is disabled.

Temperature Differential

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	1°F to 20°F in 0.1°F increments 1°C to 10°C in 0.1°C increments
Factory Set	9.9°F (5.5°C)
Exceptions	Only available if BLOCKED AIR CHUTE DETECT is ENABLED.

Description This feature selects the temperature differential, from the front to the back of the trailer that must be exceeded to cause an alarm to occur. The temperature differential is calculated using the control discharge air sensor and spare sensor 1. This temperature differential must exist for the time specified by TIME TO ALARM below in order to set Alarm Code 46 Check Air Flow.

Time to Alarm

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	5 to 120 minutes in 1-minute increments
Factory Set	30 minutes
Exceptions	Only available if BLOCKED AIR CHUTE DETECT is ENABLED.
Description	This feature selects the time interval that must be exceeded to cause Alarm Code 46 CHECK AIR FLOW to occur. This condition must exist with a temperature differential, in excess of that specified by TEMPERATURE DIFFERENTIAL above, in order to set Alarm Code 46 Check Air Flow.

Door Open Override

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED or DISABLED
Factory Set	ENABLED
Exceptions	Only available if BLOCKED AIR CHUTE DETECT is ENABLED.
Description	This feature determines if a door switch should interrupt the operation of the BLOCKED AIR CHUTE DETECT feature. If set ENABLED, then monitoring ceases when the door is opened and is resumed 45 minutes after the door is closed. If set DISABLED, monitoring is not interrupted when a door opens.

Discharge Pressure Setpoint

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	380 to 440 PSIG
Factory Set	415 PSIG
Exceptions	Only on ETV equipped units.
Description	This feature allows the head pressure setpoint to be adjusted. This pressure determines when the base controller will enter a temporary operating mode to prevent unit shutdown. Do not change this setting unless instructed to do so.

Water Temperature Setpoint

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	180°F to 210°F (82°C to 99°C)
Factory Set	210°F (99°C)
Exceptions	Only on ETV equipped units.
Description	This feature allows the water temperature setpoint to be adjusted. This temperature determines when the base controller will enter a temporary operating mode to prevent unit shutdown. Do not change this setting unless instructed to do so.

Limited Alarm Resets

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED or DISABLED
Factory Set	DISABLED
Exceptions	Does not appear unless rail is disabled and restarts are enabled.

Description This feature modifies the ability to repeatedly clear certain alarms from the Main menu or Operators menu. If these alarms occur repeatedly, they may indicate a need for service to prevent unit or product damage. These alarms are as follows:

- Alarm Code 23 Cooling Cycle Fault
- Alarm Code 24 Heating Cycle Fault
- Alarm Code 32 Refrigeration Capacity Low
- Alarm Code 82 High Comp Discharge Temp

Setting this feature to ENABLED will allow the above alarms to be cleared conventionally 2 times in a continuous 12 hour period. If any of these alarms are cleared more than 2 times in 12 hours, all subsequent occurrences can only be cleared from the Guarded Access Menu. This helps ensure that the alarms receive the attention of service personnel. The 12 hour timer is reset when any of the above alarms is cleared from the Guarded Access Menu. The 12 hour timer is not reset with a unit or controller power-down.

Setting this feature DISABLED will allow the above alarms to be cleared conventionally an unlimited number of times.

Remote Device

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED or DISABLED
Factory Set	DISABLED
Exceptions	Requires optional device – see below.

Description

Setting this feature to ENABLED allows an external device, such as TracKing, to start and stop a properly equipped unit. Setting this feature to DISABLED prevents this control.

IMPORTANT: The Remote Device feature should be set DISABLED before working on the unit if the unit is equipped with a device that allows it to be started and stopped from a remote location.

HMI Control Panel COM 1 Default Baud Rate

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200 BPS
Factory Set	1200
Exceptions	
Description	This feature allows the default baud rate to be selected for the HMI Control Panel COM Port 1.

COM Port 1 is used by Wintrac. The setting of this feature should not be changed.

HMI Control Panel COM 2 Default Baud Rate

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200 BPS
Factory Set	9600
Exceptions	
Description	This feature allows the default baud rate to be selected for the HMI Control Panel COM Port 2. COM Port 2 is used by the CargoWatch printer. If a customer has a mixed fleet with both SR-2/SR-3 and μP-IV M/T controllers with DAS, the baud rate for COM 2 should be set to 2400. This will allow printing from both the SR-2/SR-3 and μP-IV controllers without changing the printer baud rate. Note that the printer baud rate must be set to match the baud rate setting of the Com 2 Port.

HMI Control Panel COM 3 Default Baud Rate

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200 BPS
Factory Set	9600
Exceptions	
Description	This feature allows the default baud rate to be selected for the HMI Control Panel COM port 3. COM port 3 is currently used by R:COM or other telematics devices. The setting of this feature should not be changed.

High Temperature Defrost

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED or DISABLED
Factory Set	DISABLED
Exceptions	
Description	This feature changes the defrost allowed temperature and defrost termination temperature. It should only be used when specified by the customer. If High Temperature Defrost is enabled a defrost cycle is allowed with an evaporator coil temperature less than or equal to 55 °F (13°C) and terminates at 70°F (21°C). **IMPORTANT:** Unlike the Rail Alternate feature, the Low Fuel Shutdown feature is available when High Temperature Defrost is set ENABLED and a float or solid state fuel level sensor is installed.

Local Authorization of OS+ Upload (Future Use)

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED or DISABLED
Factory Set	ENABLED
Exceptions	This feature appears in the Guarded Access Menu but does not appear in OptiSet Plus 4.1.
Description	Future Use –

Local Authorization of Flash Load (Future Use)

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED or DISABLED
Factory Set	ENABLED
Exceptions	This feature appears in the Guarded Access Menu but does not appear in OptiSet Plus 4.1.
Description	Future use –

MAIN MENU CONFIGURATION MENU

The Main Menu Configuration Menu determines if the Keypad Lockout and Sleep Mode menus are visible in the Main Menu | Mode Menu. These features are set to factory defaults when shipped, but can easily be changed to suit the end user's needs.

Add Keypad Lockout to Mode Menu

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Enabled or Disabled
Factory Set	Disabled
Exceptions	
Description	When enabled, Keypad Lockout allows the operator to lock the keypad to prevent tampering. Pressing any soft key for 5 seconds will unlock the keypad. Setting this feature Enabled adds the Keypad Lockout feature to the Mode Menu. Setting this feature Disabled turns the Keypad Lockout feature off and removes the feature from the Mode Menu.

Add Sleep to Mode Menu

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Enabled or Disabled
Factory Set	Disabled
Exceptions	
Description	When enabled, Sleep Mode allows the operator to place the unit in Sleep Mode from the Mode Menu. Setting this feature Enabled adds the Sleep Mode feature to the Mode Menu. Setting this feature Disabled removes the Sleep Mode feature from the Mode Menu.

Add Temperature Units to Mode Menu

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Enabled or Disabled
Factory Set	Disabled
Exceptions	
Description	When enabled, Select Temperature Units allows the operator to choose to display temperatures in either degrees Fahrenheit or degrees Celsius. Setting this feature Enabled adds the Select Temperature Units feature to the Mode Menu. Setting this feature Disabled removes the Select Temperature Units feature from the Mode Menu.

ALARM DISPLAY MENU

The Alarm Menu allows the technician to display and clear any existing alarms except alarms that auto-clear only. See Section 4 for operating details. If an alarm condition still exists when the alarm is cleared, the alarm will be set again as soon as the alarm condition is detected.

A simplified list of Alarm Codes is presented in Section 4 of this manual.

A list of alarm codes including diagnostic procedures for each alarm code is presented in Section 5 of this manual.

HOURMETER SETUP MENU

The Hourmeter Setup Menu allows the unit hourmeters to be configured to customer requirements. There are two sub-menus under the Hourmeter Setup Menu as follows:

- Program Hourmeter
- Viewable Hourmeter Setup
- Program Service Due Date

PROGRAM HOURMETER SUB-MENU

The hourmeters listed below allow a time limit to be established for each programmable Hourmeter. These time limits are defined by the customer and are typically used as maintenance reminders. When a hourmeter time is exceeded, a stored alarm is set as a maintenance reminder. The hourmeter is cleared by means of a CLEAR soft key when viewing the hourmeters from the Guarded Access Menu. The hour meter elapsed time should be reset to 0. Hourmeters cannot be cleared from the Main Menu

With the exception of Controller Power On Hours and Pretrip Reminder Hours there are two hourmeters for each feature to allow two different maintenance intervals to be set.

The Program Hourmeter Sub-menu is used to set and clear the adjustable time limits for each Hourmeter, as required by a customer's maintenance program. The default time limit for all hourmeters is 100 hours. The hourmeters appear in the order shown here.

Total Run Time Reminder # 1 Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	OFF, 1 to 99,999
Factory Set	OFF
Exceptions	If a time limit is set and exceeded then Alarm Code 132 will be set as a stored alarm.
Description	Total Run Time Reminder #1 Hours is one of two hourmeters that track the total amount of time the unit has run in both diesel and electric mode. If a time limit is set and exceeded then Alarm Code 132 will be set as a stored alarm. This feature sets the meter limits for this programmable hourmeter. The default setting is OFF. Time limits start at 100 hours and can be decreased to 1 and then OFF or increased to a maximum of 99,999 hours.

Total Run Time Reminder # 2 Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	OFF, 1 to 99,999
Factory Set	OFF
Exceptions	If a time limit is set and exceeded then Alarm Code 133 will be set as a stored alarm.
Description	Total Run Time Reminder #2 Hours is one of two hourmeters that track the total amount of time the unit has run in both diesel and electric mode. If a time limit is set and exceeded then Alarm Code 133 will be set as a stored alarm. This feature sets the meter limits for this programmable hourmeter. The default setting is OFF. Time limits start at 100 hours and can be decreased to 1 and then OFF or increased to a maximum of 99,999 hours.

Controller Power On Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	OFF, 1 to 99,999
Factory Set	OFF
Exceptions	If a time limit is set and exceeded then Alarm Code 134 will be set as a stored alarm.
Description	Controller Power On Hours is the total amount of time the controller has been turned on. If a time limit is set and exceeded then Alarm Code 134 will be set as a stored alarm. This feature sets the meter limits for this programmable hourmeter. The default setting is OFF. Time limits start at 100 hours and can be decreased to 1 and then OFF or increased to a maximum of 99,999 hours.

Pretrip Reminder Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	OFF, 1 to 99,999
Factory Set	OFF
Exceptions	If a time limit is set and exceeded then Alarm Code 64 will be set as a stored alarm.
Description	Controller Power On Hours is the total amount of time since the last Pretrip Test was performed. If a time limit is set and exceeded then Alarm Code 64 will be set as a stored alarm. This feature sets the meter limits for this programmable hourmeter. The default setting is OFF. Time limits start at 100 hours and can be decreased to 1 and then OFF or increased to a maximum of 99,999 hours.

Engine Run Time Reminder # 1 Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	OFF, 1 to 99,999
Factory Set	OFF
Exceptions	If a time limit is set and exceeded then Alarm Code 128 will be set as a stored alarm.
Description	Engine Run Time Reminder #1 Hours is one of two hourmeters that track the total amount of time the unit has run in diesel mode. If a time limit is set and exceeded then Alarm Code 128 will be set as a stored alarm. This feature sets the meter limits for this programmable hourmeter. The default setting is OFF. Time limits start at 100 hours and can be decreased to 1 and then OFF or increased to a maximum of 99,999 hours.

Engine Run Time Reminder # 2 Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	OFF, 1 to 99,999
Factory Set	OFF
Exceptions	If a time limit is set and exceeded then Alarm Code 129 will be set as a stored alarm.
Description	Engine Run Time Reminder #2 Hours is one of two hourmeters that track the total amount of time the unit has run in diesel mode. If a time limit is set and exceeded then Alarm Code 129 will be set as a stored alarm. This feature sets the meter limits for this programmable hourmeter. The default setting is OFF. Time limits start at 100 hours and can be decreased to 1 and then OFF or increased to a maximum of 99,999 hours.

Electric Run Time Reminder # 1 Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	OFF, 1 to 99,999
Factory Set	OFF
Exceptions	If a time limit is set and exceeded then Alarm Code 130 will be set as a stored alarm. Only appears if the unit is configured as being equipped with optional electric standby.
Description	Electric Run Time Reminder #1 Hours is one of two hourmeters that track the total amount of time the unit has run in electric mode. If a time limit is set and exceeded then Alarm Code 130 will be set as a stored alarm. This feature sets the meter limits for this programmable hourmeter. The default setting is OFF. Time limits start at 100 hours and can be decreased to 1 and then OFF or increased to a maximum of 99,999 hours.

Electric Run Time Reminder # 2 Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	OFF, 1 to 99,999
Factory Set	OFF
Exceptions	If a time limit is set and exceeded then Alarm Code 131 will be set as a stored alarm. Only appears if the unit is configured as being equipped with optional electric standby.
Description	Electric Run Time Reminder #2 Hours is one of two hourmeters that track the total amount of time the unit has run in electric mode. If a time limit is set and exceeded then Alarm Code 131 will be set as a stored alarm. This feature sets the meter limits for this programmable hourmeter. The default setting is OFF. Time limits start at 100 hours and can be decreased to 1 and then OFF or increased to a maximum of 99,999 hours.

VIEWABLE HOURMETER SETUP SUB-MENU

The hourmeters can be programmed to be visible or hidden from the Main Menu. The hourmeters continue to accumulate time even if the hourmeter view is hidden.

If an hourmeter view is set Enabled, then that hourmeter will appear in the Hourmeter menu in both the Main Menu and Maintenance Menu. If the hourmeter view is set disabled, the hourmeter is only viewable from the Maintenance Menu.

With Model 30 units the default setting for the Engine Hours hourmeter is Enabled. The default setting of all other hourmeters is Disabled.

With Model 50 units the default setting for the Total Run Time Hours, Engine Hours and Electric Run Hours hourmeters is Enabled. The default setting of all other hourmeters is Disabled.

The hourmeters appear in the order shown here.

Total Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Enabled or Disabled
Factory Set	Disabled
Exceptions	
Description	The setting of this feature determines if the Total Hours hourmeter can be viewed from the Main Menu. If the hourmeter is Enabled it can be viewed from the Main Menu. If it is Disabled it cannot be viewed from the Main Menu but is visible from the Maintenance Menu.

Total Run Time Hours (If Model 50)

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Enabled or Disabled
Factory Set	Enabled if Model 50
Exceptions	Only appears if the unit is configured as being equipped with optional electric standby.
Description	The setting of this feature determines if the Total Run Time Hours hourmeter can be viewed from the Main Menu. If the hourmeter is Enabled it can be viewed from the Main Menu. If it is Disabled it cannot be viewed from the Main Menu but is visible from the Maintenance Menu.

Engine Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Enabled or Disabled
Factory Set	Enabled
Exceptions	
Description	The setting of this feature determines if the Engine Hours hourmeter can be viewed from the Main Menu. If the hourmeter is Enabled it can be viewed from the Main Menu. If it is Disabled it cannot be viewed from the Main Menu but is visible from the Maintenance Menu.

Electric Run Hours (If Model 50)

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Enabled or Disabled
Factory Set	Enabled if Model 50
Exceptions	Only appears if the unit is configured as being equipped with optional electric standby.
Description	The setting of this feature determines if the Electric Run Hours hourmeter can be viewed from the Main Menu. If the hourmeter is Enabled it can be viewed from the Main Menu. If it is Disabled it cannot be viewed from the Main Menu but is visible from the Maintenance Menu.

Total Run Time Reminder # 1 Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Enabled or Disabled
Factory Set	Disabled
Exceptions	
Description	The setting of this feature determines if the Total Run Time Reminder # 1 Hours hourmeter can be viewed from the Main Menu. If the hourmeter is Enabled it can be viewed from the Main Menu. If it is Disabled it cannot be viewed from the Main Menu but is visible from the Maintenance Menu.

Total Run Time Reminder # 2 Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Enabled or Disabled
Factory Set	Disabled
Exceptions	
Description	The setting of this feature determines if the Total Run Time Reminder # 2 Hours hourmeter can be viewed from the Main Menu. If the hourmeter is Enabled it can be viewed from the Main Menu. If it is Disabled it cannot be viewed from the Main Menu but is visible from the Maintenance Menu.

Controller Power On Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Enabled or Disabled
Factory Set	Disabled
Exceptions	
Description	The setting of this feature determines if the Controller Power On Hours hourmeter can be viewed from the Main Menu. If the hourmeter is Enabled it can be viewed from the Main Menu. If it is Disabled it cannot be viewed from the Main Menu but is visible from the Maintenance Menu.

Pretrip Reminder Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Enabled or Disabled
Factory Set	Disabled
Exceptions	
Description	The setting of this feature determines if the Pretrip Reminder Hours hourmeter can be viewed from the Main Menu. If the hourmeter is Enabled it can be viewed from the Main Menu. If it is Disabled it cannot be viewed from the Main Menu but is visible from the Maintenance Menu.

Engine Run Time Reminder # 1 Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Disabled
Factory Set	Disabled
Exceptions	
Description	The setting of this feature determines if the Engine Run Time Reminder # 1 Hours hourmeter can be viewed from the Main Menu. If the hourmeter is Enabled it can be viewed from the Main Menu. If it is Disabled it cannot be viewed from the Main Menu but is visible from the Maintenance Menu.

Engine Run Time Reminder # 2 Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Disabled
Factory Set	Disabled
Exceptions	
Description	The setting of this feature determines if the Engine Run Time Reminder # 1 Hours hourmeter can be viewed from the Main Menu. If the hourmeter is Enabled it can be viewed from the Main Menu. If it is Disabled it cannot be viewed from the Main Menu but is visible from the Maintenance Menu.

Electric Run Time Reminder # 1 Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Disabled
Factory Set	Disabled
Exceptions	Only appears if the unit is configured as being equipped with optional electric standby.
Description	The setting of this feature determines if the Electric Run Time Reminder # 1 Hours hourmeter can be viewed from the Main Menu. If the hourmeter is Enabled it can be viewed from the Main Menu. If it is Disabled it cannot be viewed from the Main Menu but is visible from the Maintenance Menu.

Electric Run Time Reminder # 2 Hours

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Disabled
Factory Set	Disabled
Exceptions	Only appears if the unit is configured as being equipped with optional electric standby.
Description	The setting of this feature determines if the Electric Run Time Reminder # 2 Hours hourmeter can be viewed from the Main Menu. If the hourmeter is Enabled it can be viewed from the Main Menu. If it is Disabled it cannot be viewed from the Main Menu but is visible from the Maintenance Menu.

Programmable Service Due Date

This feature allows a Service Due Date to be programmed. When the selected Service Due Date is reached, Alarm Code 128 Service Due is set.

Service Due Date

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Enabled or Disabled
Factory Set	Disabled
Exceptions	
Description	If this feature is set Enabled, prompts appear to set a Service Due Date (Date / Month / Year). When this date is reached, Alarm Code 128 Service Due is set as a stored alarm. Alarm Code 128 Service Due can only be cleared from the Guarded Access Menu. When Alarm Code 128 Service Due is cleared, the Service Due Date feature is reset to Disabled. The feature can again be set Enabled and a new Service Due Date selected.

SENSOR CALIBRATION MENU

The grade number for graded sensors must be set correctly for the unit to operate properly. Sensor grades are defined such that a sensor grade 5H does not exist. The default setting for a new controller or after a cold start is 5H. This serves as a notice that the sensor grade is not set. The default grade of 5H is not a valid grade and will not be printed on any sensor.

If a sensor grade for a return air or discharge air sensor is set to grade 5H, the Alarm Code for that sensor and Alarm Code 92 Sensor Grade Not Set will be set.

Spare Sensor 1 is also a graded sensor but an alarm code is not set if this sensor grade is set to 5H.

NOTE: To insure proper operation the grades must be properly set to match the actual sensor grades. Failure to do so may result in false alarm codes. Exercise care to properly identify the sensor grades. The best way to positively identify the sensor grade is to physically check the sensor grade printed on each graded sensor. In addition, colored cable ties are installed on the sensor harness near the sensor as shown in the Sensor Cable Tie Identification Table.

IMPORTANT: Sensor grades cannot be set using OptiSet Plus.

The Sensor Calibration Menu allows the operator to select the correct grade for all graded sensors. Sensor grades range from 1L through 9H. The sensors appear in the order shown here.

Sensor Cable Tie Identification

Sensor and Alarm Code	Wire #	Cable Tie Color
Control Return Air Sensor Alarm Code 03	RTP RTN	1 Yellow
Control Discharge Air Sensor Alarm Code 04	DTP DTN	1 Red
Display Return Air Sensor Alarm Code 203	RTRP RTRN	2 Yellow
Display Discharge Air Sensor Alarm Code 204	DTRP DTRN	2 Red

Control Return Air Sensor Grade

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	1L thru 9H
Factory Set	5H
Exceptions	Unit Type = Trailer Single Temperature.
Description	This feature is used to set the sensor grade for the Control Return Air Sensor.

The default setting for a new base controller or after a ServiceWatch base controller cold start is 5H. This serves as a warning that the sensor grade is not set. The default grade of 5H is not a valid grade and will not be printed on any sensor. If a sensor grade for a return air or discharge air sensor is set to grade 5H, the alarm code for that sensor and Alarm Code 92 Sensor Grade Not Set will occur. Alarm Code 92 is not set if a Spare Sensor is set to 5H.

To insure proper operation the grades must be properly set to match the actual sensor grades to prevent nuisance alarm codes. Exercise care to properly identify the sensor grades. The best way to positively identify the sensor grade is by physically checking the sensor grade printed on each graded sensor.

Control Discharge Air Sensor Grade

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	1L thru 9H
Factory Set	5H
Exceptions	Unit Type = Trailer Single Temperature.
Description	This feature is used to set the sensor grade for the Control Discharge Air Sensor.

The default setting for a new base controller or after a ServiceWatch base controller cold start is 5H. This serves as a warning that the sensor grade is not set. The default grade of 5H is not a valid grade and will not be printed on any sensor. If a sensor grade for a return air or discharge air sensor is set to grade 5H, the alarm code for that sensor and Alarm Code 92 Sensor Grade Not Set will occur. Alarm Code 92 is not set if a Spare Sensor is set to 5H.

To insure proper operation the grades must be properly set to match the actual sensor grades to prevent nuisance alarm codes. Exercise care to properly identify the sensor grades. The best way to positively identify the sensor grade is by physically checking the sensor grade printed on each graded sensor.

Display Return Air Sensor Grade

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	1L thru 9H
Factory Set	5H
Exceptions	Unit Type = Trailer Single Temperature.
Description	This feature is used to set the sensor grade for the Display Return Air Sensor.

The default setting for a new base controller or after a ServiceWatch base controller cold start is 5H. This serves as a warning that the sensor grade is not set. The default grade of 5H is not a valid grade and will not be printed on any sensor. If a sensor grade for a return air or discharge air sensor is set to grade 5H, the alarm code for that sensor and Alarm Code 92 Sensor Grade Not Set will occur. Alarm Code 92 is not set if a Spare Sensor is set to 5H.

To insure proper operation the grades must be properly set to match the actual sensor grades to prevent nuisance alarm codes. Exercise care to properly identify the sensor grades. The best way to positively identify the sensor grade is by physically checking the sensor grade printed on each graded sensor.

Display Discharge Air Sensor Grade

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	1L thru 9H
Factory Set	5H
Exceptions	Unit Type = Trailer Single Temperature.
Description	This feature is used to set the sensor grade for the Display Discharge Air Sensor.

The default setting for a new base controller or after a ServiceWatch base controller cold start is 5H. This serves as a warning that the sensor grade is not set. The default grade of 5H is not a valid grade and will not be printed on any sensor. If a sensor grade for a return air or discharge air sensor is set to grade 5H, the alarm code for that sensor and Alarm Code 92 Sensor Grade Not Set will occur. Alarm Code 92 is not set if a Spare Sensor is set to 5H.

To insure proper operation the grades must be properly set to match the actual sensor grades to prevent nuisance alarm codes. Exercise care to properly identify the sensor grades. The best way to positively identify the sensor grade is by physically checking the sensor grade printed on each graded sensor.

Spare 1 Sensor Grade

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	1L thru 9H
Factory Set	5H
Exceptions	Unit Type = Trailer Single Temperature. If the optional Spare 1 Sensor is not present this feature need not be set.
Description	This feature is used to set the sensor grade for the Spare 1 Sensor.

The default setting for a new base controller or after a ServiceWatch base controller cold start is 5H. This serves as a warning that the sensor grade is not set. The default grade of 5H is not a valid grade and will not be printed on any sensor. If a sensor grade for a return air or discharge air sensor is set to grade 5H, the alarm code for that sensor and Alarm Code 92 Sensor Grade Not Set will occur. Alarm Code 92 is not set if a Spare Sensor is set to 5H.

To insure proper operation the grades must be properly set to match the actual sensor grades to prevent nuisance alarm codes. Exercise care to properly identify the sensor grades. The best way to positively identify the sensor grade is by physically checking the sensor grade printed on each graded sensor.

NOTE: Alarm Code 92 Sensor Grades Not Set is not active with spare sensors. However, if the sensor is in used the sensor grade should be set to provide maximum sensor accuracy.

CYCLE SENTRY SETUP MENU

The Cycle Sentry Menu allows the unit defaults for Cycle Sentry Null and Sleep Null unit shut down on battery charge current and unit restart on battery voltage to be modified as desired by the customer.

Cycle Sentry Amps Level

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	2A to 8A in 1A increments
Factory Set	5A
Exceptions	
Description	When operating in Cycle Sentry or Sleep mode the unit will automatically run to charge the battery, until the charging current falls below this set limit. This occurs even if cooling, heating or defrosting is not required.

Battery Sentry Voltage Level

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	11.8V to 12.6V in 0.1V increments
Factory Set	12.2V
Exceptions	
Description	When operating in Cycle Sentry or Sleep mode the controller will monitor battery voltage and restart the unit to charge the battery, if the battery voltage falls below this set limit. This occurs even if cooling, heating or defrosting is not required.

DEFROST SETUP MENU

The Defrost Setup Menu allows the defrost operation to be configured for maximum performance.

- ✓ The evaporator coil temperature must be 45°F (7°C) or less to allow defrost. Defrost cycles will terminate at 58°F (14°C).
- ✓ If rail alternate or High Temperature Defrost is enabled a defrost cycle is allowed with an evaporator coil temperature less than or equal to 55 °F (13°C) and terminates at 70°F (21°C).

Defrost Interval In Range with Fresh Setpoint

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	2, 4, 6, 8 or 12 Hours
Factory Set	6 Hours
Exceptions	
Description	This feature selects the timed interval between defrost cycles with Fresh range setpoints when the temperature is in range.

Defrost Interval Not In Range with Fresh Setpoint

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	2, 4, 6, 8 or 12 Hours
Factory Set	4 Hours
Exceptions	
Description	This feature selects the timed interval between defrost cycles with Fresh range setpoints when the temperature is not in range.

Defrost Interval In Range with Frozen Setpoint

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	2, 4, 6, 8 or 12 Hours
Factory Set	6 Hours
Exceptions	
Description	This feature selects the timed interval between defrost cycles with Frozen range setpoints when the temperature is in range.

Defrost Interval Not In Range with Frozen Setpoint

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	2, 4, 6, 8 or 12 Hours
Factory Set	6 Hours
Exceptions	
Description	This feature selects the timed interval between defrost cycles with Frozen range setpoints when the temperature is not in range.

Maximum Defrost Duration

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	30 or 45 Minutes
Factory Set	45 Minutes
Exceptions	
Description	This feature selects the maximum time the unit can remain in a defrost cycle. A defrost cycle normally terminates when the evaporator coil temperature reaches 58°F (14°C). If Rail Alternate is enabled a defrost cycle terminates at 70°F (21°C). If the evaporator temperature does not reach this temperature, the defrost cycle will terminate after the elapsed time selected here.

LANGUAGE SETUP MENU

This menu allows the display language or languages to be enabled as required. When a language is selected all subsequent displays are in that language.

The languages available are dependent on the software revision in the HMI Control Panel. Only one of the four software revisions can be installed, and only the languages in that revision are available. Other than language support, there is no difference between the software revisions. English is included in all HMI software versions. HMI Control Panel software revisions support the languages shown in the table below.

Software Revision Language Support Table

Revision 65xx	Revision 66xx	Revision 67xx	Revision 68xx
English	English	English	WinTrac Setup
Spanish	Danish	Japanese	English
French	Russian	Chinese	English and
German	Norwegian		Spanish
Italian	Swedish		English and
Dutch	Finnish		up to 5
Portuguese	Polish		additional
Greek	Hungarian		languages
Turkish	Romanian		from
Hebrew	Bulgarian		65xx and
Arabic	Czech		66xx

Revision 68xx

HMI Control Panel Revision 68xx allows a combination of up to 5 languages from the 21 languages available in Revision 65xx and Revision 66xx to be selected. This allows several languages from Revision 65xx and Revision 66xx to be loaded. HMI Control Panel Revision 68xx requires WinTrac 5.1 or later.

When flash loading HMI Control Panel Revision 68xx software, one of three language options is selected as shown below.

- English only
- English and Spanish only
- Select up to five languages from the provided list

See Service Procedure A46B Flash Loading HMI Control Panel Software in Section 6 of this manual for details.

There is an Enable Language screen for each language included in the installed HMI software version. English is included in all language sets and is factory set as Enabled. Only enabled languages will appear in the Main Menu Language selections. All languages other than English are factory set as Disabled. If only one language is enabled the Language selection screen does not appear in the Main Menu.

Enable Language

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	See Language Support Table
Factory Set	English only
Exceptions	
Description	This feature allows any or all of the included languages to be enabled. Only enabled languages will appear in the Operators Language Menu. All languages other than English are factory set as Disabled. If only one language is enabled then the Language Menu screen will not appear in the Main Menu.

ACCESS CODE SETUP MENU

This menu allows an Access code to be required for entry to the Guarded Access Menu. If a code is selected, an access code challenge will appear when entering the Guarded Access menu. If the correct code is not entered access is denied.

A technician can bypass an unknown Access Code by entering "4444" and pressing the Enter key.

Enter Access Code

The + and – keys are used to enter the desired Access Code. When the desired Access Code is displayed, the Enter Key is pressed to load the code. The code should be recorded for future use.

If OptiSet Plus is active this feature is set using OptiSet Plus 4.1 or later.

OPTISET PLUS MENU

The OptiSet Plus™ Temperature Management System allows up to 64 different Named and/or Numeric temperature profiles to be defined and tailored for maximum operating efficiency as determined by customer load requirements. The term "OptiSet Plus" refers to both the programmable temperature profiles and the unit operating features that can be tailored using OptiSet Plus.

Due to the large number of features available in OptiSet Plus, the OptiSet Plus features can no longer be viewed or changed from the Guarded Access Menu. The only OptiSet Plus features available from the Guarded Access Menu are OptiSet Plus Reset and Temperature Profile Selection.

- ✓ OptiSet Plus Reset is used to reset all OptiSet Plus features to the factory default settings.

- ✓ Temperature Profile Selection is used to determine what temperature profiles are available for use by the driver.

For details of OptiSet Plus Reset and Temperature Profile Selection see the next page.

IMPORTANT: All other OptiSet Plus Features are set using OptiSet Plus. They cannot be viewed or changed from the Guarded Access Menu. OptiSet Plus 4.1 or later is required for use with the SR-3 Control System and is used to tailor unit performance to customer requirements.

For additional details see the following material. Information on installing and using OptiSet Plus 4.1 can be found in the OptiSet Plus 3.0 User Guide (TK 54686-8-MS). Additional information can also be found in the extensive Help Menu in OptiSet Plus 4.1.

OPTISET PLUS FEATURES AVAILABLE FROM THE GUARDED ACCESS MENU

These two features are available from the Guarded Access OptiSet Plus Menu.

OptiSet Plus Reset

Control Rev	D000 and later
HMI Rev	6550 and later
Exceptions	Only available if OptiSet Plus features have been previously set using OptiSet Plus 4.1.
Description	If any OptiSet Plus features have been previously set using OptiSet Plus 4.1, an OptiSet Reset is provided at the beginning of the OptiSet Plus menu to return all settings to the default values. If this OptiSet Reset feature is used, all OptiSet Plus settings are returned to factory defaults.

Temperature Profile Selection

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	NUMERIC SETPOINT ONLY NAMED PRODUCT ONLY NAMED PROD & NUMERIC SP
Factory Set	Numeric Setpoint Only
Exceptions	
Description	This feature determines what profiles are available to the driver. If NUMERIC SETPOINT ONLY is selected, only numeric setpoints are available to the driver, such as 35°F or -10°F. If NAMED PRODUCT ONLY is selected, only the named products enabled during OptiSet Plus setup are available to the driver, such as Potatoes or Squash. If NAMED PROD & NUMERIC SP is selected, both named products and numeric setpoints are available to the driver.

OPTISET PLUS CONTINUOUS MODE FEATURES

Frozen Ranges and Fresh Ranges without ETV or with Modulation turned Off.

The software features shown below are used to custom tailor temperature profiles using OptiSet Plus software. These software features are accessible only in OptiSet Plus software. They are not available in the Guarded Access Menu. They are shown here for convenience only. When shipped from the factory the features will be set as shown by Factory Set.

Continuous High Speed Pulldown

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Off or On
Factory Set	**On**
Exceptions	Not active if modulation is enabled
Description	This feature allows High Speed Pull Down for the selected range to be turned On or Off. If High Speed Pull Down is turned On, the unit will run in high speed on initial start until setpoint is reached in both cool and heat mode. If High Speed Pull Down is turned Off, the unit will switch to low speed cool when the return air temperature is below the programmed low speed switch point value plus setpoint. There is a two-minute delay on initial startup before high speed operation is allowed. If Fuel Saver II is turned On, there may be a delay before high speed operation is allowed. This feature does not apply to modulation operation.

Continuous Low Speed Switch Point

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	3.4°F (1.9°C) to 10.1°F (5.6°C)
Factory Set	3.4°F (1.9°C)
Exceptions	Not active if modulation is enabled. Only appears if High Speed Pulldown = Off.
Description	Low Speed Switch Point is the point at which the unit will switch from high speed operation to low speed operation on temperature pull down. This is true on initial startup as well as a startup from Cycle Sentry Null. This feature is not available if High Speed Pull Down = On. If High Speed Cool to Low Speed Cool Switch Point is set above 3.4°F (1.9°C), the Null Restart Above Setpoint feature will be changed automatically. It must be at least 1.5°F (0.8°C) above the setting of High Speed Cool to Low Speed Cool Switch Point. This feature is not used during modulation operation.

Continuous Fuel Saver II

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Off or On
Factory Set	On
Exceptions	Not active if modulation is enabled
Description	This feature allows Fuel Saver II for the selected range to be turned On or Off. If Fuel Saver II is On, and the box temperature changes a predetermined amount from setpoint in Cycle Sentry mode operation, or temperature indicates a need for high speed in Continuous mode operation, the unit will first run in low speed. An 8-minute timer is started and the control sensor air temperature is monitored. As long as the temperature falls (in cool mode operation) or rises (in heat mode operation) a specified amount before the timer expires, the 8-minute timer is reset and low speed operation continues. If the temperature has not changed the pre-determined amount when the timer times out, high speed operation resumes, if allowed. This provides fuel savings by delaying high speed operation. If the unit switches to high speed from FS-II the unit will run in high speed until setpoint is reached. If Fuel Saver II is turned Off there is still a two-minute delay on initial startup before high speed operation is allowed. If OFF high speed cool and high speed heat is allowed with no delay.

Continuous Low Speed Heat to Low Speed Cool Switch Point

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	0.5°F (0.3°C) to 2.0°F (1.1°C)
Factory Set	1.7°F (0.9°C)
Exceptions	This feature may not be available with all profiles.
Description	This feature controls the switch point at which the unit shifts from Low Speed Heat to Low Speed Cool.

Continuous Low Speed Cool to Low Speed Cool FS II Switch Point

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	3.5°F (1.9°C) to 10.0°F (5.6°C)
Factory Set	5.0°F (2.8°C)
Exceptions	Not active if modulation is enabled. This feature may not be available with all profiles.
Description	The Low Speed Cool to Low Speed Cool FS II Switch Point is the Low Speed Cool to High Speed Cool Switch Point + 1.5°F. If enabled, then the Low Speed Cool FS II to High Speed Cool Switch Point will always be the Low Speed Cool to Low Speed Cool FS II Switch Point + 3.5°F.

Door Switch Option

Description	This feature is the same as Door Open Forces shown under Programmable Features. See full description on page 3-35.

Door Open Timer

Description	This feature is the same as Door Open Timeout shown under Programmable Features. See full description on page 3-36.

Continuous Minimum Discharge Air Mode

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Off or On
Factory Set	Off
Exceptions	Only appears if Cycle Sentry Door Open Forces = Off.
Description	If set On, this feature limits the temperature of the discharge air to prevent top freeze on units without an Electronic Throttling Valve (ETV). This feature can impact the unit's ability to reach setpoint. If set Off, then standard return air control is used.

Continuous Minimum Discharge Temperature

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	27.0°F (-3.0°C to 37°F (3.0°C)
Factory Set	32.0°F (0.0°C)
Exceptions	Only appears if Continuous Minimum Discharge Air Mode feature is set = Off.
Description	This feature determines the minimum discharge air temperature that will be allowed if the Minimum Discharge Air Mode feature (above) is set On.

OPTISET PLUS CONTINUOUS MODULATION MODE FEATURES

The software features shown below are used to custom tailor temperature profiles using OptiSet Plus software. These software features are accessible only in OptiSet Plus software. They are not available in the Guarded Access Menu. They are shown here for convenience only. When shipped from the factory the features will be set as shown by Factory Set.

Controlling Sensor

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Return or Discharge
Factory Set	Return
Exceptions	

Description Modulation provides very smooth and steady temperature control. Modulation is only operational in Continuous Mode.

This feature determines the controlling sensor used during modulation operation, either the Return Air Temperature Sensor or Discharge Air Temperature Sensor.

During Return Air Modulation, the discharge air temperature is limited to the programmed floor limit. The floor limit is equal to setpoint minus the setting of the FreshSet Floor Limit feature. This provides additional protection from freezing for sensitive loads.

During Discharge Air Modulation, the discharge air temperature is controlled to the setpoint.

PMAX Modulation Pull Down Option

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	On or Off
Factory Set	On
Exceptions	Only appears if Controlling Sensor = Return.

Description This feature determines the modulation pull down control algorithm used. This feature is only available with return air temperature control. The floor limit algorithm is always used with discharge air control.

If PMAX is set On, modulation pull down control is governed by the 300°F*Minute (160°C*Minute) algorithm. During pull down, the unit is in full cool and the discharge air temperature is allowed to drop below the programmed floor limit for a defined period of time. This option provides the fastest pull down while minimizing the potential for product top freezing.

MAX pull down example: If the discharge air is 15°F (8°C) below setpoint the unit will operate in full cool for 20 minutes before entering modulation cool.
e.g. 15°F x 20 minutes = 300°F*Minutes (8°C x 20 minutes = 160°C*Minutes)

If PMAX is set Off, modulation pull down control is governed by the Floor Limit pull down algorithm. During Floor Limit pull down the unit will operate in high speed but will control the discharge air temperature to the programmed Floor Limit. After the pull down conditions are satisfied the unit will switch to low speed modulation. This option provides a fast pull down while eliminating the potential for product top freezing with fragile commodities.

Floor Limit

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	1.0°F (0.5°C) to 6.0°F (3.5°C)
Factory Set	**4.0°F (2.8°C)**
Exceptions	Only appears if Controlling Sensor = Return.
Description	This feature allows the minimum discharge air temperature during return air modulation to be programmed. The discharge air temperature is limited to the programmed limit to provide additional protection from freezing for sensitive loads. For example, with a 35°F (1.7°C) setpoint and a 2.5°F (1.4°C) Floor Limit, the discharge air temperature is limited to 32.5°F (0.3°C). The minimum discharge air temperature is controlled to 29°F (-1.5°C) regardless of the programmed floor limit with setpoints of 30°F (-1.1°C) and higher.

High Speed Modulation

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Off or On
Factory Set	On
Exceptions	Only appears if Modulation Control = On.

Description This feature turns High Speed Modulation on or off. High Speed Modulation provides precise modulation control with increased air-flow and capacity under high cooling load conditions. Air flow is increased by operating the unit in high speed. The increased air flow reduces the rise in the return air temperature above setpoint under high cooling load conditions. The discharge air temperature is controlled to the programmed floor limit during high speed operation.

If this feature is On the unit will automatically enter high speed operation under high load conditions. The unit will automatically switch back to low speed operation when conditions allow. High speed operation only occurs when necessary to minimize fuel consumption and high speed operating hours.

High Speed Modulation Ceiling

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	1.0°F (1.0°C) to 10.1°F (5.5°C)
Factory Set	2.0°F (1.1°C)
Exceptions	Only appears if High Speed Modulation = On.

Description This switch point determines the number of degrees above setpoint the temperature must rise before high speed modulation is allowed. A lower setting will result in tighter control to setpoint but increases high speed operation time. A higher setting will result in looser temperature control but reduces high speed operation time for additional fuel savings.

When the temperature rises to the Modulation Ceiling + 2°F (-17°C) the unit will run in high speed modulation until the temperature falls back to the Modulation Ceiling.

For example, if the setpoint is 35°F (1.7°) and the High Speed Modulation Ceiling is 3°F (1.7°C), the Modulation Ceiling is 38°F (3.4°C). If the temperature reaches 40°F (4.4°C) as determined by a Modulation Ceiling of 38°F (3.4°C) + 2°F (1.0°C), the unit will switch to high speed modulation. The unit will run in high speed modulation until the Modulation Ceiling of 38°F (3.4°C) is reached. The unit will then switch back to low speed modulation.

Low Ambient Temperature Override

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	OFF, 5°F to 35°F in 5°F Increments (-15°C to 1.7°C in 3°C Increments)
Factory Set	OFF
Exceptions	This is a trailer only feature.

Description If a temperature is selected and the ambient temperature is below the selected value, the unit will run in high speed modulation for 100 minutes. This ensures adequate air flow throughout the trailer to prevent hot or cold spots and provide more even temperature control. As a result, longer periods of high speed operation may be observed. This is normal operation when the feature is enabled.

If the feature is set OFF there is no change in unit operation.

High Ambient Temperature Override

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	OFF, 85°F to 115°F in 5°F Increments (29°C to 46°C in 3°C Increments)
Factory Set	OFF
Exceptions	This is a trailer only feature.
Description	If a temperature is selected and the ambient temperature is above the selected value, the unit will run in high speed modulation for 100 minutes. This ensures adequate air flow throughout the trailer to prevent hot or cold spots and provide more even temperature control. As a result, longer periods of high speed operation may be observed. This is normal operation when the feature is enabled. If the feature is set OFF there is no change in unit operation.

Door Switch Option

Description	This feature is the same as Door Open Forces shown under Programmable Features. See full description on page 3-35.

Door Open Timer

Description	This feature is the same as Door Open Timeout shown under Programmable Features. See full description on page 3-36.

OPTISET PLUS CYCLE SENTRY MODE FEATURES

The software features shown below are used to custom tailor temperature profiles using OptiSet Plus software. These software features are accessible only in OptiSet Plus software. They are not available in the Guarded Access Menu. They are shown here for convenience only. When shipped from the factory the features will be set as shown by Factory Set.

Cycle Sentry High Speed Pulldown

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Off or On
Factory Set	On
Exceptions	

Description This feature allows High Speed Pull Down for the selected range to be turned On or Off. If High Speed Pull Down is turned On, the unit will run in high speed on initial start until setpoint is reached in both cool and heat mode. If High Speed Pull Down is turned Off, the unit will switch to low speed cool when the return air temperature is below the programmed low speed switch point value, plus setpoint.

There is a two minute delay on initial startup before high speed operation is allowed.

If Fuel Saver II is turned On, there may be a delay before high speed operation is allowed.

This feature does not apply to modulation operation.

Cycle Sentry Low Speed Switch Point

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	3.4°F to 10.1°F
Factory Set	3.4°F
Exceptions	Only appears if High Speed Pulldown = Off.
Description	Low Speed Switch Point is the point at which the unit will switch from high speed operation to low speed operation on temperature pull down. This is true on initial startup as well as a startup from Cycle Sentry Null. This feature is not available if High Speed Pull Down = On. If High Speed Cool to Low Speed Cool Switch Point is set above 3.4°F, the Null Restart Above Setpoint feature will be changed automatically. It must be at least 1.5°F above the setting of High Speed Cool to Low Speed Cool Switch Point.

Cycle Sentry Fuel Saver II

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Off or On
Factory Set	On
Exceptions	

Description This feature allows Fuel Saver II for the selected range to be turned On or Off.

If Fuel Saver II is On, and the box temperature changes a predetermined amount from setpoint in Cycle Sentry mode operation, or temperature indicates a need for high speed in Continuous mode operation, the unit will first run in low speed. An 8-minute timer is started and the control sensor air temperature is monitored. As long as the temperature falls (in cool mode operation) or rises (in heat mode operation) a specified amount before the timer expires, the 8-minute timer is reset and low speed operation continues. If the temperature has not changed the pre-determined amount when the timer expires, then high speed operation is resumed if allowed. This provides fuel savings by delaying high speed operation.

If the unit switches to high speed from FS-II the unit will run in high speed until setpoint is reached.

If Fuel Saver II is turned Off, there is still a two-minute delay on initial startup before high speed operation is allowed. If set to OFF, high speed cool and high speed heat are allowed with no delay.

Cycle Sentry Null Restart Temperature

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	5.0°F to 15.0°F
Factory Set	5.0°F
Exceptions	

Description This feature determines the number of degrees above setpoint that the temperature can rise before the unit restarts in Cycle Sentry Mode. The range of values available is determined by the setting of High Speed Pull Down. If Low Speed Switch Point is set above 3.5°F (1.9°C), the Null Restart Temperature feature will be changed automatically. It must be at least 1.5°F (0.8°C) above the setting of High Speed Cool to Low Speed Cool Switch Point.

With frozen range setpoints, the maximum restart limit can be no greater than 29°F (-1.6°C). This prevents melt damage with frozen cargo.

The Null Restart Temperature below setpoint is a fixed value and cannot be changed.

Door Switch Option

Description This feature is the same as Door Open Forces shown under Programmable Features. See full description on page 3-35.

Door Open Timer

Description This feature is the same as Door Open Timeout shown under Programmable Features. See full description on page 3-36.

OPTISET PLUS CYCLE SENTRY MODULATION MODE FEATURES

The software features shown below are used to custom tailor temperature profiles using OptiSet Plus software. These software features are accessible only in OptiSet Plus software. They are not available in the Guarded Access Menu. They are shown here for convenience only.

IMPORTANT: Cycle Sentry Modulation is used at the customer's discretion and is set up using a customer designed named or numeric Temperature Profile in OptiSet Plus.

Cycle Sentry Modulation offers a compromise between fuel savings and temperature control when used with fresh commodities with specific characteristics.

Some fresh commodities with the following characteristics may be candidates for Cycle Sentry Modulation.

- ✓ Fresh commodities with low heat of respiration
- ✓ Fresh commodities that do not ripen after harvest
- ✓ Fresh commodities that do not require continuous airflow

If Cycle Sentry Modulation is enabled the following features can be tailored to the particular commodity:

MNTL Maximum Null Timer

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Off, 20 Minutes, 40 Minutes, 60 Minutes, 80 Minutes
Factory Set	None
Exceptions	This feature is only available as a custom Temperature Profile created using OptiSet Plus.
Description	This feature allows Maximum Null Time Limit [MNTL] for the selected range to be set for 20, 40, 60 or 80 minutes or turned off. If Maximum Null Time Limit is turned off normal Cycle Sentry operation will occur. If a Maximum Null Time Limit is set (20, 40, 60 or 80 minutes) the unit will restart after the set time period to provide air circulation even if cooling or heating is not required.

MOTL Minimum Off Timer

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Off, 15 Minutes, 30 Minutes, 45 minutes
Factory Set	None
Exceptions	This feature is only available as a custom Temperature Profile created using OptiSet Plus.
Description	This screen allows Minimum Off Time Limit [MOTL] for the selected range to be set for 15, 30 or 45 minutes or turned off. If Minimum Off Time Limit is turned off normal Cycle Sentry operation will occur. If a Minimum Off Time Limit is set (15, 30 or 45 minutes) the unit will remain off for the set time period even if cooling or heating is required. The time limit will be ignored if temperature varies an excessive amount above or below setpoint.

Null Restart Temperature

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	3.0°F to 15.0°F by 0.1°F Increments
Factory Set	None
Exceptions	This feature is only available as a custom Temperature Profile created using OptiSet Plus.
Description	This feature determines the number of degrees above setpoint that the temperature can rise before the unit restarts in Cycle Sentry Mode.

Floor Limit

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	5.9°F to 15.0°F by 0.1°F Increments
Factory Set	None
Exceptions	This feature is only available as a custom Temperature Profile created using OptiSet Plus.
Description	This feature allows the minimum discharge air temperature during modulation to be programmed. The discharge air temperature will not fall below the programmed limit to provide additional protection from freezing for chill sensitive loads.

Door Switch Option

Description This feature is the same as Door Open Forces shown under Programmable Features. See full description on page 3-35.

Door Open Timer

Description This feature is the same as Door Open Timeout shown under Programmable Features. See full description on page 3-36.

Minimum Run Time

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	5 to 60 Minutes in 5 minute Increments
Factory Set	None
Exceptions	This feature is only available as a custom Temperature Profile created using OptiSet Plus.
Description	This feature determines the minimum amount of time the unit will run after a Cycle Sentry Modulation restart. It is used to provide adequate air circulation in the trailer.

SENSOR CONFIGURATION MENU – CARGOWATCH DATALOGGER

The CargoWatch Datalogger is internal to the HMI Control Panel. This datalogger conforms to European standard EN12830. The data logger supports up to 6 temperature sensors and 3 digital inputs. These sensors are optional sensors and are not the same as the temperature sensors used to control the unit. The CargoWatch Data Logger features the ability to customize logging parameters and enable product temperature checking. Note that the CargoWatch Data Logger does not record unit sensors. Unit sensors and other unit operating data are recorded by the ServiceWatch Data Logger. The CargoWatch logger records the unit setpoint, operating mode, and shutdown alarms.

When shipped from the factory, CargoWatch sensors 1 and 2 are turned on to be logged and CargoWatch sensors 3 through 6 are turned off. Also, digital input 1 is turned on to be logged and digital inputs 2 through 4 are turned off. Sensors and digital inputs can be turned on, off and configured using the CargoWatch menu in Guarded Access or with Wintrac.

Sensor Configuration Menu (CargoWatch)

Logging Interval (15 Minutes)
Log Sensor 1(On)
- Independant Sensor #1 Name (Log Sensor 1)
- Out of Range Checking (Off)
  - Low (-10.8°F)
  - High (10.8°F)
- Italian Option (Sensor 1 only) (Off)
- Sensor Averaging (Off)

Log Sensor 2 (On)
- Independant Sensor #1 Name (Log Sensor 2)
- Out of Range Checking (Off)
  - Low (-10.8°F)
  - High (10.8°F)
- Sensor Averaging (Off)

Log Sensor 3 (Off)
- Same features as Sensor 2 if On

Log Sensor 4 (Off)
- Same features as Sensor 2 if On

Log Sensor 5 (Off)
- Same features as Sensor 2 if On

Log Sensor 6 (Off)
- Same features as Sensor 2 if On

Digital In 1 (On)
- Door Open Logging (On)
- Digital Input #1 Name (Digital Input #1)

Digital In 2 (Off)
- Same features as Digital Input 1 if On

Digital In 3 (Off)
- Same features as Digital Input 1 if On

Countdown (Off)
Conservative (Off)

CargoWatch Sensor Programming

Logging Interval

Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	1 minute, 2 minutes and 5 to 60 minutes in 5-minute intervals
Factory Set	15 Minutes
Exceptions	Wintrac is capable of setting additional intervals as short as 1 minute.
Description	This feature allows the desired logging interval to be set for all sensors and digital inputs that are turned On.

Log Sensor for CargoWatch sensor 1, 2, 3, 4, 5 or 6

Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	ON or OFF
Factory Set	Sensors 1-2 ON, sensors 3-6 OFF
Exceptions	
Description	This feature allows the desired sensors to be turned On to be logged. If the sensor is turned on then additional features may be selected for that sensor.

Independent Sensor Name for CargoWatch sensor 1, 2, 3, 4, 5 or 6

Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	See table below
Factory Set	Log Sensor 1 through 6
Exceptions	
Description	This feature allows the desired sensor name to be specified. These names appear only on handheld printer reports. This aids in reading and understanding data logger printer reports.

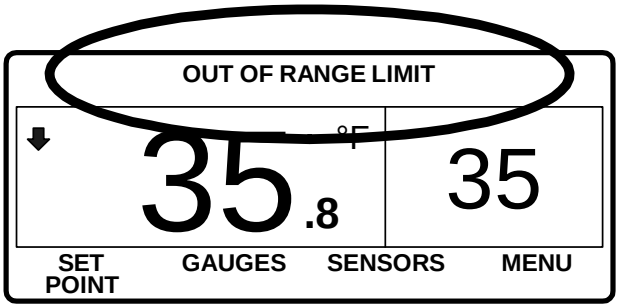
~ choices shown on next page ~

Choices

- Log Sensor 1, 2, 3, 4, 5 or 6
- Spare Ambient
- Ambient
- Spare Dry
- Spare Chilled
- Spare Frozen
- Spare Fresh
- Dry
- Chilled
- Fresh
- Spare Left Side
- Spare Right Side
- Spare Side
- Spare Rear
- Spare Front
- Left Side
- Right Side
- Side
- Rear
- Front
- Other Spare
- Other
- Spare
- Spare USDA 1, 2 or 3
- USDA 1, 2 or 3
- Other Spare Discharge Air
- Spare Discharge Air Zone 1, 2 or 3
- Spare Discharge Air
- Other Spare Return Air
- Spare Return Air Zone 1, 2 or 3
- Spare Return Air
- Other Discharge Air
- Discharge Air Zone 1, 2 or 3
- Discharge Air
- Other Return Air
- Return Air Zone 1, 2 or 3
- Return Air
- Frozen
- Independent Sensor 1, 2, 3, 4, 5 or 6

Out of Range Checking (for current sensor)

Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	ON or OFF
Factory Set	ON
Exceptions	
Description	This feature allows the Out of Range Checking feature to be turned on or off. If Out of Range Checking is turned on, an alarm will be set if the temperature, as sensed by the specified sensor, is above or below setpoint by more than the number of degrees determined by the setting of LOW and HIGH programmable features. The out of range condition must exist for 1 hour before the alarm is set. A visual notification will be provided to the driver on the standard display, as shown below.



Low

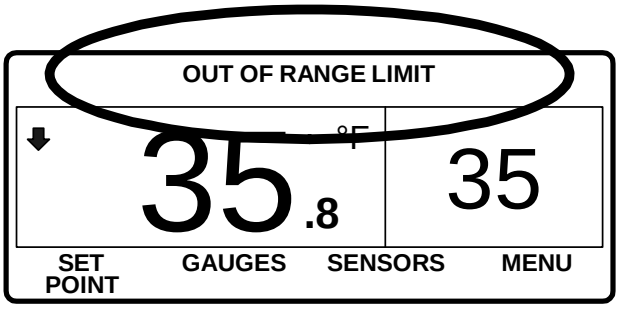
Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	From -1.0° to –20.0° in 0.1-degree increments, in either Fahrenheit or Celsius.
Factory Set	–10.8°F (-6.0°C)
Exceptions	
Description	This feature allows the low limit for Out of Range Checking to be set.

High

Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	From 1.0° to 20.0° in 0.1-degree increments, in either Fahrenheit or Celsius.
Factory Set	10.8°F (6.0°C)
Exceptions	
Description	This feature allows the high limit for Out of Range Checking to be set.

Italian Option

Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	ON or OFF
Factory Set	OFF
Exceptions	This feature is available with Sensor 1 only.
Description	If this feature is turned ON, the driver is presented a visual “Out of Range Limit” notification and flashes the backlight if the box temperature rises above -15°C. The visual notification appears on the Standard Display as shown below.



Sensor Averaging

Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	ON or OFF
Factory Set	OFF
Exceptions	

Description If this feature is turned OFF, the temperature logged will be the actual instantaneous sensor reading at the time of log. If this feature is turned ON, the sensor is read once each minute. The sensor readings are averaged dependant on the setting of the Logging Interval feature selected above.

For example, if the Logging Interval is 15 minutes the previous 15 sensor readings are averaged and logged instead of the actual instantaneous value. If the Logging Interval is set for 10 minutes, the previous 10 sensor readings are averaged and logged.

Digital Input Programming

The digital inputs are used to log the door switch status.

Digital In for CargoWatch digital input 1, 2 or 3

Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	Digital Input 1, 2, 3 or 4
Factory Set	
Exceptions	
Description	This feature allows the digital input to be programmed to be selected.

Door Open Logging

Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	ON or OFF
Factory Set	Input 1 ON, inputs 2-4 OFF
Exceptions	
Description	This feature allows the desired digital inputs to be logged or ignored.

Digital Input Name for CargoWatch digital input 1, 2, 3 or 4

Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	See table below
Factory Set	Digital Input 1 through 4
Exceptions	
Description	This feature allows the desired input name to be specified. This aids in reading and understanding data logger downloads.

Choices

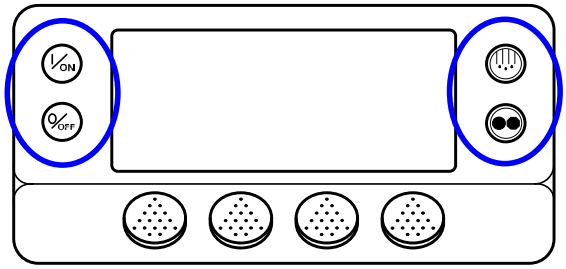
- Digital Input 1, 2, 3 or 4
- Door
- Other Door
- Main Door
- Back Door
- Front Door
- Side Door
- Left Door
- Right Door
- Other Back Door
- Other Front Door
- Other Side Door
- Other Left Door
- Other Right Door
- Fresh Door
- Other Fresh Door
- Frozen Door
- Other Frozen Door
- Chilled Door
- Other Chilled Door
- Dry Door
- Other Dry Door

Countdown Timer

Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	OFF, 1 – 96 Hours
Factory Set	OFF
Exceptions	The Countdown Timer only affects the CargoWatch Data Logger.

Description The Countdown Mode feature will keep the HMI Control Panel powered up for a user specified time period after the unit is turned off. Under these conditions the display and backlight are turned off to conserve unit battery power.

IMPORTANT: The four Hard Keys will remain illuminated when the unit is in Countdown. This is normal operation.



The CargoWatch data logger will continue to record data according to the current CargoWatch interval settings until the user specified time period expires. This allows data to be recorded during an interval where the unit is turned off.

The programmable time intervals are from 1 Hour to 96 Hours. The default setting for Countdown Mode is OFF.

Conservative Log Count

Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	OFF, 1 – 400 Logs
Factory Set	OFF
Exceptions	The Countdown Timer only affects the CargoWatch Data Logger.
Description	The Conservative Mode can be utilized by the user after the Countdown Mode interval above has expired. When the Countdown Mode has expired, Conservative Mode (if programmed) allows the HMI Control Panel to be temporarily powered up according to the current CargoWatch interval settings to log an additional number of CargoWatch data logs. The HMI Control Panel will be powered up for approximately 30 seconds to perform each data log, and will then turn off. The possible number of additional Conservative Mode CargoWatch data logs is from 1 Log to 400 Logs. The default setting for Conservative Mode is OFF.

SOT on Setpoint

Micro Rev	D000 and later
HMI Rev	6550 and later
Choices	Disabled, Enabled
Factory Set	Disabled
Exceptions	
Description	If this feature is set ENABLED, a Start of Trip is sent to the ServiceWatch and CargoWatch Data Loggers after any setpoint change. If this feature is set DISABLED, a Start of Trip is not sent.

UNIT CONFIGURATION SETUP MENU

The Unit Setup Menu is used to specify the actual unit configuration. These features are set at the factory as required for each unit. The factory settings shown below are for a replacement base controller.

Alarm Code 111 Unit Not Configured Correctly

If the base controller detects a mismatch between unit connections and configuration selections, Alarm Code 111 Unit Not Configured Correctly will be set.

Unit Type

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	TRUCK or TRAILER
Factory Set	To match unit as built. A Base Controller Cold Start will default this feature to Trailer.
Exceptions	If this feature is changed, it is necessary to exit the Guarded Access Menu after making the change. This will reset the unit to the new setting. Failure to do so will result in the wrong selections to be present in other Guarded Access Menu settings. For example, if the feature was set TRAILER and changed to TRUCK, the reset changes the trailer default settings to truck default settings.
Description	This feature allows the unit type to be selected.

Engine Type

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Yanmar 2.1
Factory Set	Yanmar 2.1
Exceptions	
Description	This feature allows the engine type to be selected.

Compressor Type

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	Recip or Screw
Factory Set	Reciprocating
Exceptions	
Description	This feature allows the compressor type to be selected. The screw option is for a future implementation and should not be selected.

ETV Configured

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	YES or NO
Factory Set	To match unit as built. A base controller cold start will default this feature to YES.
Exceptions	
Description	This feature allows the unit to be configured with an Electronic Throttling Valve (ETV). Units with an Electronic Throttling Valve should be set YES. All other units should be set NO.

Electric Standby Equipped?

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	YES or NO
Factory Set	To match unit as built. A base controller cold start will default this feature to YES.
Exceptions	This setting will automatically be forced from “NO” to “YES” if the unit detects that electric supply power is connected to the unit.
Description	This feature specifies if the unit is equipped with optional electric standby. If the unit is equipped with electric standby, this feature should be set YES. If the unit is not equipped with electric standby, this feature should be set NO.

Electric Heat Option

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	YES or NO
Factory Set	To match unit as built. A base controller cold start will default this feature to YES.
Exceptions	
Description	This feature specifies if the unit is equipped with the electric heat option. If the unit is equipped with electric heat, this feature should be set YES. If the unit is not equipped with electric heat, this feature should be set NO. On multi-temp applications electric heat is applicable to Zone 1 host evaporators only.

Electric Motor Type

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	14 HP or optional 24 HP
Factory Set	As built
Exceptions	
Description	This feature specifies which motor is used on units equipped with the Electric Standby option. A 14 HP motor is standard on units equipped with the Electric Standby option. The 24 HP motor is an available option.

Diesel to Electric Auto Switch Enabled?

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	YES or NO
Factory Set	NO
Exceptions	
Description	This feature allows the Auto Switch from Diesel to Electric to be enabled or disabled. If this feature is set YES, the unit will switch automatically to electric mode when standby power is connected. If the feature is set NO, the operator must manually switch the unit to electric mode using the HMI Control Panel mode menu.

Electric to Diesel Auto Switch Enabled?

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	YES or NO
Factory Set	NO
Exceptions	
Description	This feature allows the Auto Switch from Electric to Diesel to be enabled or disabled. If this feature is set YES, the unit will switch automatically to diesel mode when standby power is disconnected or fails. If the feature is set NO, the operator must manually switch the unit to diesel mode using the HMI Control Panel mode menu. **NOTE:** Auto-switch from electric to diesel is not recommended when the unit is running in electric mode indoors or when below deck on a ferry.

Unit Model

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	SB, Super II, SL-400, SLX-100, SLX-200, SLX-300, SLX-400, SLX-LDB.
Factory Set	To match unit as built. A base controller cold start will default this feature to SB.
Exceptions	
Description	Set for the appropriate unit.

High Capacity Unit?

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	YES or NO
Factory Set	To match unit as built. A base controller cold start will default this feature to NO.
Exceptions	
Description	If the unit was built as a high capacity unit with an engine designed for 2600 RPM high speed operation this setting should be set to YES. If the unit was not built as a high capacity unit then high speed is 2200 RPM and this setting must be set to NO. **IMPORTANT: Improper setting of this feature will cause Alarm Code 33 Check Engine RPM to be set during a Pretrip Test.**

High Capacity Fresh?

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	YES or NO
Factory Set	NO
Exceptions	Available only if the high capacity option is selected.
Description	If the unit was built as a high capacity unit, the unit may be changed from the factory setting of NO (1450 RPM) to YES (1720 RPM). This feature should be set to YES if the customer wants to allow the engine to run at 1720 RPM in low speed. This provides additional airflow when necessary. If this feature is set NO the engine will run at 1450 RPM in low speed.

Defrost Motor Equipped?

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	YES or NO
Factory Set	To match unit as built. A base controller cold start will default this feature to NO.
Exceptions	
Description	This feature specifies if the unit is equipped with a defrost solenoid or defrost motor. If the unit is equipped with a defrost motor this feature should be set YES. If the unit is not equipped with a defrost motor this feature should be set NO. If OptiSet Plus is active this feature is set using OptiSet Plus 4.1 or later. **NOTE:** All SL and SLX units are equipped with defrost motors and this feature must be set YES. **NOTE:** A different SR-3 Base Controller is required for units equipped with a damper gear motor. The damper gear motor SR-3 Base Controller has added electronic circuitry to drive the gear motor. See Section 7 for more details and parts numbers.

Fuel Sensor Type

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	NONE, SOLID STATE, FLOAT or SWITCH
Factory Set	NONE
Exceptions	
Description	This feature is used to select the type of fuel level sensor installed. If no fuel level sensor is installed, this feature should be set to NONE.

Rear Remote Control Panel

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	NONE, COM 2
Factory Set	NONE
Exceptions	
Description	This feature specifies if the unit is equipped with the optional flush mount Rear Remote Control Panel. If the unit is equipped with the flush mount Rear Remote Control Panel this feature should be set to COM 2 and the flush mount Rear Remote Control Panel should be connected to the COM2 port on the interface board. If the unit is not equipped with a flush mount Rear Remote Control Panel, this feature should be set NONE. See Section 4 of this manual for more information on using the Rear Remote Control Panel.

Rear Remote Control Panel Action

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	STAND BY, RUN
Factory Set	STAND BY
Exceptions	Only appears if Rear Remote Control Panel is set for COM 2

Description If the Action is set to STAND BY, the unit will power up when the Rear Remote Control Panel ON key is pressed. The setpoints can be changed from the Rear Remote Control Panel but the unit will not start and run. The unit must be started from the HMI Control Panel on the unit. Pressing the Rear Remote Control Panel OFF key will power down the control system. All Rear Remote Control Panel functions are present except the engine will not start and a Manual Defrost Cycle or Pretrip Test cannot be initiated.

If the Action is set to RUN the unit will automatically start and run when the Rear Remote Control Panel ON key is pressed. Pressing the Rear Remote Control Panel OFF key will power down the control system. All Rear Remote Control Panel functions are present.

See Section 4 of this manual for more information on using the Rear Remote Control Panel.

Pretrip/Sleep Switch Options

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	DISABLE, PRETRIP, SLEEP
Factory Set	DISABLE
Exceptions	
Description	This feature is used to allow an optional Sleep or Pretrip switch to be connected to the controller. A momentary contact switch is connected from chassis ground to the Controller Sensor Connecter J7 pin 30. This feature determines the action resulting when this input is temporarily connected to chassis ground. DISABLE results in no action. If a switch is not connected this feature should be set to Disable. PRETRIP will start a Pretrip Test in the same manner as starting the test from the Main/Mode menu. SLEEP will place the unit in Sleep Mode in the same manner as entering Sleep Mode from the Main/Pretrip menu.

3rd Party Device Control

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	NONE, COM 1, COM 2
Factory Set	NONE
Exceptions	
Description	This feature selects the communications port on the SR-3 Base Controller/Interface Board that will be used by a third party control device such as satellite communications. If the unit is not equipped with a third party device, this feature should be set NONE.

Low Fuel Shutdown

Control Rev	D000 and later
HMI Rev	6550 and later
Choices	ENABLED, DISABLED
Factory Set	DISABLED
Exceptions	A float or solid state fuel level sensor must be installed and enabled from the Guarded Access / Unit Configuration / Fuel Sensor Type menu. This feature is not available if the Rail Option feature is enabled.
Description	Low Fuel Shutdown allows the low fuel shutdown feature to be enabled or disabled. If Low Fuel Shutdown is set ENABLED then Alarm Code 44 Out of Fuel will be set as a shutdown alarm if the fuel level falls below 5% of tank capacity. When the fuel tank is filled to more than 15% of tank capacity then Alarm Code 44 Out of Fuel is automatically cleared. **IMPORTANT:** If an Alarm Code 44 Out of Fuel Shutdown Alarm is manually cleared it is reset as a Check Alarm. The unit can now be restarted but will continue to run until the fuel supply is exhausted. If Low Fuel Shutdown is set DISABLED then no Out of Fuel alarm will be set and the unit will run until the fuel supply is exhausted.

Fresh Air Exchange

Control Rev	D006 Only – see Exceptions below
HMI Rev	6561 Only – see Exceptions below
Choices	ENABLED, DISABLED
Factory Set	DISABLED

Exceptions Guarded Access > Unit Configuration > Unit Type must be set for Trailer. The Fresh Air Exchange Feature must be installed on the unit.

Software Revisions: As of this date, Revision D006 Base Controller Software and Revision 6561 HMI Control Panel are required for the Fresh Air Exchange feature and will be installed only in SR-3 SB units equipped with the Fresh Air Exchange option. Revision D006 Base Controller Software is a direct descendent of Revision D007 Base Controller Software and has all the same features as Revision D007 Software.

Description The Fresh Air Exchange option allows fresh outside air to be drawn into the trailer and the interior air to be exhausted by opening the Fresh Air Exchange doors. This feature is beneficial when hauling loads that release gas as they ripen, such as potatoes. The Fresh Air Exchange feature should be used exactly as specified by the customer.

The Fresh Air Exchange feature is only available with setpoints above 32°F (0°C). The feature is disabled with setpoints of 32°F (0°C) and below.

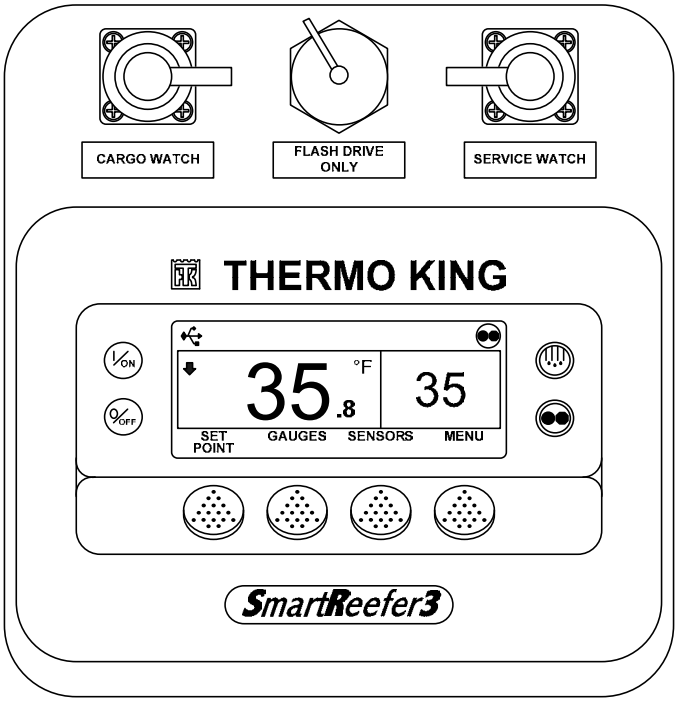
A solenoid is used to open and close the Fresh Air Exchange Door. Note that the Fresh Air Exchange door will only be open when the unit engine is running, as it is held in the open position by the Fresh Air Exchange Solenoid. The door will close when the engine shuts down to preserve unit battery life. The setting of the Fresh Air Exchange door will survive power off / power on cycles – if the door is set to “Open” by the operator it will continue to open any time the engine is running until it is set to “Close” by the operator.

If Fresh Air Exchange is set ENABLED then the Fresh Air Exchange Open | Close feature will be shown in the Mode Menu. If Fresh Air Exchange is set DISABLED then the Fresh Air Exchange Open | Close feature will not appear in the Mode Menu.

TABLE OF CONTENTS SECTION 4

HMI CONTROL PANEL FEATURES

The HMI (Human/Machine Interface) Control Panel is connected to the Base Controller and is used to operate the unit and display unit information. The HMI Control Panel communicates with the Base Controller via a controller area network (CAN) bus. The HMI Control Panel also contains the 'Cargo Watch®' data logger. The HMI Control Panel is located on the control box door.



SR-3 SB Unit Control Panel

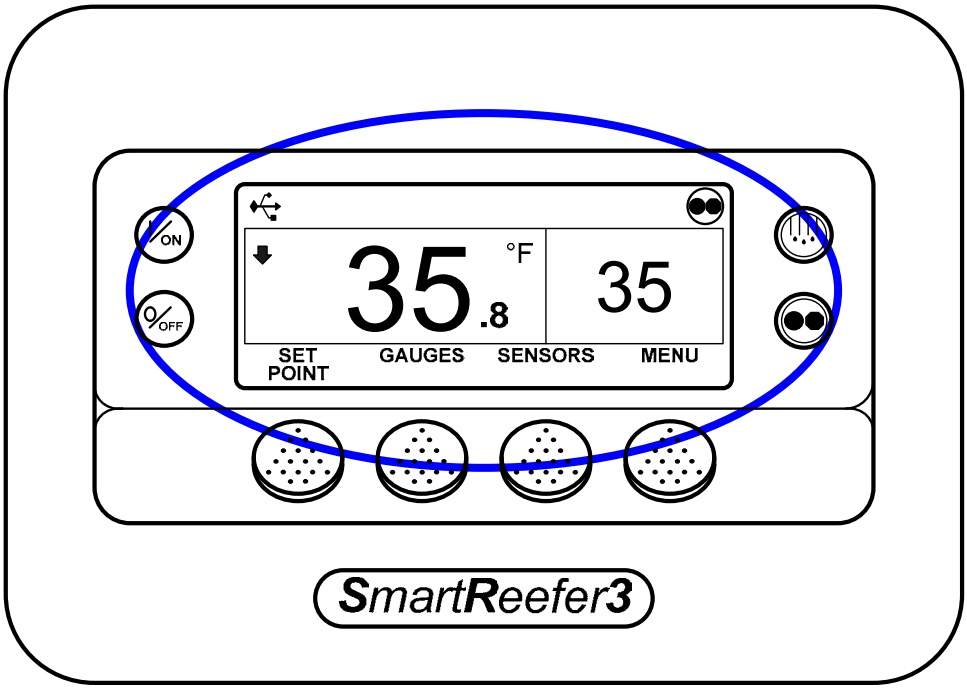
The HMI Control Panel consists of a display and 8 touch-sensitive keys.

The display is capable of showing both text and graphics.

The keys on the left and right sides of the display are dedicated or single function keys.

The four keys under the display are termed "soft" keys. The functions of these keys change depending on the operation being performed. If a soft key is active the current key function is shown in the display directly above the key.

Display



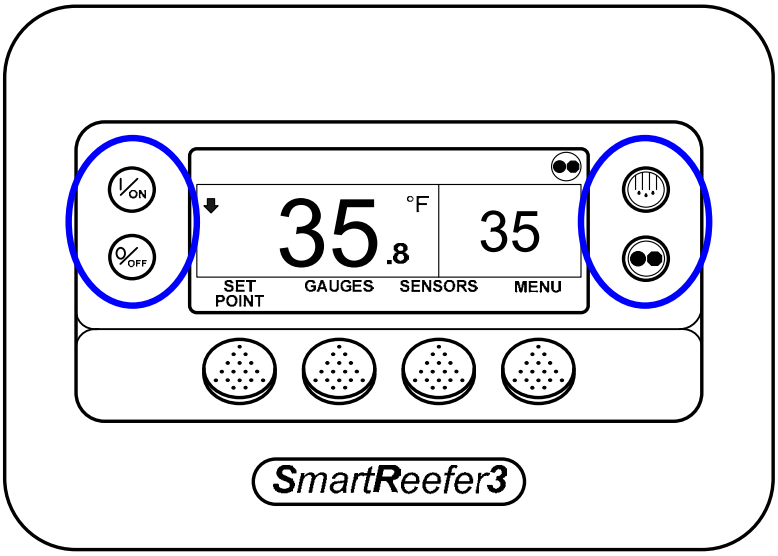
The display is used to present information to the operator. This information includes setpoint and temperature, unit operating information, gauge readings, temperatures and other information as selected by the operator.

The Standard Display of box temperature and setpoint is shown here. The unit is running in Cycle Sentry Mode as shown by the Cycle Sentry Icon in the upper right corner of the display. If the Cycle Sentry icon is not present, the unit is running in Continuous Mode. The unit has a setpoint of 35°F, and an actual box temperature of 35.8°F. The down-pointing arrow shows the unit is cooling.

The USB Icon in the upper left corner of the display indicates that a USB Flash Drive is inserted in the USB Port on the Unit Control Panel.

The four keys under the display are termed “soft” keys. The functions of these keys change depending on the operation being performed. The function of each soft key is shown in the display directly above the key. In the example shown above, pressing the left soft key accesses the SETPOINT and pressing the right soft key accesses the MAIN MENU. The other two soft keys access the GAUGES and SENSORS menus as shown in the display.

Keys



Hard Keys

The keys on either side of the display are dedicated or “hard” keys. Their function always remains the same.

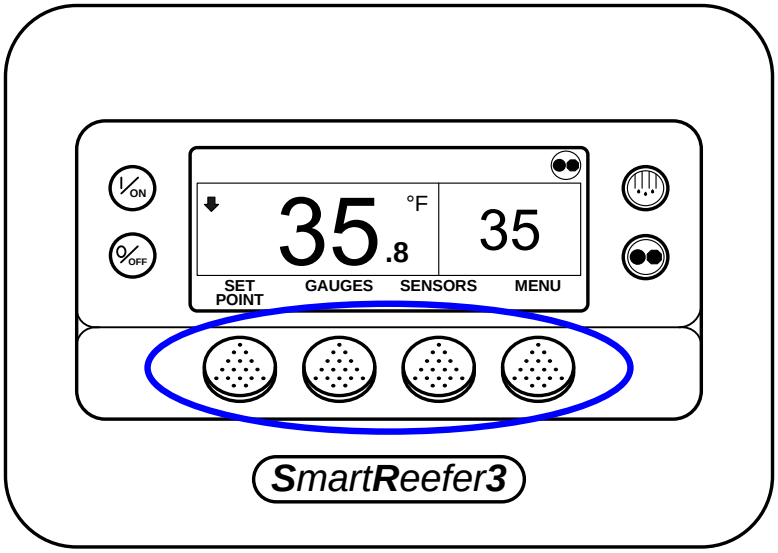
This key is used to turn the unit on. First the display will briefly show the Thermo King Logo and then the statement “Configuring System – Please Wait”. When the power-up sequence is complete the display shows the Standard Display of box temperature and setpoint. For more information see “Turning the Unit On and Off” later in this section.

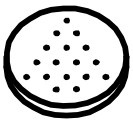
This key is used to turn the unit off. First the display will briefly show “System is Powering Down – Please Wait. Press On to Resume” and then “Off” will appear momentarily. When the power-down sequence is complete the display will be blank. For more information see “Turning the Unit On and Off” later in this section.

This key is used to initiate a manual defrost cycle. For more information see “Initiating a Manual Defrost Cycle” later in this section.

This key is used to select Cycle Sentry Mode or Continuous Mode operation if allowed by OptiSet Plus. For more information see “Selecting Cycle Sentry or Continuous Mode” later in this section.

Soft Keys





The four “soft” keys under the display are multi-purpose keys. Their function changes depending on the operation being performed. If a soft key is active the key function is shown in the display directly above the key. The keys are numbered from left to right, with Key 1 on the far left and Key 4 on the far right.

Typical soft key functions:

MENU	
NEXT	BACK
YES	NO
+	-
SELECT	EXIT
CLEAR	HELP
HOUR METERS	SENSORS
GAUGES	

Display Heater

The HMI Control Panel is equipped with a display heater. This heater is needed to make the display visible in cold ambient temperatures.

The HMI has its own internal temperature sensor for the display heater. The heater is energized when the unit is turned on and the ambient temperature is below 29.4°F (-2°C). The heater turns off when the temperature sensed by the internal sensor rises above 37.4°F (+3°C). The heater draws from 1.4 to 1.7 amps when energized.

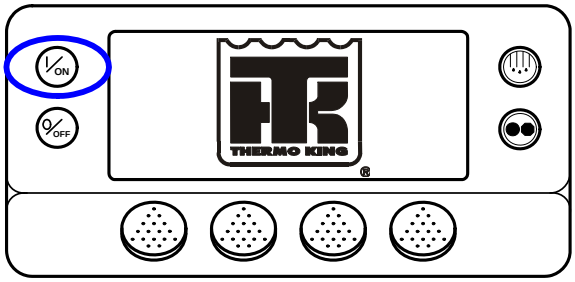
The colder the ambient temperature the longer it will take for the heater to make the display visible on a cold startup. It may take 10-15 seconds for the display to appear with very cold temperatures.

TURNING THE UNIT ON AND OFF

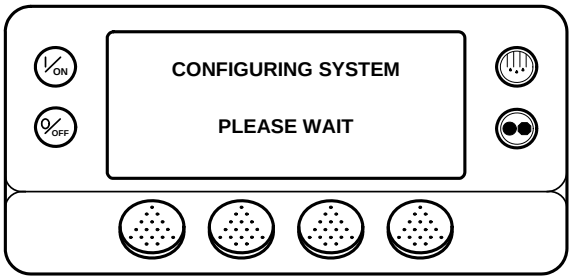
The unit is turned on by pressing the ON Key and off by pressing the OFF Key. When the On Key is pressed the display briefly shows the THERMO KING Logo as the display initializes.

IMPORTANT: The ON Key must be held down until the Thermo King Logo appears. If the ON Key is not held down long enough (approximately ½ second), the display may flicker but the unit will not start up. If this occurs, hold the ON Key down until the Thermo King logo appears.

NOTE: *With extremely cold ambient temperatures it may take up to 15 seconds for the display to appear on initial startup.*



Then the startup screen shown below appears while communications are established and the unit prepares for operation.

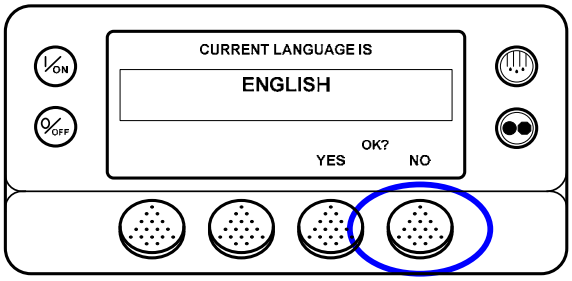


Turning the Unit On and Off - (continued)

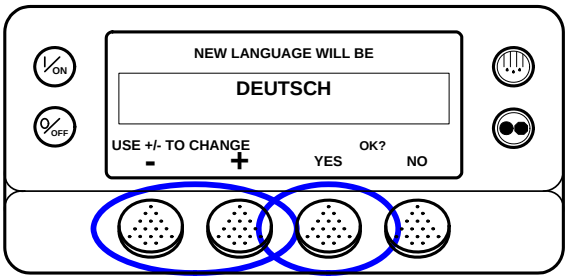
THIS PAGE ONLY APPLIES IF MORE THAN ONE LANGUAGE IS ENABLED

If more than one language has been enabled from the Guarded Access Language Menu, a prompt will appear to allow the desired language to be chosen as shown below. Only languages specifically enabled from the Guarded Access Menu are available. If a different language is desired, press the NO Key as shown below.

IMPORTANT: The engine start is not delayed by the language prompt shown below. The prompt will appear for 10 seconds and then the engine will start. After the engine is started the display will return to the prompt shown below.



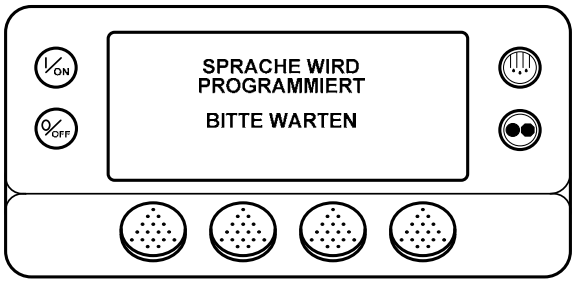
The Language menu will appear as shown below. Press the + or – Keys to select the desired language. When the desired language is shown press the YES Key to confirm the choice.



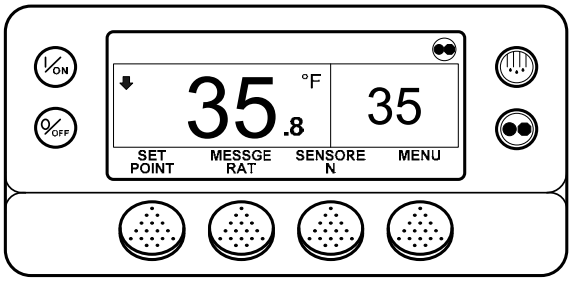
Turning the Unit On and Off - (continued)

THIS PAGE ONLY APPLIES IF MORE THAN ONE LANGUAGE IS ENABLED

The display will briefly show PROGRAMMING LANGUAGE – PLEASE WAIT in the new language as shown below.



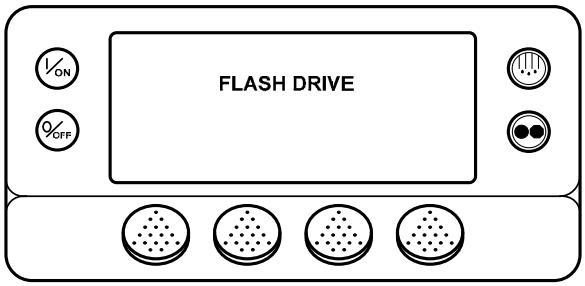
The new language is confirmed, and then the Standard Display will appear in the new language as shown below. The unit is ready to run. Continue on the next page.



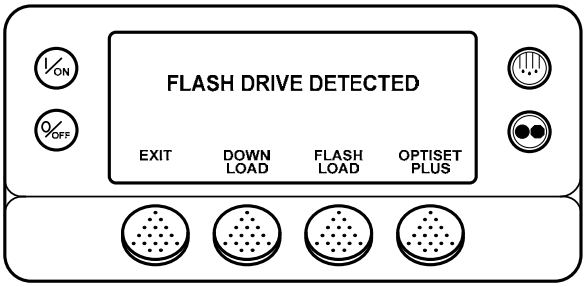
Turning the Unit On and Off - (continued)

THIS PAGE ONLY APPLIES IF A USB FLASH DRIVE IS INSERTED IN THE USB PORT WHEN THE UNIT IS TURNED ON

If a USB Flash Drive is inserted in the USB Port on the Control Panel when the unit is turned on, the display will briefly show FLASH DRIVE.



Then FLASH DRIVE DETECTED and the Flash Drive Menu will appear on the display as shown below. If desired, downloads, flash loads and OptiSet Plus send and retrieve functions can be performed. For complete details regarding using the USB Flash Drive see Using the USB Flash Drive later in this section.



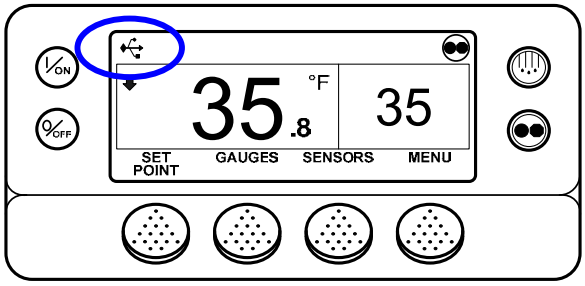
IMPORTANT: The engine start is not delayed by the Flash Drive Menu shown above. The engine start prompt will appear and the engine will start. After the engine is started the display will return to the Flash Drive Menu.

The Flash Drive Menu will time out about 30 seconds after the engine starts. When the Flash Drive Menu times out, the Standard Display will appear. To go to the Standard Display immediately press the EXIT Key.

Turning the Unit On and Off - (continued)

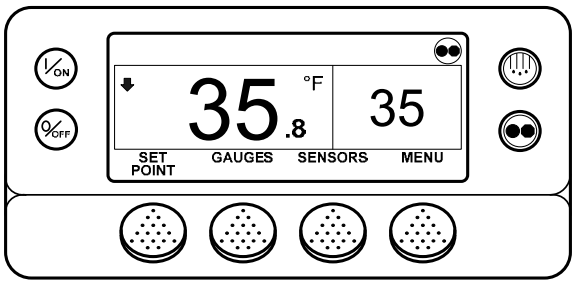
THIS PAGE ONLY APPLIES IF A USB FLASH DRIVE IS INSERTED IN THE USB PORT WHEN THE UNIT IS TURNED ON

NOTE: If a USB Flash Drive is connected to the USB Port on the Control Panel, the USB Icon will appear in the upper left corner of the display as shown below.

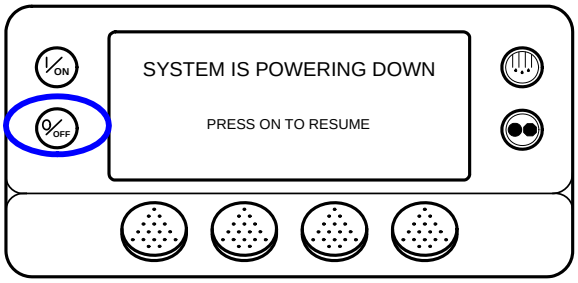


Turning the Unit On and Off - (continued)

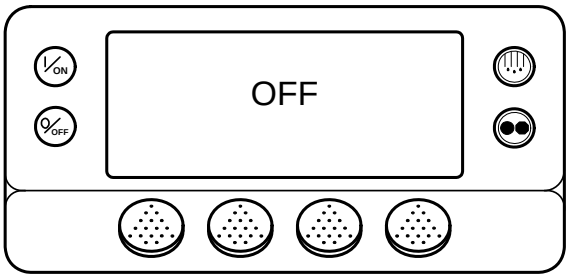
When the unit is ready to run the Standard Display appears.



Pressing the OFF Key stops unit operation. The unit shuts down immediately and the display briefly shows the power down message.



The display briefly shows OFF and then goes blank. To start the unit again, press the ON Key.



THE STANDARD DISPLAY

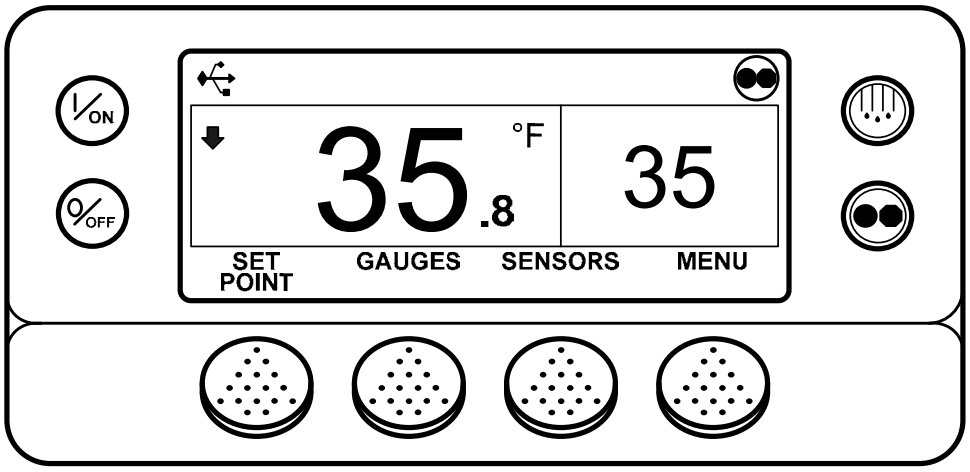
The Standard Display is the default display that appears if no other display function is selected. The Standard Display shows the box temperature and setpoint. The box temperature is that measured by the controlling sensor, usually the return air sensor. The box temperature here is 35.8°F with a 35°F setpoint.

The Cycle Sentry icon in the upper right corner of the display shows that the unit is operating in Cycle Sentry mode. If the Cycle Sentry icon is not present, the unit is running in Continuous Mode.

The down-pointing arrow indicates that the unit is cooling.

The USB Icon in the upper left corner of the display indicates that a USB Flash Drive is inserted in the USB Port on the Unit Control Panel.

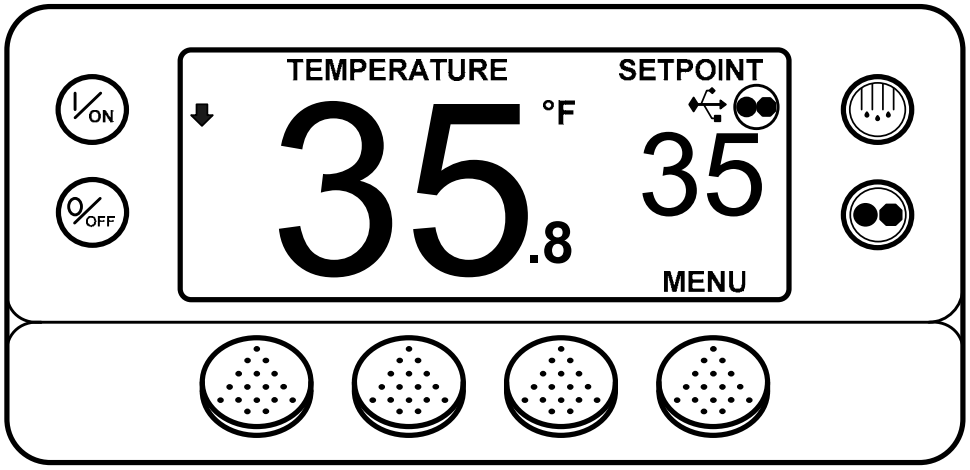
Pressing the left soft key allows the user to change the SETPOINT, and pressing the right soft key accesses the MAIN MENU. The other two soft keys access the GAUGES menu and the SENSORS menu.



THE TEMPERATURE WATCH DISPLAY

The TemperatureWatch Display appears 2 ½ minutes after the Standard Display appears so long as there is no key activity and no check, prevent or shutdown alarms are present. The TemperatureWatch Display will remain on until any key is pressed or a check, prevent or shutdown alarm occurs.

The TemperatureWatch Display shows the box temperature and setpoint. The large numbers allow unit conditions to be checked from a distance. The box temperature is that measured by the controlling sensor, usually the return air sensor. The box temperature here is 35.8°F with a 35°F setpoint. The Cycle Sentry icon in the upper right corner of the display shows that the unit is operating in Cycle Sentry mode. If the Cycle Sentry icon is not present, the unit is running in Continuous Mode. The down-pointing arrow indicates that the unit is cooling. Pressing any soft key returns the display to the Standard Display. The USB Icon next to the Cycle Sentry Icon in the upper right corner of the display indicates that a USB Flash Drive is inserted in the USB Port on the Unit Control Panel.



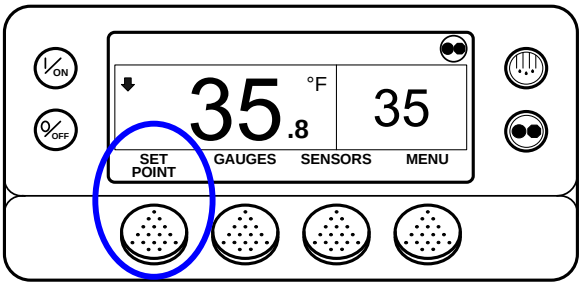
If an alarm condition (other than a log alarm) is present, the TemperatureWatch Display will not appear. If an alarm condition occurs while the TemperatureWatch Display is present the display will return to the Standard Display to indicate that an alarm condition has occurred.

If the Defrost Key or Cycle Sentry Key is pressed, the display will return to the TemperatureWatch Display immediately after the defrost cycle is initiated or the operating mode is changed.

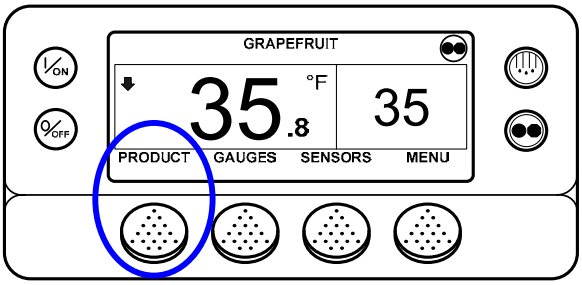
CHANGING THE SETPOINT

IMPORTANT: If OptiSet Plus is in use there are several possible options when changing the setpoint.

- **Numerical Setpoints** If OptiSet Plus is not in use or if only Numerical Setpoints are enabled, then the Standard Display left soft key will be labeled SETPOINT as shown below.

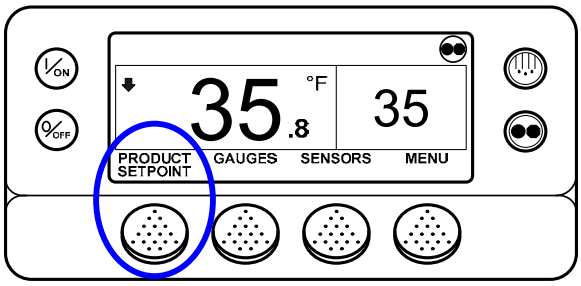


- **Named Products** OptiSet Plus allows the use of Named Products such as GRAPEFRUIT or BANANAS in place of a numerical setpoint. If only named products are enabled, then the Standard Display left soft key will be labeled PRODUCT as shown below.
  - ✓ If Named Products are in use, a single setpoint temperature may be allowed for the specific named product.
  - ✓ If Named Products are in use, a numerical setpoint range may be allowed for the specific named product.



Changing the Setpoint – (continued)

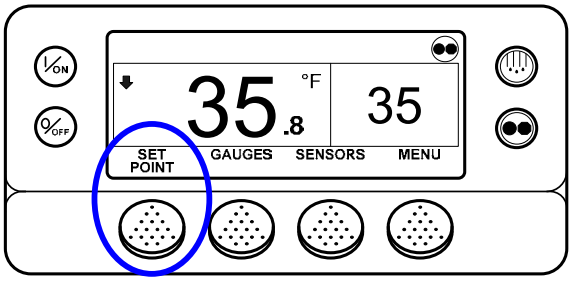
- **Both Numerical Setpoints and Named Products** OptiSet Plus can allow the use of both Numerical Setpoints and Named Products. If both numerical setpoints and named products are enabled, then the Standard Display left soft key will be labeled PRODUCT/SETPOINT as shown below.



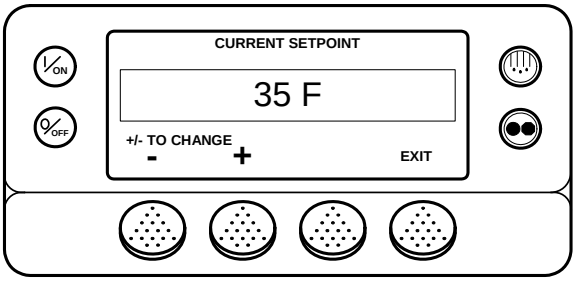
Changing the Setpoint – (continued)

Changing the Setpoint – Numerical Setpoint

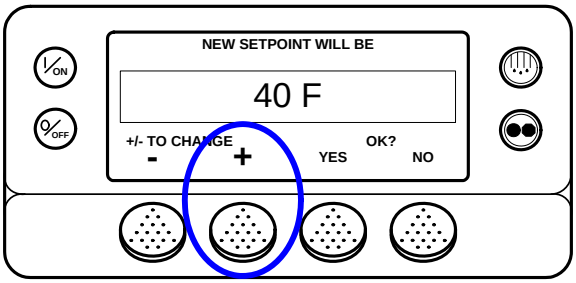
If the Temperature Watch display is shown, press any soft key to return to the Standard Display. From the Standard Display, press the SETPOINT Key.



The setpoint display appears as shown below.



The "-" and "+" Keys are used to increase or decrease the setpoint until the desired setpoint is shown. Here the setpoint has been changed to 40°F using the "+" Key.

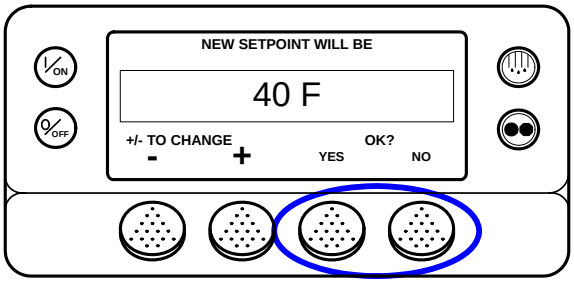


Changing the Setpoint – (continued)

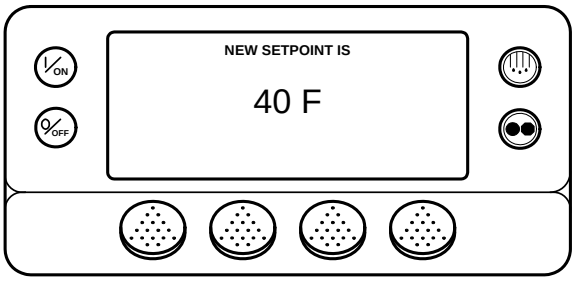
Changing the Setpoint – Numerical Setpoint

The YES and NO Keys confirm the setpoint change. When the desired setpoint has been selected using the "+" and/or "-" Keys, press the YES Key to confirm and load the new setpoint. If the setpoint is changed using the "+" or "-" Keys, the change must be confirmed or rejected by pressing the YES or NO Key within 10 seconds of changing the setpoint. A warning beep will sound for 5 seconds as a reminder.

Failure to confirm the new setpoint by pressing Yes or No within 10 seconds of changing the setpoint will result in no setpoint change. In addition, Alarm Code 127 Setpoint Not Entered is set, to indicate that the setpoint change was not completed.



After the YES Key has been pressed, the display briefly shows PROGRAMMING NEW SETPOINT – PLEASE WAIT. The display then confirms the new setpoint for several seconds.

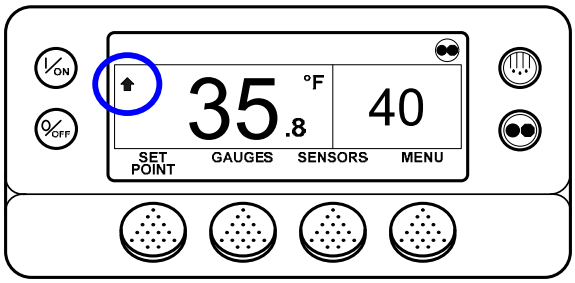


If the NO Key is pressed the display will briefly show SETPOINT NOT CHANGED and return to the Standard Display. The Standard Display will show the old setpoint.

Changing the Setpoint – (continued)

Changing the Setpoint – Numerical Setpoint

The display then returns to the Standard Display showing the new setpoint. Notice that the arrow now points up, to indicate that the unit is heating.



IMPORTANT: If the setpoint is changed using the "+" or "-" Keys, the change must be confirmed or rejected by pressing the YES or NO Key within 10 seconds of changing the setpoint.

- If the YES Key is pressed, the setpoint change made with the "+" or "-" Key is accepted, the setpoint changes, and the display returns to the Standard Display.

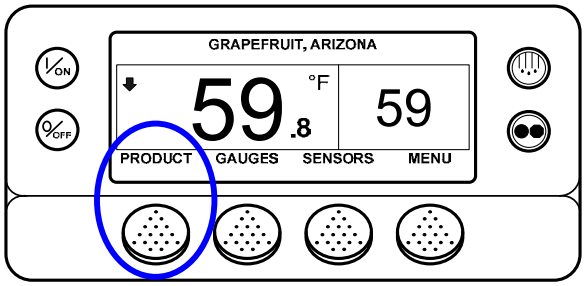
- If the NO Key is pressed the setpoint change made with the "+" or "-" Key is not accepted, the setpoint is not changed, and the display returns to the Standard Display.

- If the YES or NO Key is not pressed within 10 seconds of making a change with the "+" or "-" Key, the setpoint is not changed and the display returns to the Standard Display. The display briefly shows [SETPOINT NOT CHANGED] and **Alarm Code 127 Setpoint Not Entered** is set, to indicate that the setpoint change was started but not completed.

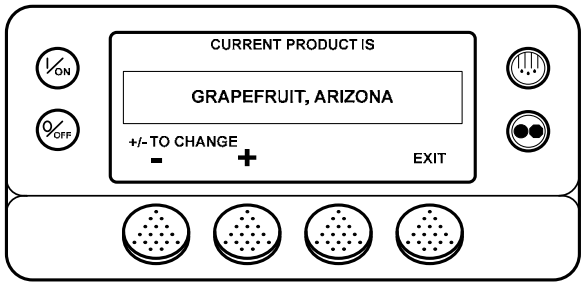
Changing the Setpoint – (continued)

Changing the Setpoint – Named Product

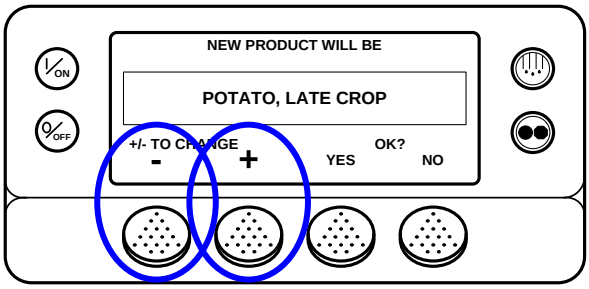
If the Temperature Watch display is shown, press any soft key to return to the Standard Display. From the Standard Display, press the PRODUCT Key. Note that PRODUCT is displayed in place of SETPOINT as shown below.



The display briefly shows PRODUCT and then the setpoint display appears as shown below.



The "-" and "+" Keys are used to change the Named Product until the desired product is shown. Here the product has been changed to Potato, Late Crop.

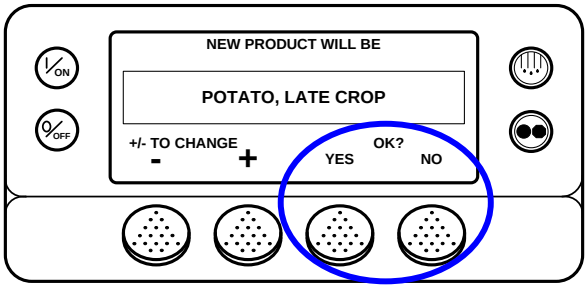


Changing the Setpoint – (continued)

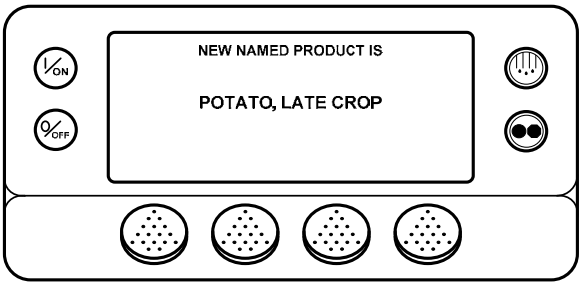
Changing the Setpoint – Named Product

The YES and NO Keys confirm the product change. When the desired product has been selected using the "+" and/or "-" Keys, press the YES Key to confirm and load the new product. If the product is changed using the "+" or "-" Keys, the change must be confirmed or rejected by pressing the YES or NO Key within 10 seconds of changing the product. A warning beep will sound for 5 seconds as a reminder.

Failure to confirm the new product by pressing Yes or No within 10 seconds of changing the product will result in no product change. In addition, Alarm Code 127 Setpoint Not Entered is set, to indicate that the product change was not completed.



After the YES Key has been pressed, the display briefly shows PROGRAMMING NAMED PRODUCT – PLEASE WAIT. The display then confirms the new setpoint for several seconds.

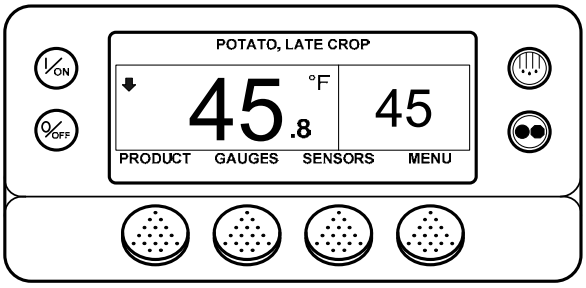


If the NO Key is pressed the display will briefly show SETPOINT NOT CHANGED and return to the Standard Display. The Standard Display will show the old setpoint.

Changing the Setpoint – (continued)

Changing the Setpoint – Named Product

The display then returns to the Standard Display showing the new named product. Notice that the arrow points down, to indicate that the unit is cooling.



IMPORTANT: If the named product is changed using the "+" or "-" Keys, the change must be confirmed or rejected by pressing the YES or NO Key within 10 seconds of changing the named product.

* If the YES Key is pressed, the product change made with the "+" or "-" Key is accepted, the product changes, and the display returns to the Standard Display.

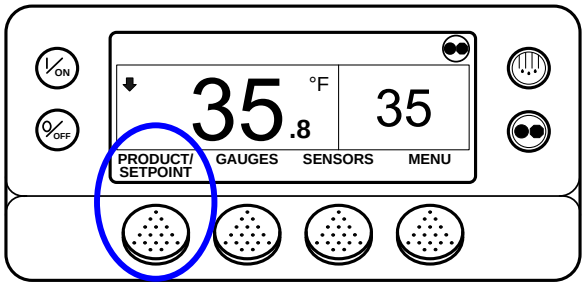
* If the NO Key is pressed the product change made with the "+" or "-" Key is not accepted, the product is not changed, and the display returns to the Standard Display.

* If the YES or NO Key is not pressed within 10 seconds of making a change with the "+" or "-" Key, the product is not changed and the display returns to the Standard Display. The display briefly shows [SETPOINT NOT CHANGED] and **Alarm Code 127 Setpoint Not Entered** is set, to indicate that the setpoint change was started but not completed.

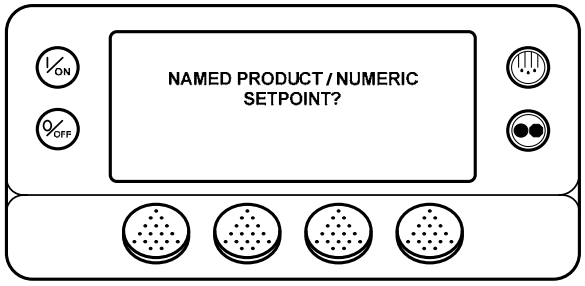
Changing the Setpoint – (continued)

Changing the Setpoint – Both Numerical Setpoint and Named Product Available

If the Temperature Watch display is shown, press any soft key to return to the Standard Display. From the Standard Display, press the SETPOINT Key. Note that both PRODUCT and SETPOINT are displayed as shown below.

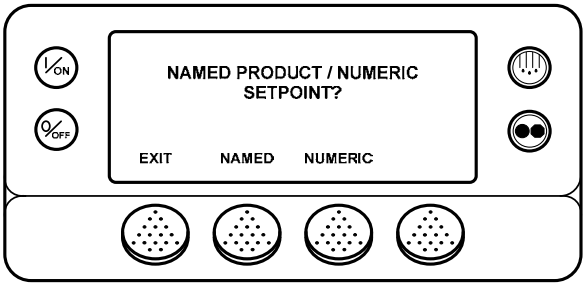


The NAMED PRODUCT / NUMERIC SETPOINT appears briefly as shown below.



Press the NAMED Soft Key to proceed with Named Product change as shown previously.

Press the NUMERIC Soft Key to proceed with Numeric Setpoint change as shown previously.



Press the EXIT Soft Key to return to the Standard Display.

STARTING THE DIESEL ENGINE

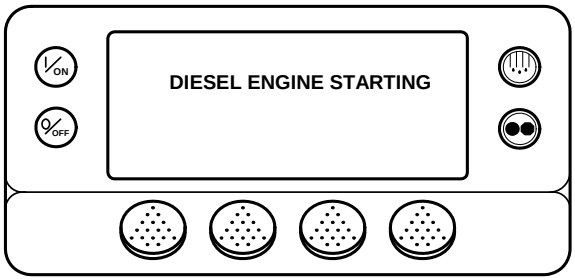
Diesel engine preheats and starts are automatic in both Continuous Mode and Cycle Sentry Mode. The engine will preheat and start as required when the unit is turned on. The engine preheat and start will be delayed in Cycle Sentry mode if there is no current need for the engine to run. If any keys are being pressed on the HMI Control Panel the engine will not preheat and start until 10 seconds after the last key is pressed.

NOTE: If the unit is equipped with optional Electric Standby there may be some additional prompts before the engine will start. See STARTING THE ELECTRIC MOTOR on the following pages for details.

CAUTION: The engine may start automatically any time the unit is turned on.

WARNING: Never use starting fluid.

When the engine is preparing to start the HMI Control Panel will display the engine start screen, as shown below. The preheat buzzer sounds during the engine preheat and crank sequence.



After the engine is started the display returns to the Standard Display of temperature and setpoint.

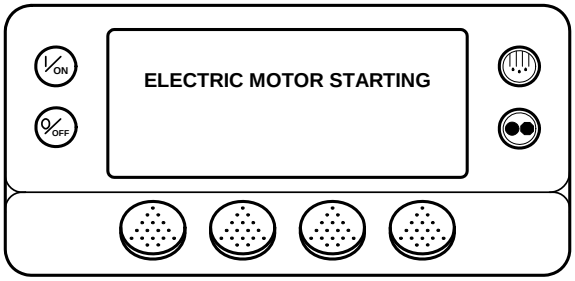
STARTING THE ELECTRIC MOTOR

Units equipped with the Electric Standby option only

Electric motor starting is automatic in both Continuous Mode and Cycle Sentry Mode. The motor will start as required when the unit is turned on. If any keys are being pressed on the HMI Control Panel prior to the motor start, the motor start will be delayed until 10 seconds after the last key is pressed.

CAUTION: The motor may start automatically any time the unit is turned on.

When the motor is preparing to start the HMI Control Panel will display the motor start screen, as shown below. The preheat buzzer sounds for 20 seconds before the electric motor starts.

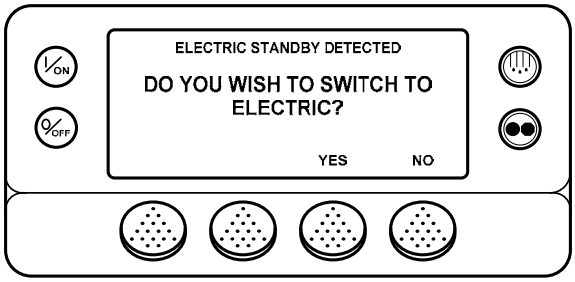


SWITCHING FROM DIESEL TO ELECTRIC

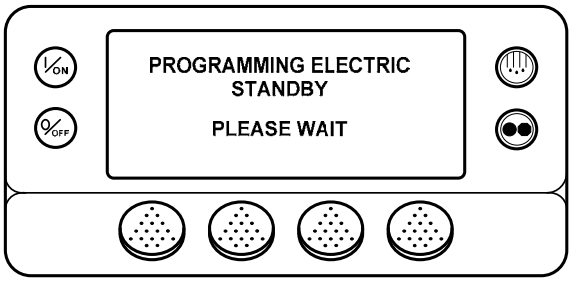
Units equipped with the Electric Standby option only

If the Diesel to Electric Autoswitch Enabled feature in Guarded Access is set YES then the unit will automatically switch to Electric Mode operation when standby power is connected and available.

If the Diesel to Electric Autoswitch Enabled feature in Guarded Access is set NO then the prompt screen shown below will appear when standby power is connected and available.



If NO is selected, then the unit will continue to operate in Diesel Mode. If YES is selected then the display will briefly show the screen below.



Electric Mode operation will briefly be confirmed. If unit operation is required the electric motor will start as shown above in STARTING THE ELECTRIC MOTOR.

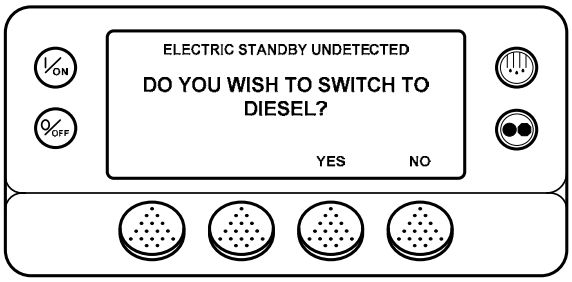
If the Diesel to Electric Autoswitch Enabled feature in Guarded Access is set NO then the unit can also be switched from Diesel mode to Electric mode operation using the Electric Standby Selection from the Main Menu as shown later in this section.

SWITCHING FROM ELECTRIC TO DIESEL

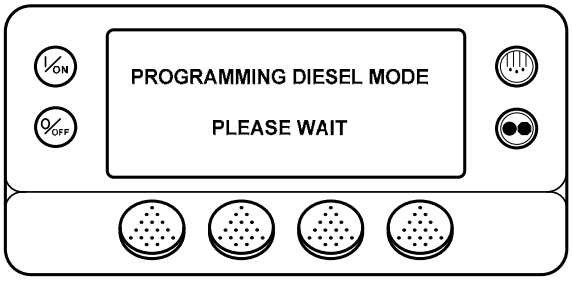
Units equipped with the Electric Standby option only

If the Electric to Diesel Autoswitch Enabled feature in Guarded Access is set YES then the unit will automatically switch to Diesel Mode operation when standby power is turned off or is no longer available.

If the Electric to Diesel Autoswitch Enabled feature in Guarded Access is set NO and standby power is disconnected or fails, the unit will not automatically switch to Diesel mode. This is primarily designed to prevent unauthorized diesel engine starts when the truck is indoors or on a ferry where engine operation is strictly prohibited. If the Electric to Diesel Autoswitch Enabled feature in Guarded Access is set NO then the prompt screen shown below will appear when standby power is turned off or is no longer available.



If YES is selected then the display will briefly show the screen below.



Diesel Mode operation will briefly be confirmed. If unit operation is required the diesel engine will start as shown previously in STARTING THE DIESEL ENGINE.

If the Electric to Diesel Autoswitch Enabled feature in Guarded Access is set NO then the unit can also be switched from Diesel mode to Electric mode operation using the Diesel Selection from the Main Menu as shown later in this section.

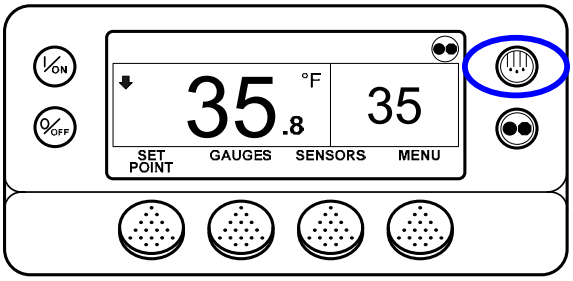
INITIATING A MANUAL DEFROST CYCLE

Defrost cycles are usually initiated automatically based on time or demand. Manual defrost is also available

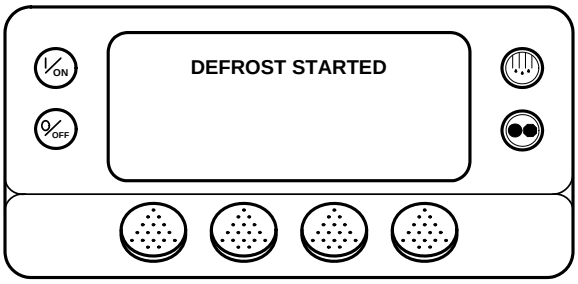
Manual defrost is available if the unit is running and the evaporator coil temperature is less than or equal to 45°F (7°C).

NOTE: If Rail Alternate is set YES defrost is allowed with an evaporator coil temperature less than or equal to 55°F (13°C).

Other features such as door switch settings may not allow manual defrost under some conditions. To initiate a manual defrost cycle, press the Defrost Key as shown below.

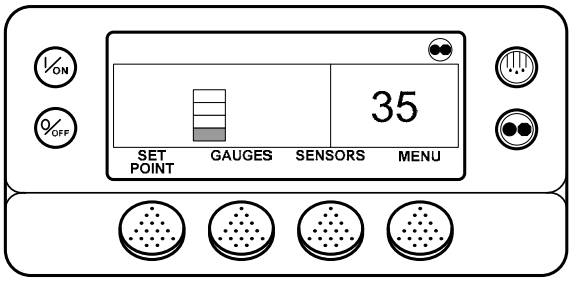


The display briefly shows [DEFROST], [PROGRAMMING DEFROST - PLEASE WAIT] and then [DEFROST STARTED].



Initiating a Manual Defrost Cycle - continued

The display then shows the Defrost display. The bar indicator shows approximately how much time remains to complete the defrost cycle. The bar indicator below shows that the defrost cycle is about 25% complete.



Terminating a Defrost Cycle

The defrost cycle terminates automatically when the coil temperature is greater than or equal to 58°F (14°C) or the defrost timer expires. Defrost can also be terminated by turning the unit off and back on.

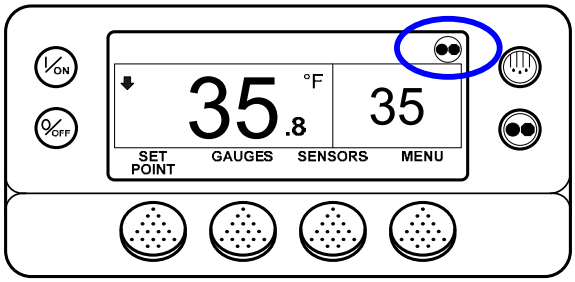
NOTE: If Rail Alternate is set YES the defrost cycle terminates at 70°F (21°C) or if the defrost timer expires.

SELECTING CYCLE SENTRY OR CONTINUOUS MODE

When Cycle Sentry mode is selected the unit will start and stop automatically to maintain setpoint, keep the engine warm and the battery charged. When Continuous Mode is selected, the unit starts automatically and runs continuously to maintain setpoint and provide constant airflow.

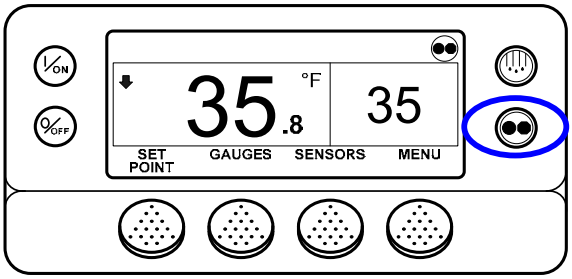
IMPORTANT: Cycle Sentry or Continuous may not be selectable if OptiSet Plus is in use.

If the unit is operating in Cycle Sentry Mode, the Cycle Sentry Icon will be present in the upper right corner of the display as shown below. If the Cycle Sentry Icon is not present the unit is operating in Continuous Mode.



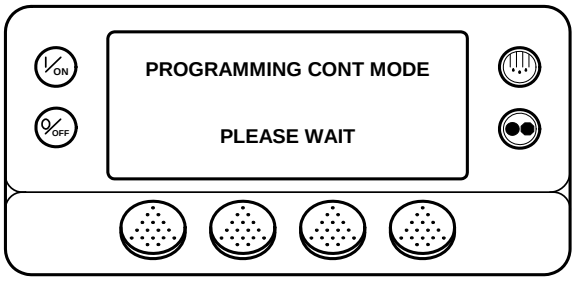
If allowed by OptiSet Plus, Cycle Sentry Mode or Continuous Mode is selected by pressing the Cycle Sentry/Continuous Key as shown below.

NOTE: Cycle Sentry Mode or Continuous Mode can also be selected using the Mode Submenu from the Main Menu.

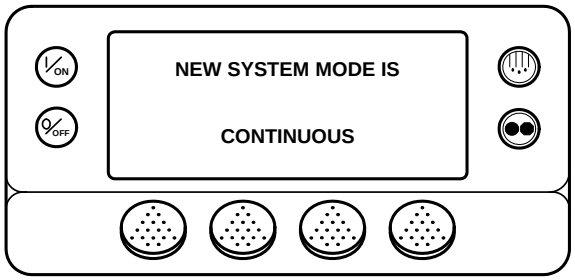


Selecting Cycle Sentry or Continuous Mode - (continued)

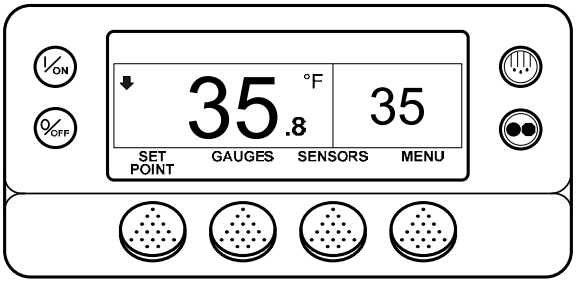
If the unit is in Cycle Sentry mode, pressing the Cycle Sentry/Continuous Key changes the mode from Cycle Sentry to Continuous. The display confirms the change, as shown below.



The new mode is confirmed for 3 seconds.



The display then returns to the Standard Display. In the example shown below the absence of the Cycle Sentry Icon indicates that the unit is running in Continuous mode.



Selecting Cycle Sentry or Continuous Mode - (continued)

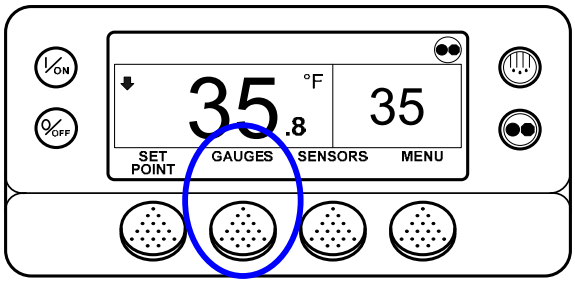
Pressing the Cycle Sentry/Continuous Key again allows the operator to change back to Cycle Sentry mode operation.

IMPORTANT: If the unit is in Cycle Sentry null and the mode is switched to Continuous Mode, the unit will start automatically.

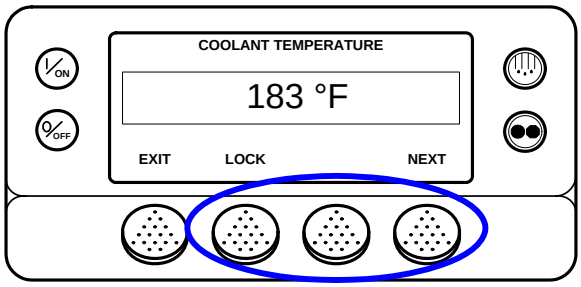
IMPORTANT: Cycle Sentry or Continuous may not be selectable if OptiSet Plus is in use.

USING THE GAUGES KEY

The GAUGES Key allows the operator to view the unit gauges. To access the GAUGES press the GAUGES Key.



The first gauge display will appear. Press the NEXT and BACK Keys to scroll thru the gauges. Pressing the LOCK Key will lock the gauges on the display.



The gauges available are shown on the next page. Not all gauges may appear depending on unit configuration and software revision.

To return to the Standard Display press the EXIT Key.

Gauges Available

Coolant Temperature – Displays the temperature of the engine coolant.

Coolant Level – Displays the coolant level in the overflow tank.

Oil Pressure – Displays the engine oil pressure as OK or LOW.

Oil Level – Displays the engine oil level as OK or LOW.

Amps – Displays the current flow in amps flowing to or from the unit battery

Battery Voltage – Displays the voltage of the unit battery.

Engine RPM – Displays the engine speed in RPMs.

Fuel Level Sensor – Displays the fuel level if a fuel level sensor is installed.

Discharge Pressure – Displays the unit discharge pressure. (ETV units only)

Suction Pressure – Displays the unit suction pressure. (ETV units only)

ETV Position – Displays the current position of the ETV valve. (ETV units only)

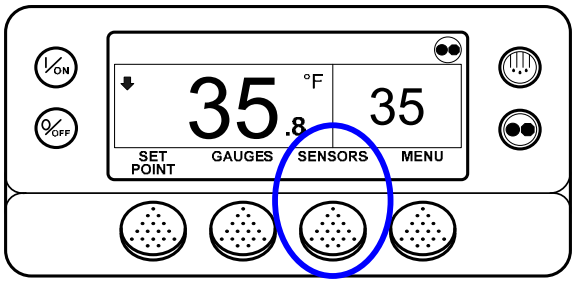
Fresh Air Exchange – Displays the current position of the optional Fresh Air Exchange Door

I/O (Input/Output State) – Displays the current state of the input/output devices listed below.

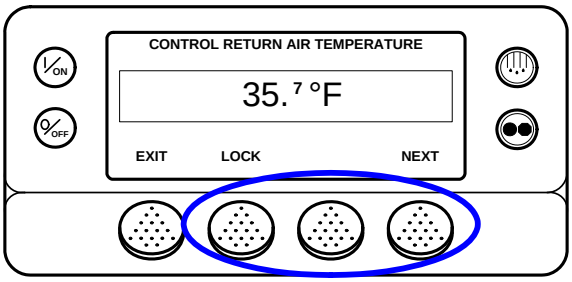
- High Speed Relay/Electric Heat
- Run Relay
- Run Relay Feedback
- Alternator Excite Output
- Defrost Damper
- Heat Output
- Alternator Frequency
- Optional Fresh Air Exchange Output
- Diesel/Electric Relay (Model 50 units only)
- Electric Ready Input (Model 50 units only)
- Electric overload (Model 50 units only)
- Hot Gas Bypass (ETV units only)

USING THE SENSORS KEY

The SENSORS Key allows the operator to view the temperatures read by the unit temperature sensors. To access the SENSORS press the SENSORS Key.



The first sensor display will appear. Press the NEXT and BACK Keys to scroll thru the sensors. Pressing the LOCK Key will lock the current sensor on the display.



The sensors available are shown on the next page.

To return to the Standard Display press the EXIT Key.

Sensors Available

Control Return Air Temperature – Displays the temperature of the control return air sensor.

Display Return Air Temperature – Displays the temperature of the display return air sensor.

Control Discharge Air Temperature – Displays the temperature of the control discharge air sensor.

Display Discharge Air Temperature – Displays the temperature of the display discharge air sensor.

Temperature Differential – Displays the calculated difference between the control return air sensor and the control discharge air sensor.

Evaporator Coil Temperature – Displays the temperature of the evaporator coil sensor.

Ambient Air Temperature – Displays the temperature of the ambient air sensor.

Spare 1 Temperature – Displays the temperature of the spare 1 temperature sensor.

Log Sensor 1 – Displays the temperature of the CargoWatch Data Logger temperature sensor 1.

Log Sensor 2 – Displays the temperature of the CargoWatch Data Logger temperature sensor 2.

Datalogger Sensor 3 Temperature – Displays the temperature of the CargoWatch Data Logger temperature sensor 3.

Datalogger Sensor 4 Temperature – Displays the temperature of the CargoWatch Data Logger temperature sensor 4.

Datalogger Sensor 5 Temperature – Displays the temperature of the CargoWatch Data Logger temperature sensor 5.

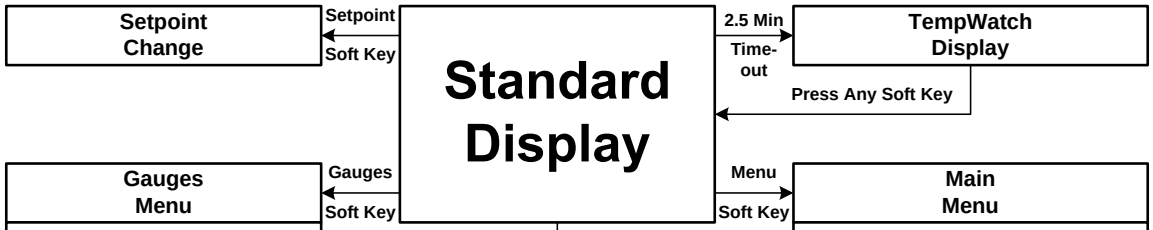
Datalogger Sensor 6 Temperature – Displays the temperature of the CargoWatch Data Logger temperature sensor 6.

Board Temperature Sensor – Displays the internal temperature of the HMI Control Panel pc board.

MAIN MENU OVERVIEW

D006/D007 and 6560/6561 SR-3 Trailer S/T Operator & Main Menu

Features shown are for units configured Trailer



Gauges Menu

- Coolant Temperature
- Coolant Level
- Oil Pressure
- Oil Level
- Amps
- Battery Voltage
- Engine RPM
- Fuel Level Sensor
- Discharge Pressure
- Suction Pressure
- ETV Position
- Fresh Air Exchange
- I/O (Inputs/Outputs)
  - High Speed Relay
  - Run Relay
  - Run Relay Feedback
  - Alternator Excite Output
  - Defrost Damper
  - Heat Output
  - Alternator Frequency
  - Fresh Air Exchange Output
  - Diesel/Electric Relay (50 only)
  - Electric Ready Input (50 Only)
  - Electric Overload (50 only)
  - Hot Gas Bypass (ETV only)

Sensors Menu

- Control Return Air Temp
- Display Return Air Temp
- Control Discharge Air Temp
- Display Discharge Air Temp
- Temperature Differential
- Evaporator Coil Temp
- Ambient Air Temp
- Spare 1 Temp
- Log Sensor 1
- Log Sensor 2
- Datalogger Sensor 3 Temp
- Datalogger Sensor 4 Temp
- Datalogger Sensor 5 Temp
- Datalogger Sensor 6 Temp
- Board Temperature Sensor

Main Menu

Flash Drive (If connected)

Language (If enabled)

Alarms
- Display all alarms
- Clear most alarms

Datalogger (CargoWatch)
- Start Trip
- Print / View

Hourmeters
- Total Hours
- Total Run Time Hours
- Engine Hours
- Electric Run Hours (50 only)
- Total Run Reminder 1
- Total Run Reminder 2
- Controller Power On
- Pretrip Reminder
- Engine Reminder 1
- Engine Reminder 2
- Electric Reminder 1
- Electric Reminder 2

Mode
- Turn Cycle Sentry On or Off
  - (Off = Continuous)
- Degrees - Fahrenheit | Celsius
- Fresh Air Exchange - Open | Close
- Keypad Lockout
- Start Sleep Mode
  - Program Wakeup Time
    - If YES
  - Day to Wake Up
  - Hour to Wake Up
  - Minutes to Wake Up

Pretrip

Electric Standby or Diesel Mode

Adjust Brightness
- High – Medium – Low – Off

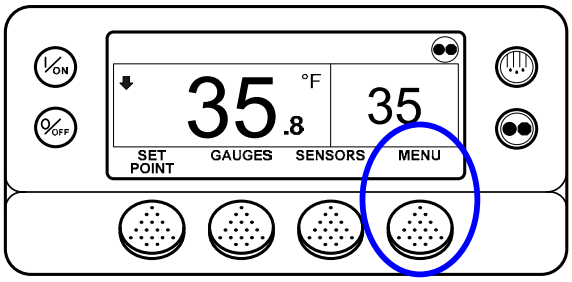
Time
- Time/Date (Display Only)

Not all menu features may appear

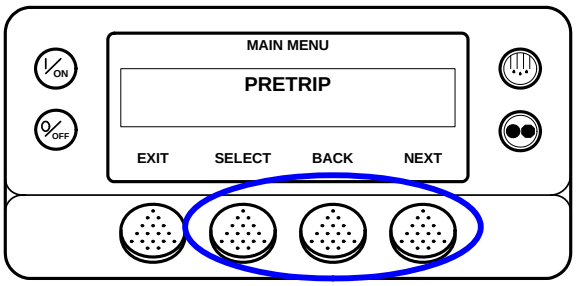
Rev D006/D007 and 6560/6561 Trailer S/T 03 Apr 2011

USING THE MAIN MENU

The Main Menu contains several additional submenus that allow the operator to view information and modify unit operation. To access the Main Menu press the MENU Key.



The first Main Menu choice will appear. Press the NEXT and BACK Keys to scroll thru the menu choices. When the desired selection is shown on the display, press the SELECT Key to access it. The Pretrip submenu is shown here.



The Main Menu choices are shown on the next page. For detailed information see the individual explanations of each submenu item on the following pages.

To return to the Standard Display press the EXIT Key.

MAIN MENU FEATURES

USB FLASH DRIVE – If a USB Flash Drive is inserted into the USB Port on the unit Control Panel, this will be the first Main Menu item to appear. If a WinTrac configured USB Flash Drive is connected to the USB connector, this feature allows the operator to select the desired Flash Drive function. If enabled when the Flash Drive was configured, the following functions may be available:

DOWNLOAD

- ✓ Download the ServiceWatch Data Logger
- ✓ Download the CargoWatch Data Logger

FLASHLOAD

- ✓ Flash load Base Controller Software
- ✓ Flash load HMI Control Panel Software

OPTISET PLUS

SEND

- ✓ Send OptiSet Plus files

RETRIEVE

- ✓ Retrieve OptiSet Plus files

If a USB Flash Drive is not connected to the unit, this feature will not appear in the Main Menu.

LANGUAGE – If a USB Flash Drive is not connected to the USB port and more than one language is enabled, this will be the first menu item to appear. If only one language is enabled, this menu will not appear. The Language Menu allows the operator to select a language from a list of up to 11 languages at one time. All subsequent displays are shown in the selected language. Four different language packages with a total of 24 languages are available. English is the default language and is provided in each of the packages. See the Guarded Access Language Setup Menu in Section 3 of this manual for details.

If Languages are not enabled from the Guarded Access Menu, this feature will not appear in the Main Menu.

ALARMS – Allows the operator to view any active alarms, and allows most alarms to be cleared. If only one language is enabled this will be the first menu item to appear.

DATA LOGGER – Allows the operator to set a Start of Trip marker to the CargoWatch and ServiceWatch data loggers and print the contents of the CargoWatch data logger.

HOURMETERS – Allows the operator to view the unit hourmeters that have the view feature enabled in the Guarded Access menu. If the view feature for a particular hourmeter is not enabled then that hourmeter will continue to accumulate time but cannot be viewed from the Main Menu. However, all hourmeters can be viewed from the Maintenance Menu, even if they are not enabled.

Possible Hourmeters

- Total Hours
- Total Run Time Hours
- Engine Hours
- Electric Run Hours
- Total Run Time Reminder # 1 Hours
- Total Run Time Reminder # 2 Hours
- Controller Power On Hours
- Pretrip Reminder Hours
- Engine Run Time Reminder # 1 Hours
- Engine Run Time Reminder # 2 Hours
- Electric Run Time Reminder # 1 Hours
- Electric Run Time Reminder # 2 Hours

MODE – Allows the operator to change the unit operating modes if allowed. Not all modes may appear depending on the settings selected from the Guarded Access menu and the HMI Control Panel software version.

- Turns Off Cycle Sentry Mode/Turns On Cycle Sentry Mode (If Cycle Sentry is Off unit runs in Continuous). Note that selecting Cycle Sentry Mode or Continuous Mode can also be accomplished using the Cycle Sentry Key to the right of the display.
- Allows temperature to be displayed in either Fahrenheit or Celsius degrees (if enabled from the Guarded Access > Main Menu Configuration Menu).
- Allows the optional Fresh Air Exchange door to be opened or closed.
- Allows Keypad Lockout to be selected (if enabled from the Guarded Access > Main Menu Configuration Menu).
- Start Sleep Mode (if enabled from the Guarded Access > Main Menu Configuration Menu).

PRETRIP – Allows the operator to start a Pretrip Test. If an alarm is active, the Pretrip Test is not allowed and the operator is prompted to clear the alarm(s).

ELECTRIC STANDBY – If the Electric Standby option is present and the Diesel to Electric Auto-switch feature is set NO, this feature allows the operator to manually select electric mode operation. This feature does not appear if the unit does not feature optional Electric Standby or if the Diesel to Electric Auto-switch feature is set YES.

DIESEL MODE – If a unit equipped with electric standby is running in electric mode and the Electric to Diesel Auto-switch feature is set NO, this feature allows the operator to manually select diesel mode operation. This feature does not appear if the unit does not feature optional Electric Standby or if the Electric to Diesel Auto-switch feature is set YES.

ADJUST BRIGHTNESS – Allows the operator to adjust the HMI Control Panel display backlight intensity as required by local conditions.

TIME – Allows the operator to view the unit time and date. The time and date cannot be changed from this menu.

USB Flash Drive

When a properly configured USB flash drive is connected to the SR-3 front panel USB connector, the flash drive user interface is shown on the HMI Control Panel. The USB flash drive provides SR-3 CargoWatch and ServiceWatch Data Logger downloads, flash loading SR-3 HMI Control Panel and Base Controller software as well as sending and retrieving OptiSet Plus files. A USB flash drive must be configured using WinTrac 5.1 or later before the flash drive can be used with SR-3 trailer units equipped with a USB Communications Port.

Using a properly configured and enabled flash drive, the following functions may be available:

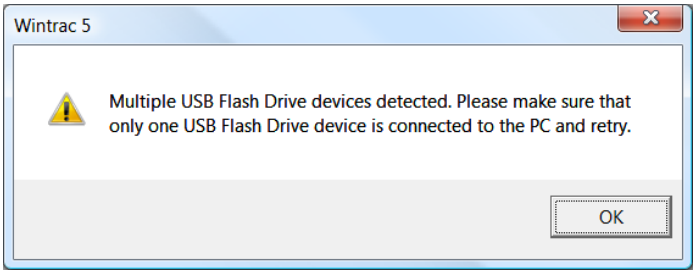
- ✓ Download the ServiceWatch Data Logger
- ✓ Download the CargoWatch Data Logger
- ✓ Flash load Base Controller Software
- ✓ Flash load HMI Control Panel Software
- ✓ Send OptiSet Plus Files
- ✓ Retrieve OptiSet Plus Files

Configuring a USB Flash Drive using WinTrac 5.1 or later

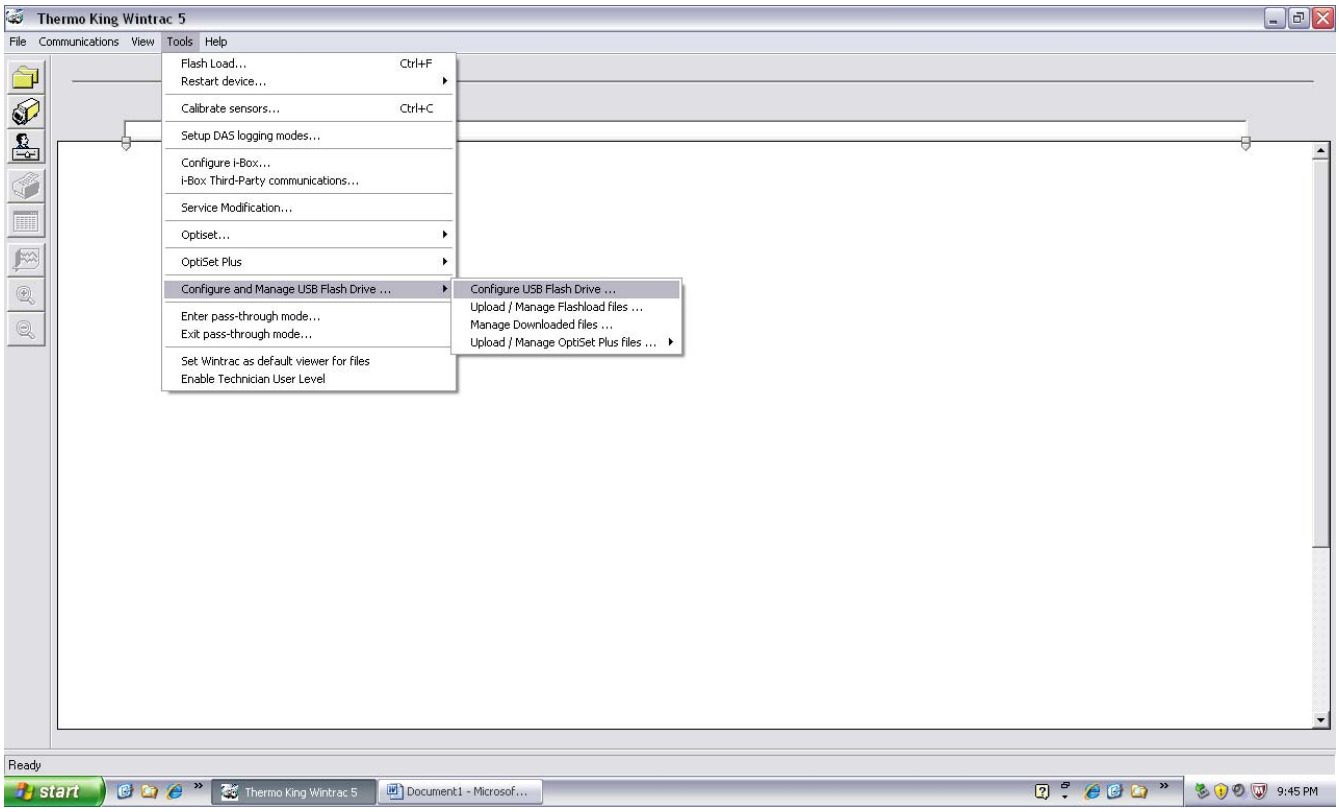
A USB flash drive must be configured using WinTrac 5.1 or later before the flash drive can be used with SR-3 trailer units equipped with a USB Communications Port. When the USB Flash Drive is configured, only empty file folders are created on the flash drive. The files required for flash loads and/or OptiSet Plus must then be placed in the appropriate flash drive folders.

Insert the USB Flash Drive into a USB Port on the computer. If a USB Flash Drive is not connected to the computer, the Configure and Manage USB Flash Drive selection in the WinTrac Tools Menu will not be available.

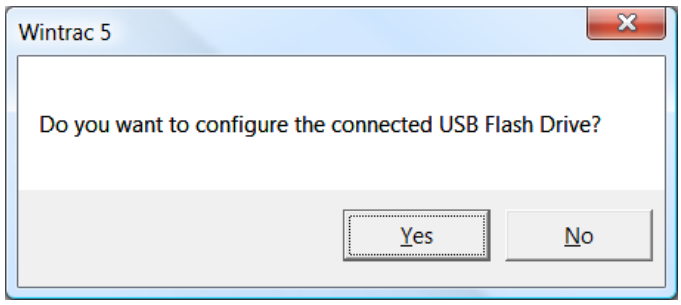
IMPORTANT: Only one USB memory device can be connected to the computer. If more than one device is connected an error message will result.



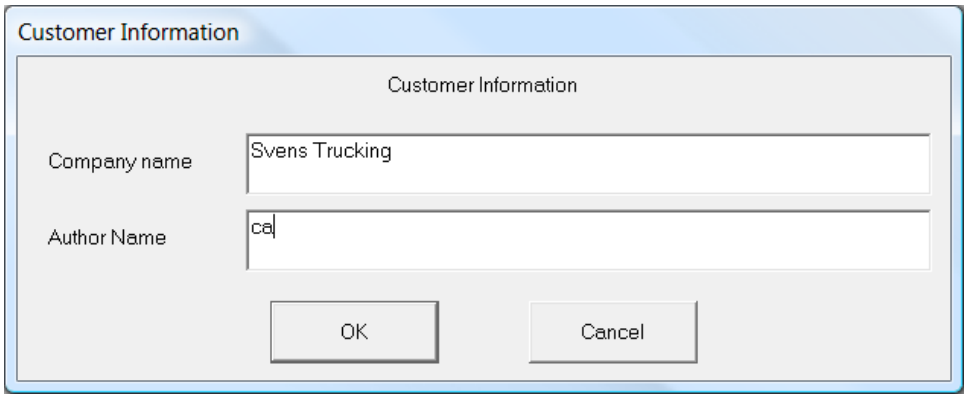
Open WinTrac 5.1 and enable the Tools Menu by simultaneously pressing CTRL-SHIFT-T. From the Tools Menu select Configure and Manage USB Flash Drive / Configure USB Flash Drive as shown below.



A confirmation screen will appear. Choose Yes to proceed.

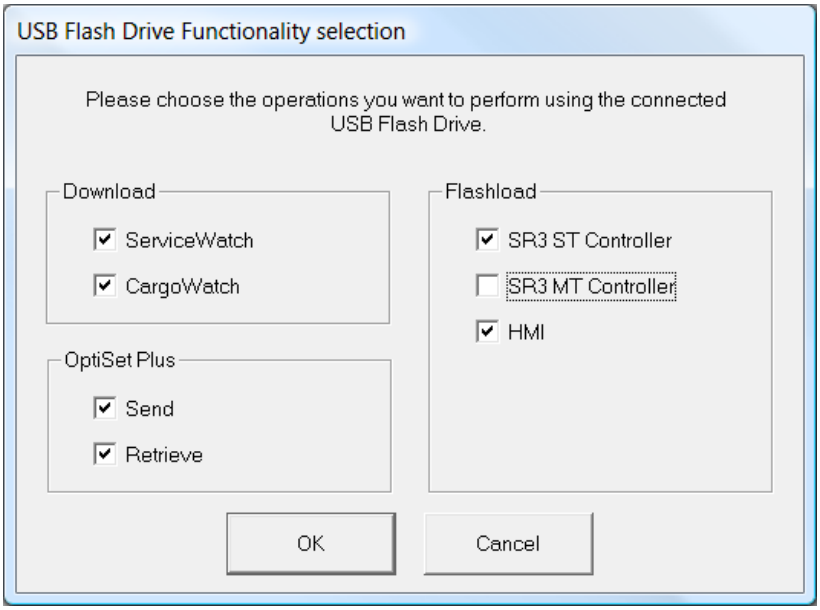


Complete the Customer Information as shown below. The field for Company name and Author Name can each be a maximum of 120 characters. Choose OK to continue.

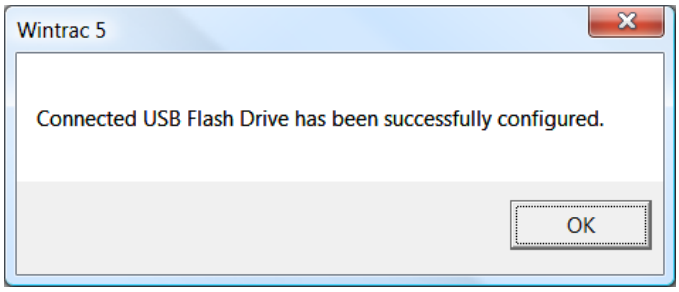


Next, select the desired functions to be enabled on the flash drive. In the example shown below, downloading the ServiceWatch and CargoWatch Data Loggers, flash loading the SR-3 Single Temperature Base Controller and SR-3 HMI Control Panel and sending and retrieving OptiSet Plus files have all been selected. Choose OK to continue.

IMPORTANT: If a feature is not enabled when the flash drive is configured, then that feature will not be available when the flash drive is connected to the SR-3 unit using the USB Connector.



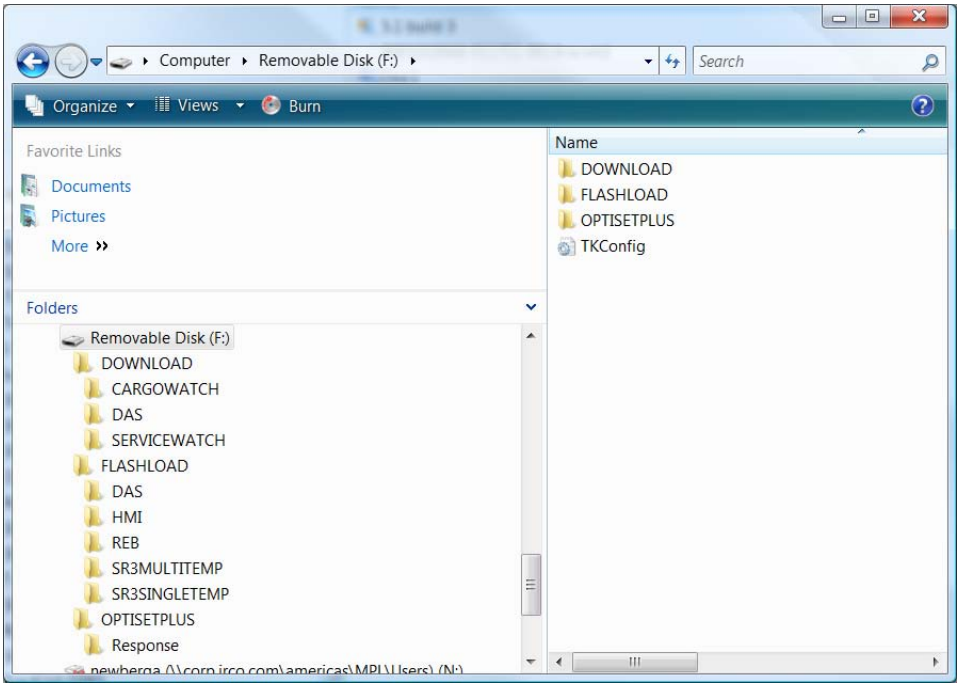
A successful configuration confirmation message will be displayed. Choose OK to finish the configuration procedure.



Configured USB Flash Drive Contents

After the USB Flash Drive is configured with WinTrac 5.1 or later, the folders and files shown below will be located on the flash drive.

IMPORTANT: The TKConfig file will be located in the flash drive root directory. The directories and sub-directories on a newly configured flash drive will be empty.



- ✓ **DOWNLOAD Folder** The DOWNLOAD Folder on the Flash Drive contains folders to hold the downloaded CargoWatch and ServiceWatch data files. The DAS Folder is not currently used.

- ✓ **FLASHLOAD Folder** The FLASHLOAD Folder on the Flash Drive contains folders to hold the software upload files for the HMI Control Panel and SR-3 Single Temp Base Controller. The other folders are not currently used.

- ✓ **OPTISETPLUS Folder** The OPTISET PLUS FOLDER on the Flash Drive holds OptiSet Plus configuration files to be sent to the Base Controller and OptiSet Plus configuration files that have been retrieved from the Base Controller.

- ✓ **TKConfig FILE** This configuration file is necessary to allow the USB Flash Drive to work with the SR-3 Control System.

Considerations when using a WinTrac Configured USB Flash Drive

ServiceWatch and CargoWatch Files If the ServiceWatch and/or CargoWatch Data Loggers are downloaded using the USB Flash Drive, the downloaded files will be placed in the appropriate Download Sub-directory on the Wintrac configured USB Flash Drive.

These files can be moved from the USB Flash Drive sub-directories to the desired location on the PC computer using either Wintrac or Windows Explorer.

Flash Load Files Flash Load files for use with the USB Flash Drive must be *.FLA files. When SR-3 Base Controller and HMI Control Panel flash load files are retrieved from the Thermo King iService web site, the flash load files are downloaded as a *.ZIP file. When flash load files for SR-3 applications are unzipped, there will now be three flash load files instead of the usual two. The traditional *.mXX and *.cXX files will be present as well as the *.FLA file.

These files can be moved from the USB Flash Drive sub-directories to the desired location on the PC computer using either Wintrac or Windows Explorer.

OptiSet Plus Files If OptiSet Plus is being used with a USB Flash Drive, the file formats of the OptiSet Plus data files must be considered.

IMPORTANT: The WinTrac 5.1 Upload > Manage OptiSet Plus Files feature must be used to move OptiSet Plus files to or from the flash drive or the file conversion process will not take place. Do not move OptiSet Plus files to or from the flash drive using Windows Explorer. Only ServiceWatch and CargoWatch Data Logger data files and flash load *.FLA files can be moved using Windows Explorer.

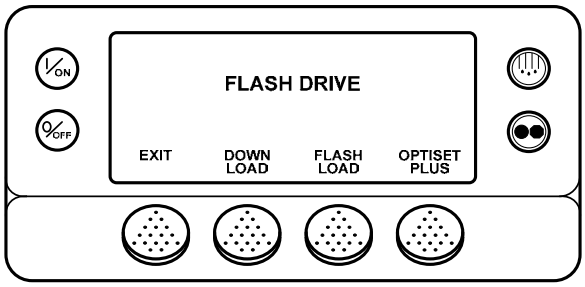
- ✓ OptiSet Plus only uses data files that are in the *.XML format.
- ✓ When sending and retrieving OptiSet Plus data using the USB Flash Drive, the data is transferred between the flash drive and the SR-3 unit using *.OSP files. OptiSet Plus is unable to directly use these *.OSP files. These *.OSP files must be converted to *.XML files before they can be used by OptiSet Plus.
- ✓ This file conversion is done automatically when the files are moved to or from the flash drive using the WinTrac 5.1 Upload > Manage OptiSet Plus Files feature as shown below.

Sending OptiSet Plus Files to the SR-3 Unit using a USB Flash Drive and WinTrac

Retrieving OptiSet Plus Files from the SR-3 Unit using a USB Flash Drive and WinTrac

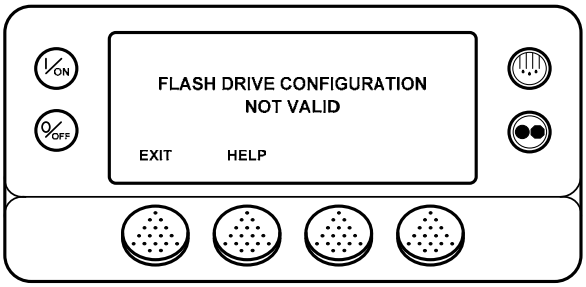
Inserting a USB Flash Drive in the USB Port on the Unit Control Panel

If a properly configured USB Flash Drive is inserted into the USB Port on the unit Control Panel, the Flash Drive Menu will automatically be shown on the HMI Control Panel. The HMI Control Panel will briefly show FLASH DRIVE and FLASH DRIVE DETECTED. Then the Flash Drive Menu will appear as shown below.



The Flash Drive Menu will time out after about 20 seconds. When the Flash Drive Menu times out, the Standard Display will re-appear. To go to the Standard Display immediately press the EXIT Key.

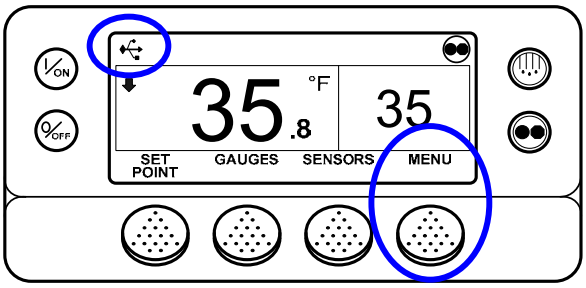
If the Flash Drive has not been properly configured it will not work when connected to the USB Port on the unit Control Panel and an error message will appear on the unit HMI Control Panel as shown below.



NOTE: On occasion some Flash Drives that have been configured using WinTrac may still show this message. If so, a different Flash Drive should be used.

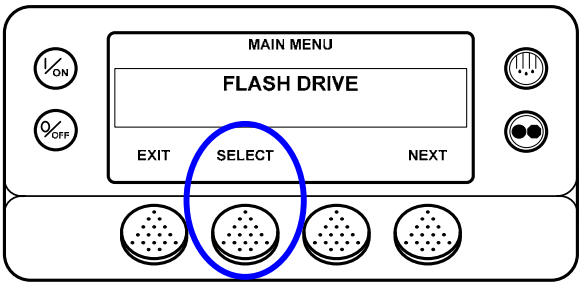
Accessing the Flash Drive Menu from the SR-3 Main Menu

If the USB Icon is present in the upper left corner of the display a USB flash Drive is connected to the unit USB Port on the Control Panel. To access the Flash Drive Menu when a USB Flash Drive is connected to the USB Port, press the MENU Key. **NOTE:** If a USB Flash Drive is not connected to the unit, the Flash Drive Menu feature will not appear in the Main Menu.



NOTE: The USB Icon will appear in the display when a USB Flash Drive is connected; even if the USB Flash Drive has not been configured using WinTrac.

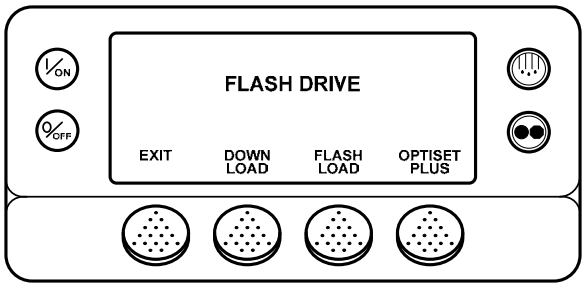
The Main Menu Flash Drive selection will appear. Press the SELECT Key to choose the Flash Drive feature.



The Flash Drive Menu will appear.

- ✓ To down load the ServiceWatch or CargoWatch Data Loggers, press the DOWN LOAD Key.
- ✓ To flash load software to the Base Controller or HMI Control Panel, press the FLASH LOAD Key.
- ✓ To send or retrieve OptiSet Plus files, press the OPTISET PLUS Key.

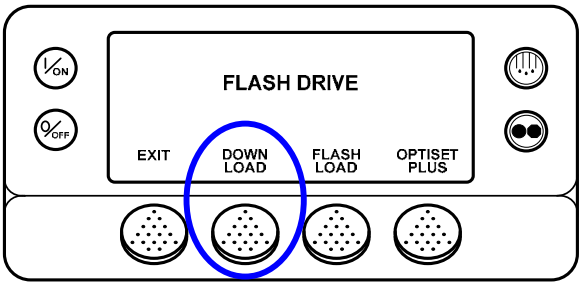
IMPORTANT: If a feature was not enabled when the Flash Drive was configured, the soft key for that feature will not be present.



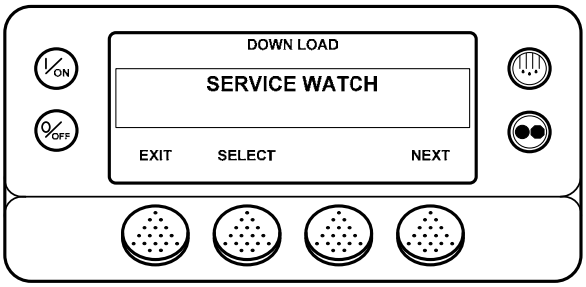
To exit to the Main Menu press the EXIT Key.

Downloading the ServiceWatch or CargoWatch Data Loggers

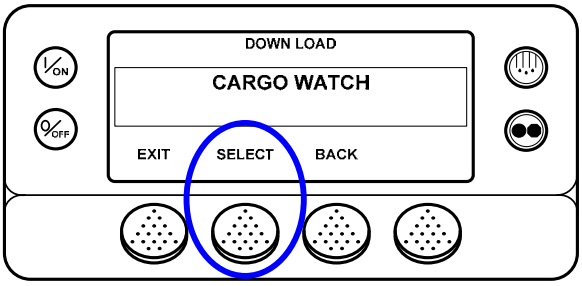
To download the ServiceWatch or CargoWatch Data Loggers press the DOWNLOAD Key from the Flash Drive Menu as shown below.



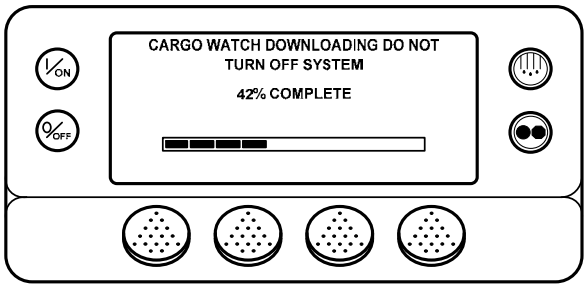
The Down Load Menu will appear as shown below. To start the ServiceWatch Data Logger download, press the SELECT Key.



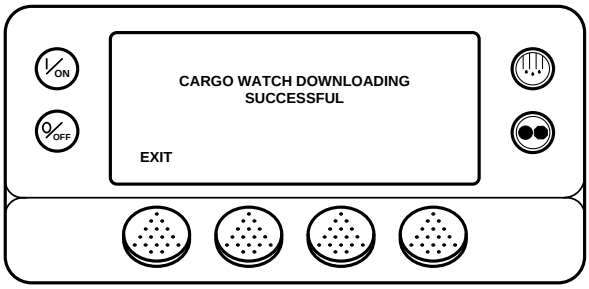
To choose the CargoWatch Data Logger for download, press the NEXT Key to display CARGOWATCH, and then press the SELECT Key to start the CargoWatch download.



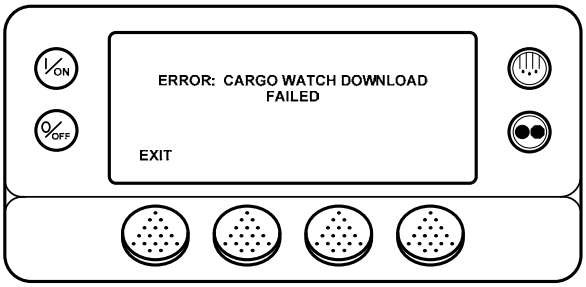
The download screen will appear. A progress bar indicates the download progress. The CargoWatch download screen is shown here.



When the download is complete, the results are reported and the downloaded file is saved to the DOWNLOAD/CARGOWATCH folder on the USB Flash Drive. To return to the Down Load Menu press the EXIT Key.



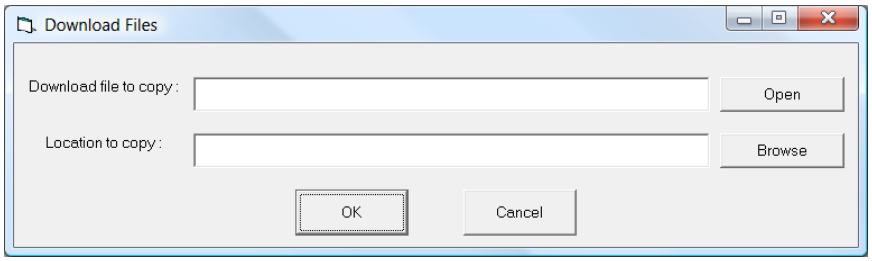
If the download fails, the screen shown below will appear.



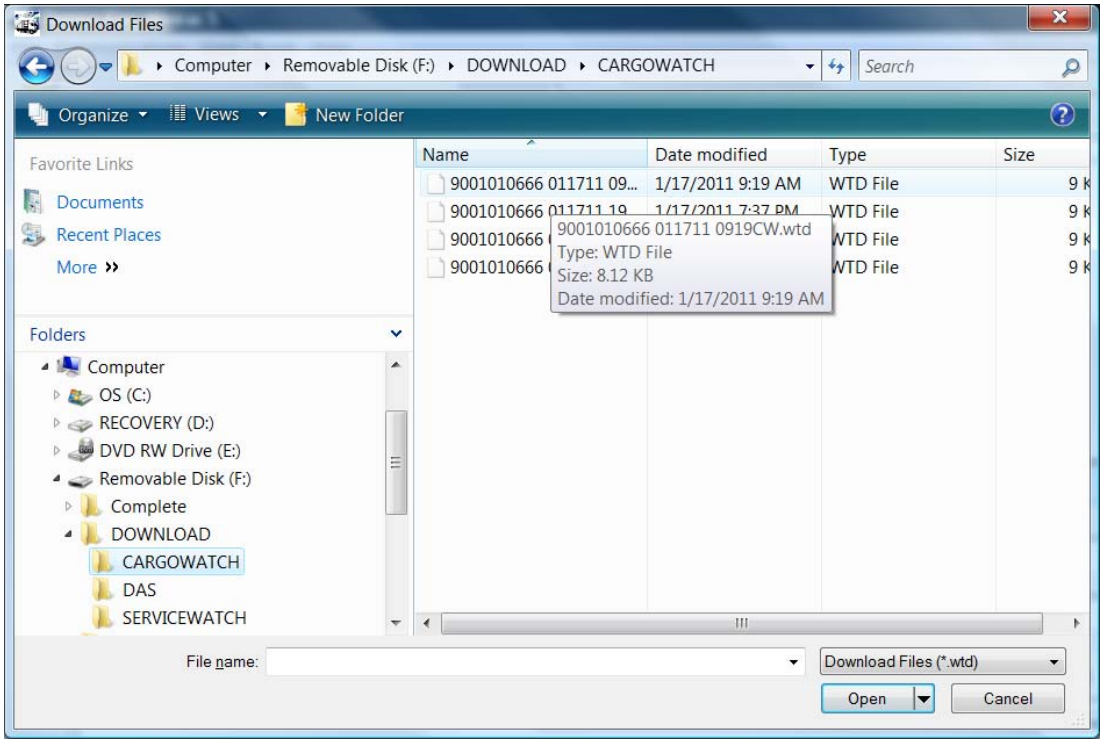
NOTE: The unit being downloaded must have a Trailer ID set by Wintrac. If a Trailer ID has not been assigned to the unit this error will occur.

Managing ServiceWatch and CargoWatch Files using a USB Flash Drive and WinTrac

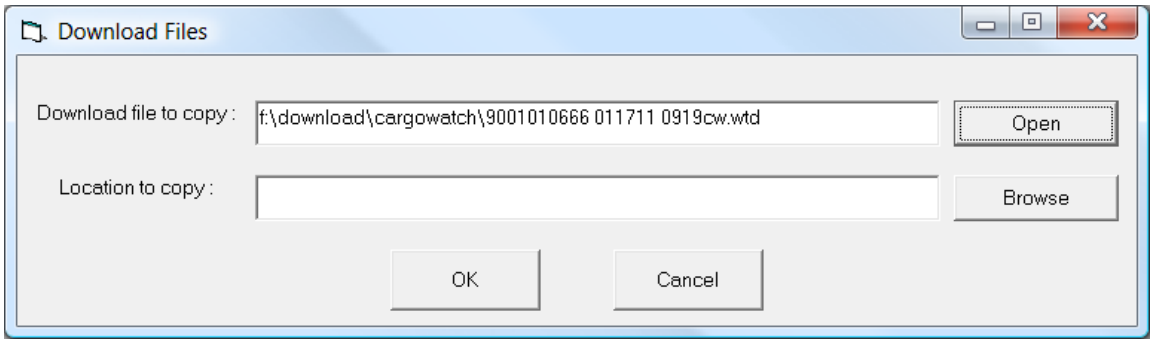
Open WinTrac 5.1 or later and activate the Tools Menu by simultaneously pressing the Ctrl – Shift – T keys. From the WinTrac Tools Menu, select Configure and Manage USB Flash Drive > Upload / Manage Downloaded Files. The screen below will appear.



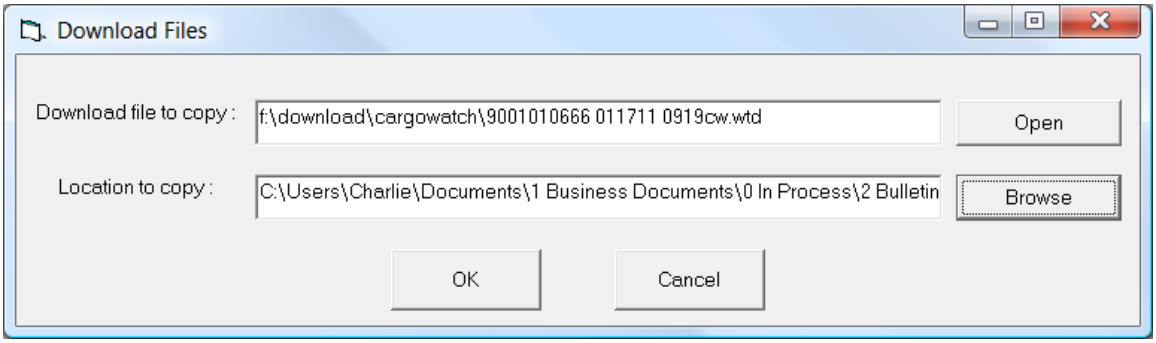
Click Open and choose the desired file to be retrieved from the USB Flash drive as shown below.



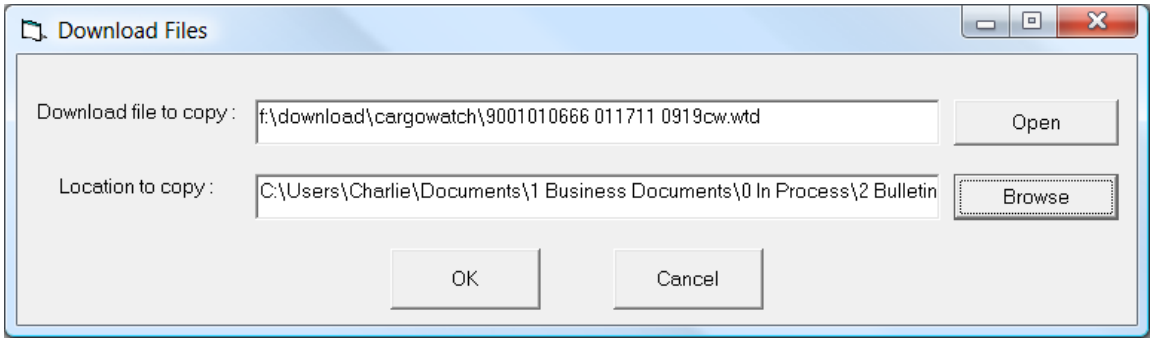
Double click the desired file to open it. The file selection screen shown below will reappear.



Click Browse and browse to the location where you wish to save the downloaded file. Left click OK to continue.

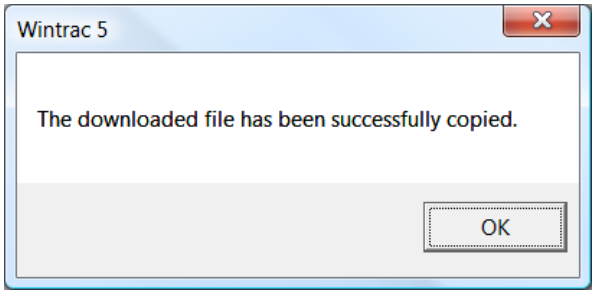


The screen shown below will appear. Confirm that the file name and location are correct and press OK to continue.

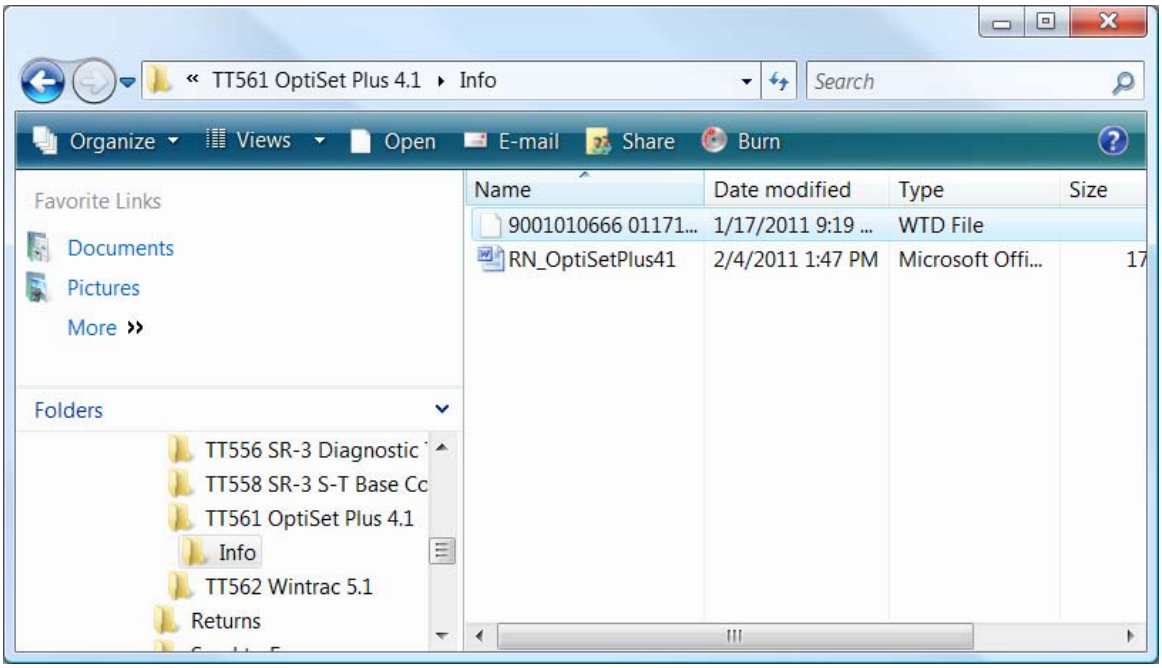


The selected file will be retrieved from the flash drive and placed in the specified location. A confirmation message will appear as shown below. If you wish to delete the file from the USB Flash Drive left click Yes, if not, left click No.

A final confirmation will appear. Left click OK to finish.



The selected file has been placed in the selected location as shown on the next page.



NOTE: The downloaded files can also be moved to the PC Computer using Windows Explorer.

Flash Load Files

If flash loads are to be performed using the USB Flash Drive, the required software flash load files must be copied to the appropriate Flashload directories located on the flash drive.

Flash load files for SR-3 applications will be supplied in two versions.

1. Flashload files will be supplied with the traditional filename extensions .mXX and .cXX in the same manner as in the past. These files are for use when flash loading a unit in the traditional manner using WinTrac on a PC computer connected to the unit with a data cable.

2. Flashload files will also be supplied with the filename extension .FLA. This file is for use when flash loading a unit using a WinTrac 5.1 configured USB Flash Drive.

The Flashload Directory on the configured USB Flash Drive contains sub-directories for HMI and SR3SINGLE TEMP flash load *.FLA files. The *.FLA file must be placed in the correct directory on the flash drive using either the WinTrac 5.1 Upload > Manage Flashload Files feature or Windows Explorer.

Flashload Files on the Internet

When SR-3 Base Controller and HMI Control Panel flash load files are retrieved from the Thermo King iService web site, the flash load files are downloaded as a *.ZIP file. When flash load files for SR-3 applications are unzipped, there will now be three flash load files instead of the usual two.

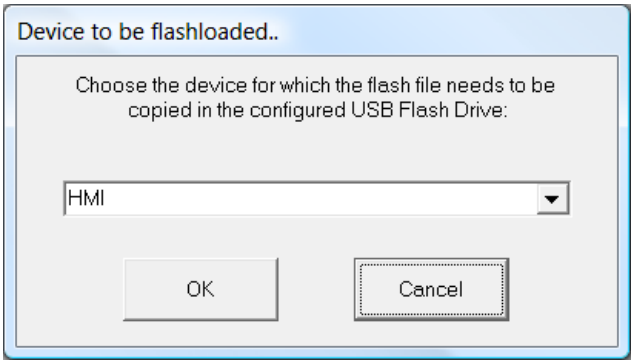
- ✓ The traditional *.mXX and *.cXX files will be unzipped. These two files are for use when flash loading an SR-3 unit in the traditional manner using a Data Cable to connected the PC Computer with WinTrac to the SR-3 Unit.

  NOTE: Both the *.mXX and *.cXX files must be present in order to perform a flash load using a Data Cable, even though only one of them is shown by WinTrac.

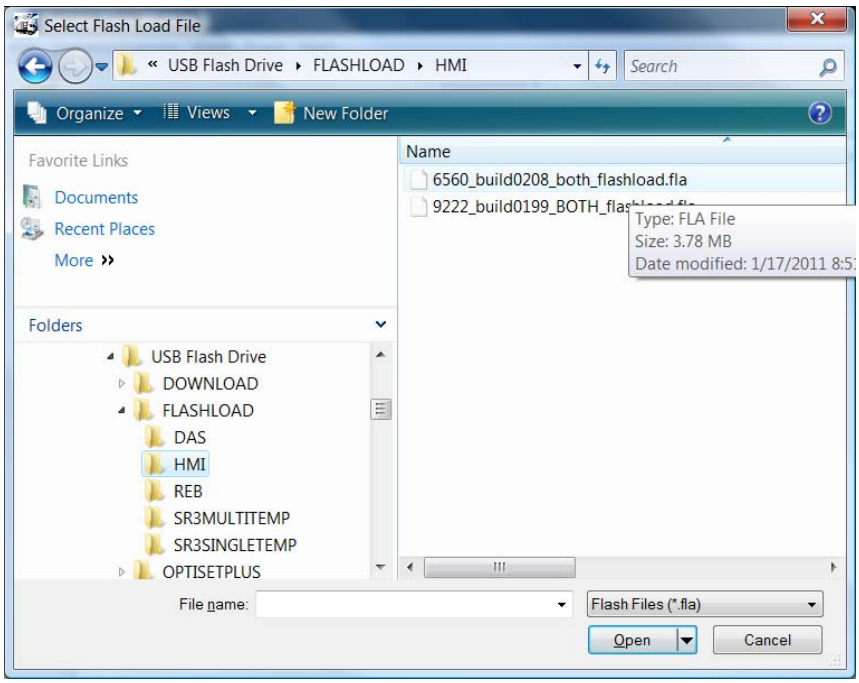
- ✓ A *.FLA file will also be unzipped. This file is for use when flash loading a unit using a WinTrac 5.1 configured USB Flash Drive.

Managing Flash Load Files using a USB Flash Drive and WinTrac

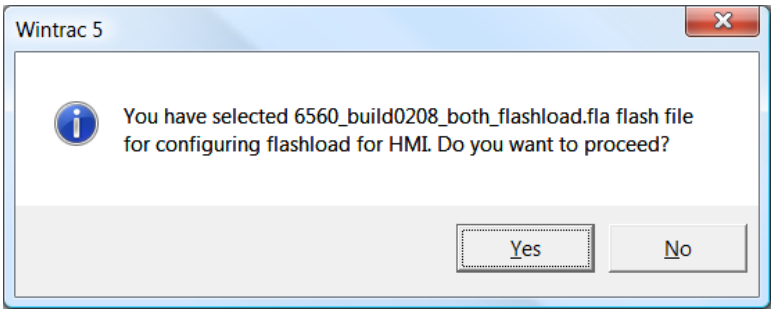
To prepare a *.FLA for flash loading, place the flash load *.FLA file for the desired device (HMI Control Panel or Single Temperature Base Controller) on the PC computer hard drive. Open WinTrac 5.1 or later and activate the Tools Menu by simultaneously pressing the Ctrl – Shift _T keys. From the WinTrac Tools Menu, select Configure and Manage USB Flash Drive > Upload / Manage Flashload Files. The screen below will appear.



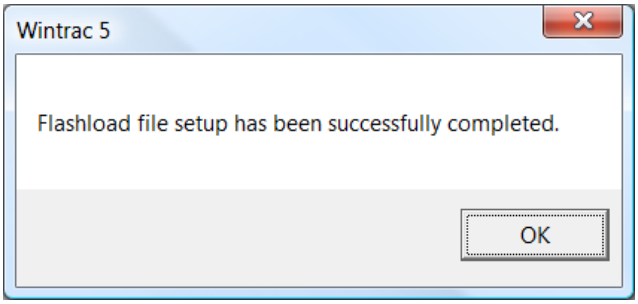
Select the appropriate device using the drop-down menu and left click OK. Browse to the location and select the desired *.FLA file as shown below. Left click Open to continue.



A confirmation message will appear as shown below. If the desired file is shown left click Yes to continue.



A wait message will appear followed by confirmation of the Flashload File Setup as shown below.

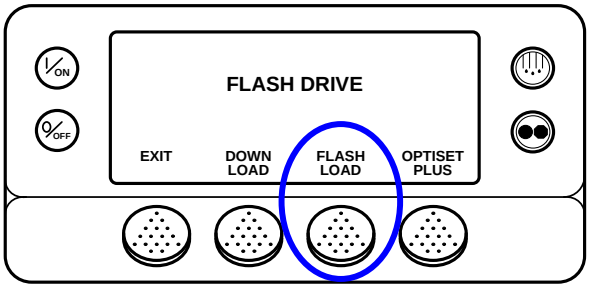


The flash load file has been successfully moved to the USB Flash Drive.

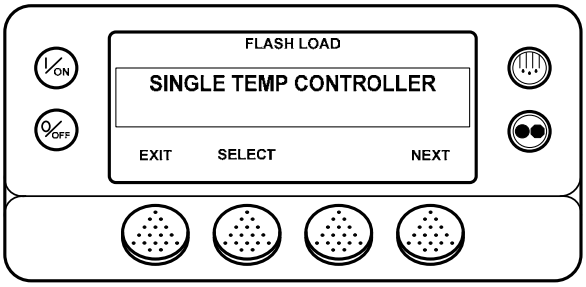
NOTE: The *.FLA flash load files can also be moved to the USB Flash Drive using Windows Explorer.

Flash Loading the SR-3 Base Controller or HMI Control Panel

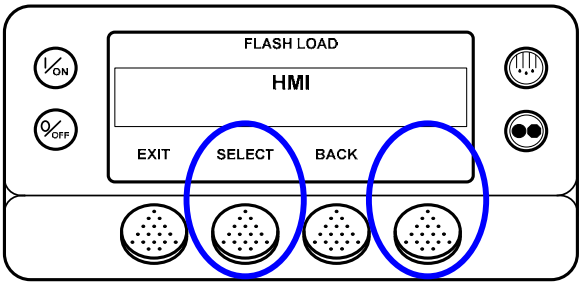
To flash load the Base Controller or HMI Control Panel, press the FLASHLOAD Key from the Flash Drive Menu as shown below.



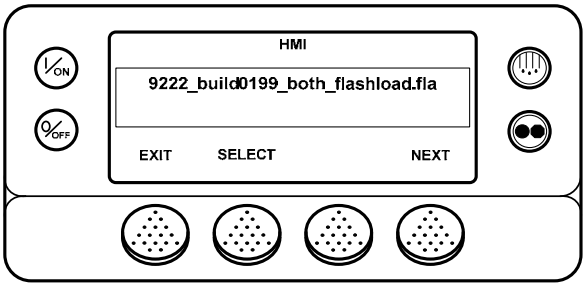
The Flash Load Menu will appear as shown below. The first component in the Flash Load Menu is SINGLE TEMP CONTROLLER as shown below. To flash load the SINGLE TEMP CONTROLLER, press the SELECT Key.



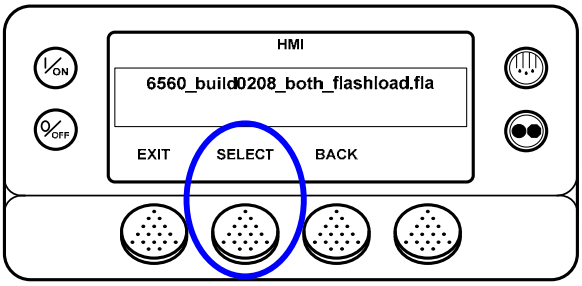
To flash load the HMI Control Panel, press the NEXT Key to display HMI, and then press the SELECT Key to start the HMI Control Panel flash load.



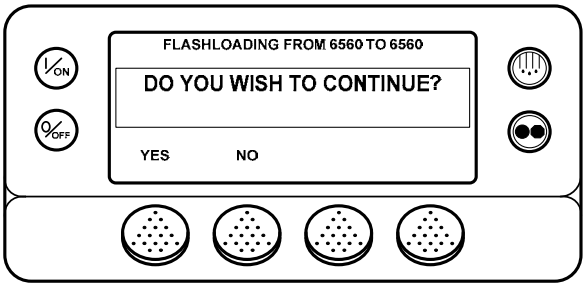
The HMI Flash Load Menu will appear. If there is more than one HMI flash load file on the Flash Drive, the NEXT Key will be present as shown below. If only one HMI flash load file is present on the Flash Drive, the NEXT Key will not appear. Pressing the NEXT Key will display the next flash load file.



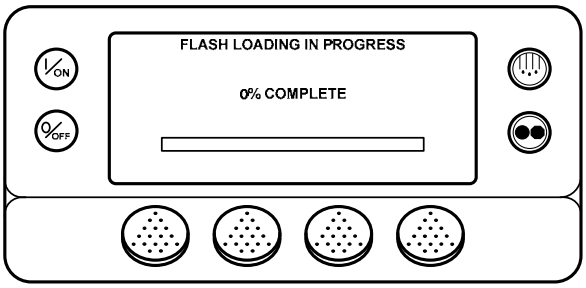
Pressing the NEXT Key will display the next flash load file. Pressing the SELECT Key will flash load the file shown on the display to the HMI Control Panel.



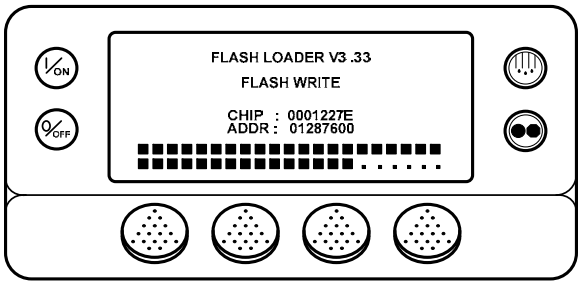
A confirmation screen will appear. If the update shown is correct, press the YES Key.



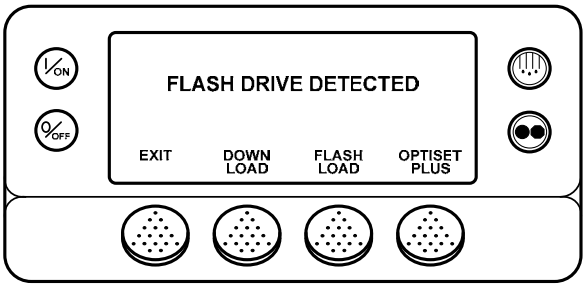
FLASHLOADING IN PROGRESS will be shown on the display while the flash load process initializes. This may take several minutes.



Then the Flash Load Display will appear. Progress is indicated by means of the black boxes in the bottom two rows of the display.



When the flash load is complete the TK Logo will appear briefly in the display. Then the CONFIGURING SYSTEM PLEASE WAIT message is shown as the system restarts. When the unit is ready to run, the Flash Drive Menu appears on the display.



OptiSet Plus Data File Formats when using a USB Flash Drive

If OptiSet Plus is being used with a USB Flash Drive, the file formats of the OptiSet Plus data files must be considered.

IMPORTANT: The WinTrac 5.1 Upload > Manage OptiSet Plus Files feature must be used to move OptiSet Plus files to or from the flash drive or the file conversion process will not take place. Do not move OptiSet Plus files to or from the flash drive using Windows Explorer. Only ServiceWatch and CargoWatch Data Logger data files and flash load *.FLA files can be moved using Windows Explorer.

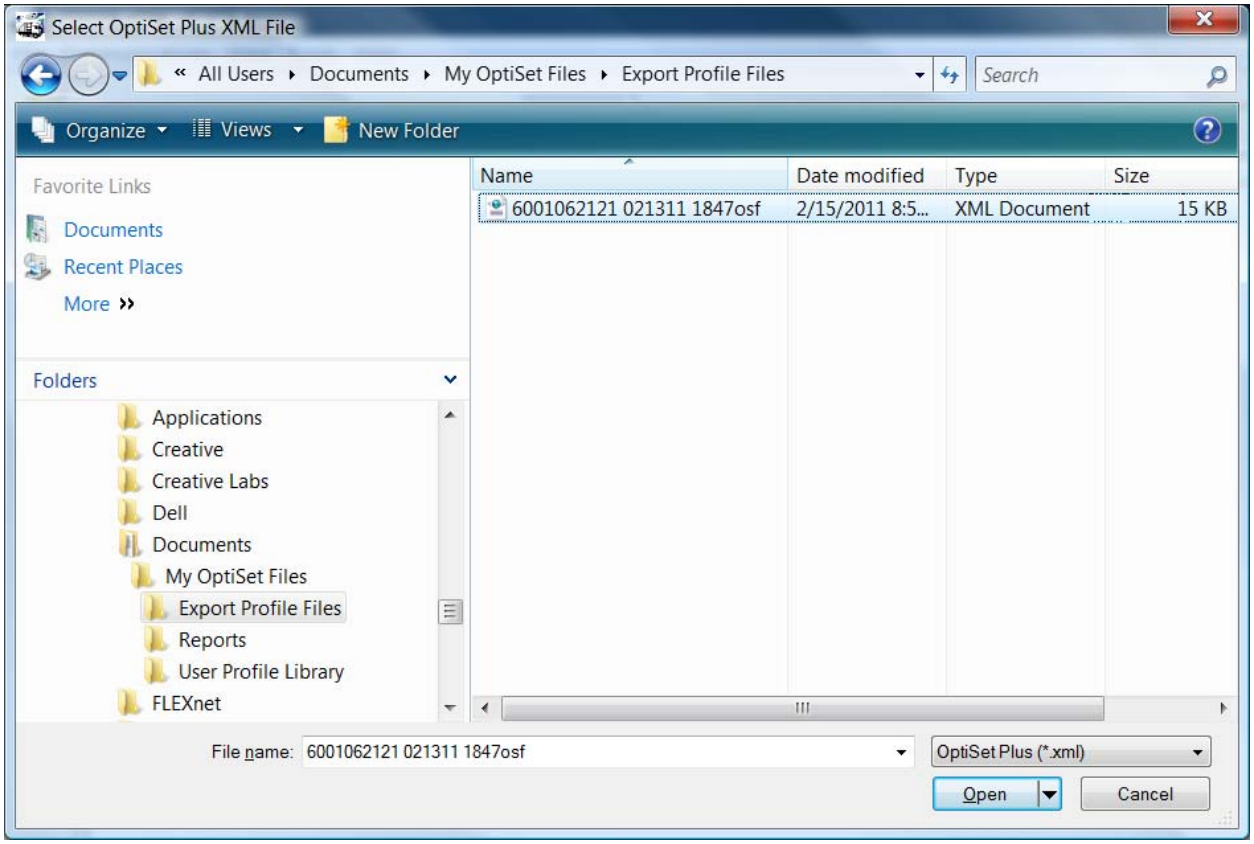
- ✓ OptiSet Plus only uses data files that are in the *.XML format.
- ✓ When sending and retrieving OptiSet Plus data using the USB Flash Drive, the data is transferred between the flash drive and the SR-3 unit using *.OSP files. OptiSet Plus is unable to directly use these *.OSP files. These *.OSP files must be converted to *.XML files before they can be used by OptiSet Plus.
- ✓ This file conversion is done automatically when the files are moved to or from the flash drive using the WinTrac 5.1 Upload > Manage OptiSet Plus Files feature as shown below.

Sending OptiSet Plus Files to the SR-3 Unit using a USB Flash Drive and WinTrac

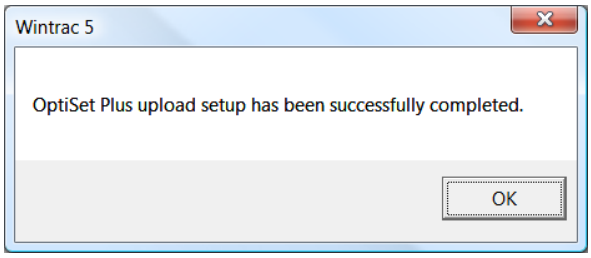
Retrieving OptiSet Plus Files from the SR-3 Unit using a USB Flash Drive and WinTrac

Managing OptiSet Plus Files to be sent to the SR-3 Unit using a USB Flash Drive and WinTrac

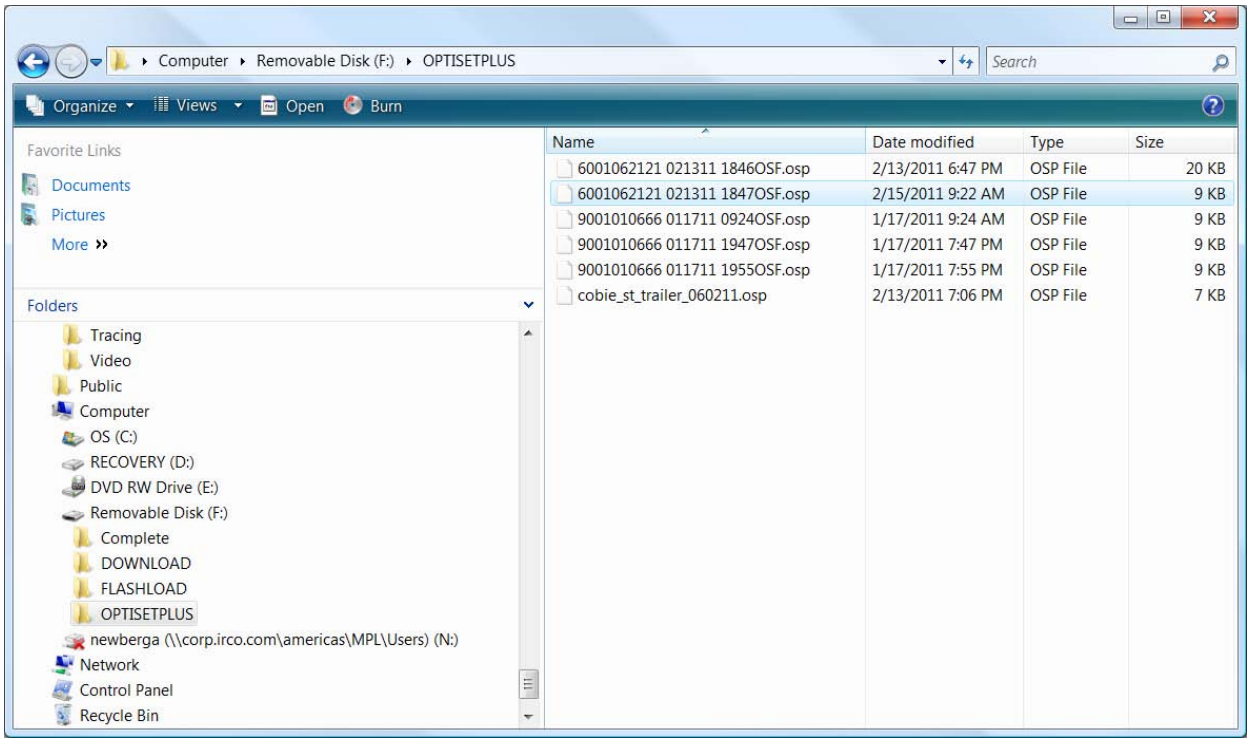
To Convert an OptiSet Plus *.XML File to a *.OSP File and Send it to the USB Flash Drive, open WinTrac 5.1 or later and activate the Tools Menu by simultaneously pressing the Ctrl – Shift _T keys. From the WinTrac Tools Menu select Configure and Manage USB Flash Drive > Upload / Manage OptiSet Plus Files > OptiSet Plus Send. The file selection screen shown below will appear. When the desired file is selected, click Open to continue.



The selected file will be converted from a *.XML file to a *.OSP file and placed in the OptiSet folder on the flash drive. A confirmation message will appear as shown below. Left click OK to finish.

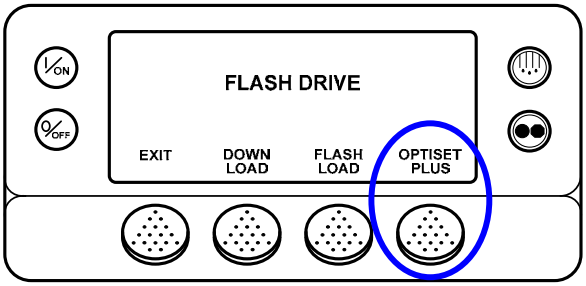


The selected file has been converted from a *.XML file to a *.OSP file and placed in the OptiSet Folder on the USB Flash Drive as shown below.

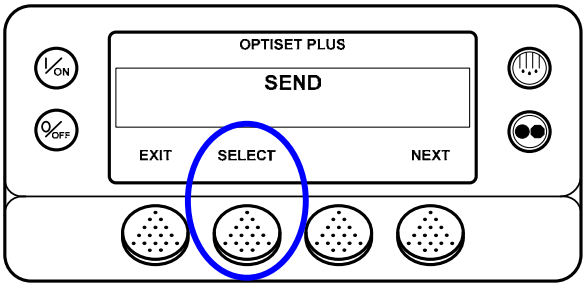


Sending OptiSet Plus Files to the SR-3 Unit using a USB Flash Drive and WinTrac

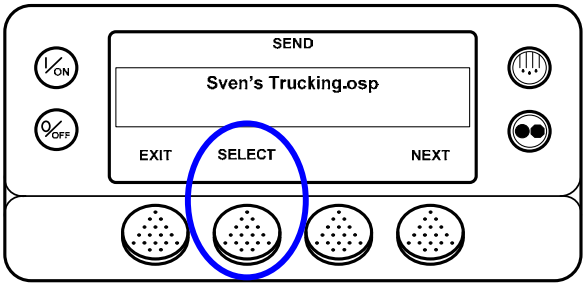
The Flash Drive allows OptiSet Plus configurations to be sent to the Base Controller. It also allows OptiSet Plus information to be retrieved as needed. To Send an OptiSet Plus Configuration File to the Base Controller, press the OPTISET PLUS Key.



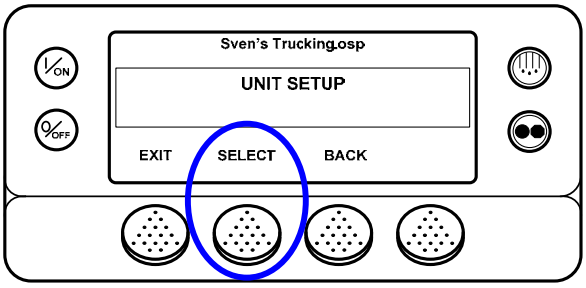
The SEND Menu is the first menu to appear as shown below. Press the SELECT Key to choose the SEND option.



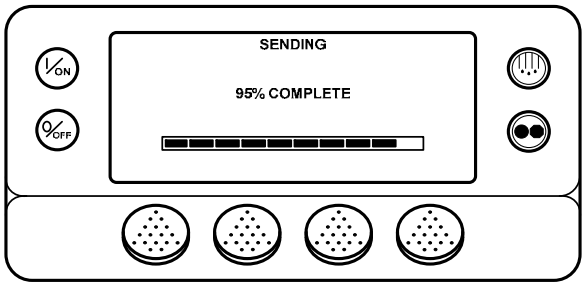
Press the SELECT Key to choose the SEND option. The files available for uploading are shown, one at a time. If only one file is available, the NEXT Key and BACK Key will not be present. If more than one file is available, they can be chosen using the NEXT Key and BACK Key. When the desired file is shown, press the SELECT Key to choose it.



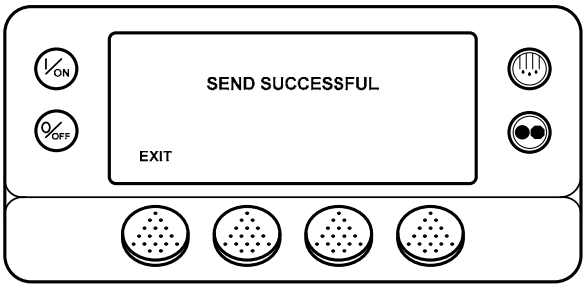
There is a brief pause to get and display the available choices. The NEXT Key and BACK Key are used to scroll through the possible choices. Choices are typically UNIT SETUP + TEMP PROFILES, TEMPERATURE PROFILES and UNIT SETUP. When the desired choice is shown on the display, press the SELECT Key. UNIT SETUP is shown here.



The Unit Setup information is sent to the Base Controller. A progress bar indicates percent completion.

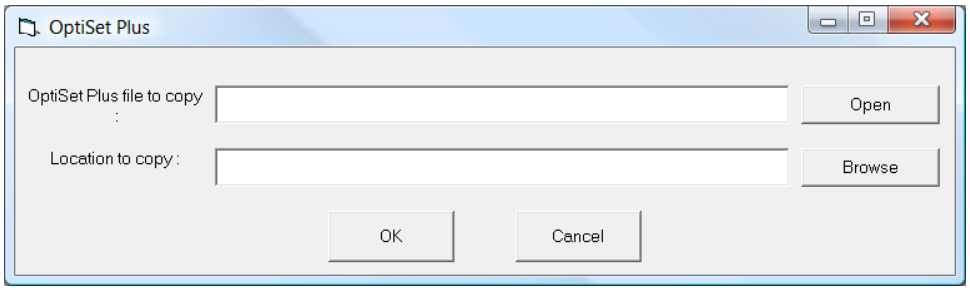


A successful send is confirmed on the display. Press the EXIT Key to return to the Flash Drive Menu.

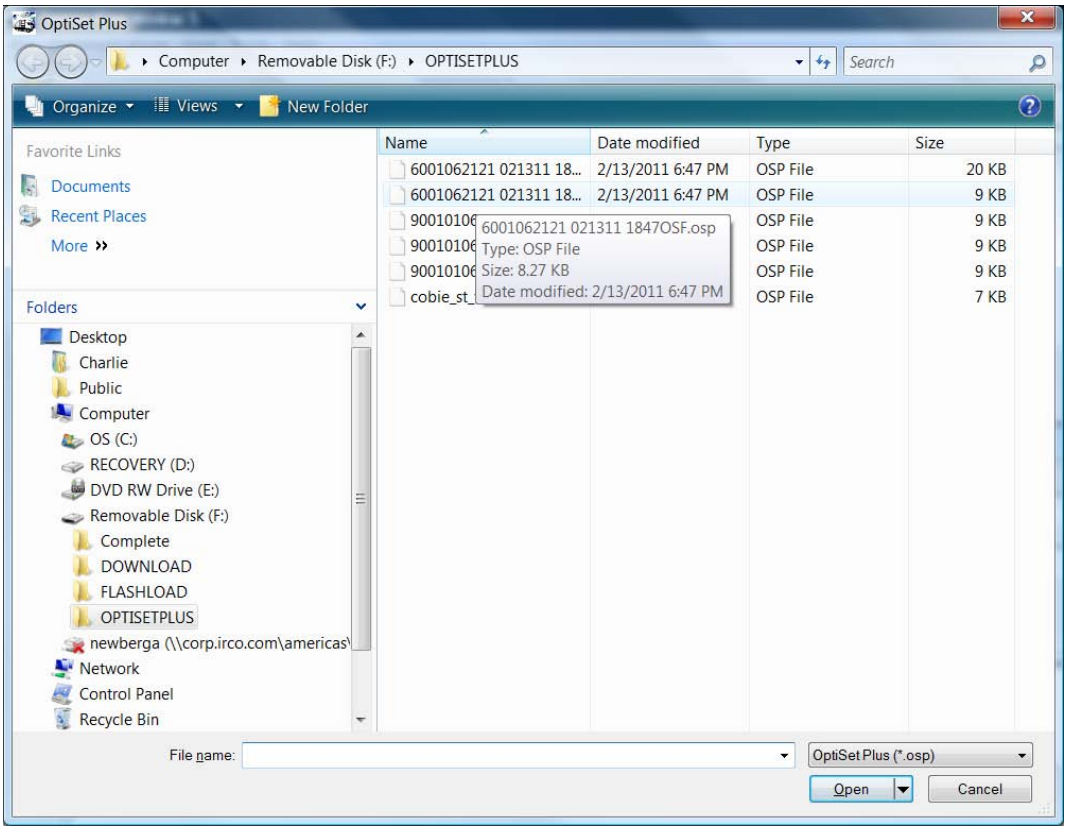


Managing OptiSet Plus Files retrieved from the SR-3 Unit using a USB Flash Drive and WinTrac

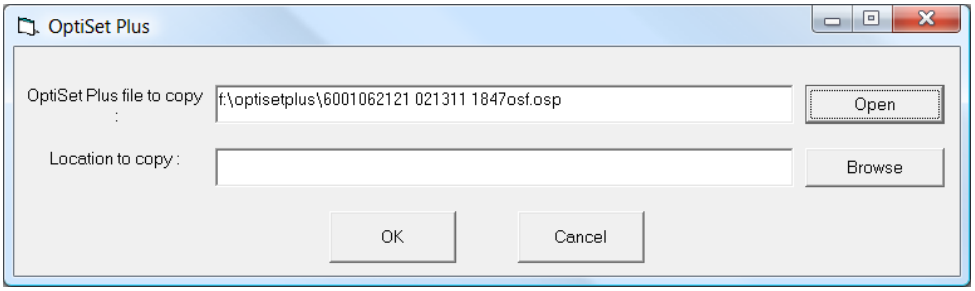
To Retrieve an OptiSet Plus *.OSP File from the USB Flash Drive and Convert to a *.XML File, open WinTrac 5.1 or later and activate the Tools Menu by simultaneously pressing the Ctrl – Shift _T keys. From the WinTrac Tools Menu select Configure and Manage USB Flash Drive > Upload / Manage OptiSet Plus Files > OptiSet Plus Retrieve. The file selection screen shown below will appear.



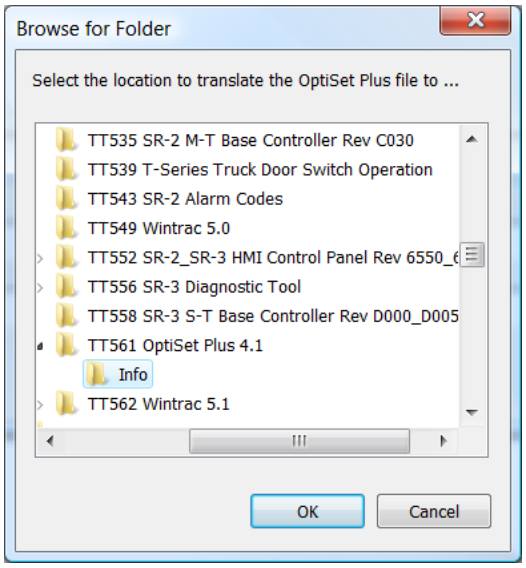
Click Open and choose the desired file to be retrieved from the USB Flash drive as shown below.



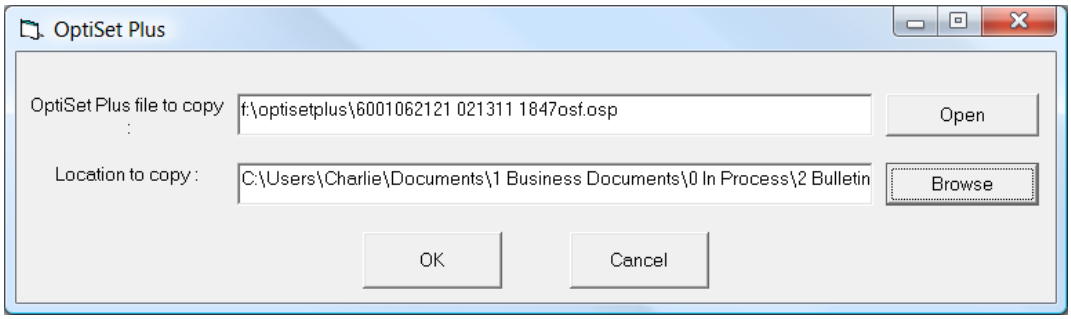
Double click the desired file to open it. The file selection screen shown below will reappear.



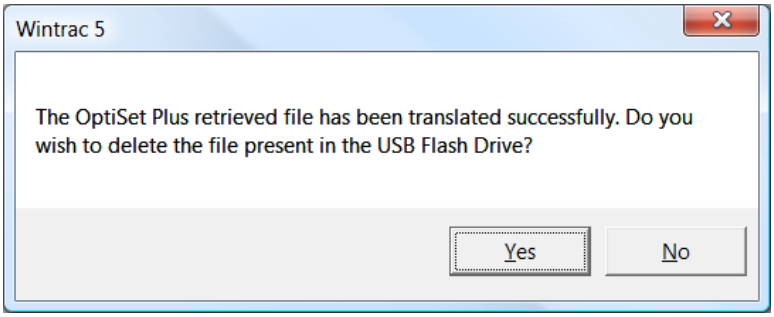
Click Browse and browse to the location where you wish to save the OptiSet Plus file. Left click OK to continue.



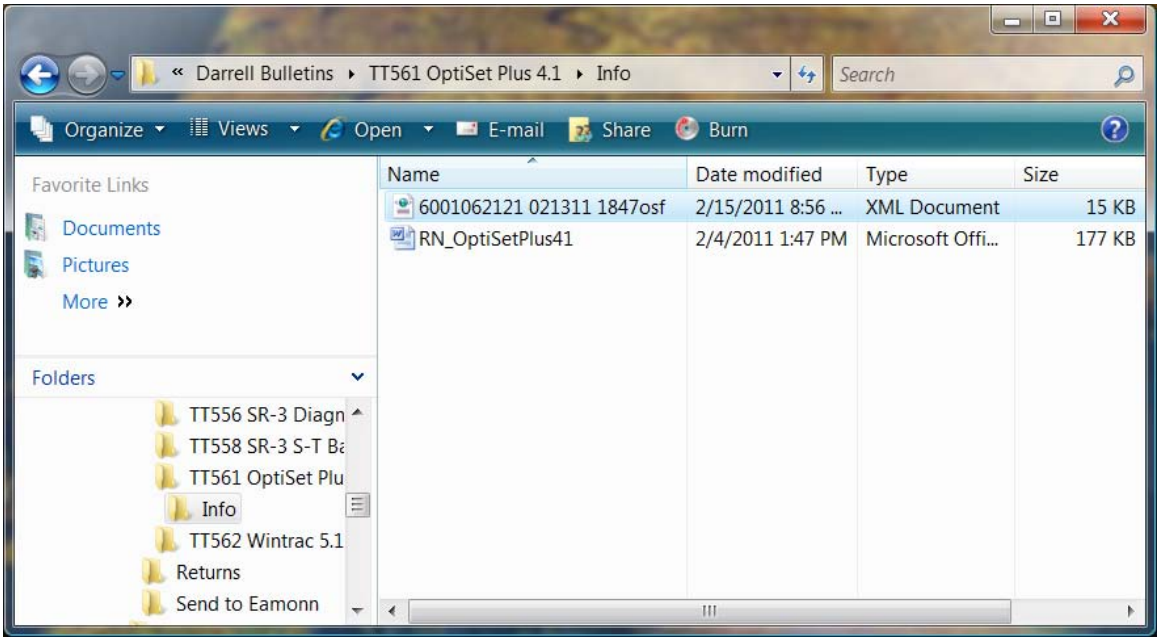
The screen shown below will appear. Confirm that the file name and location are correct and press OK to continue.



The selected file will be retrieved from the flash drive, converted to a *.XML file and placed in the specified location. A confirmation message will appear as shown below. If you wish to delete the file from the USB Flash Drive left click Yes, if not, left click No.

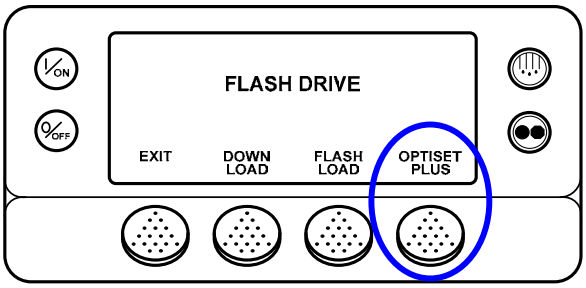


The selected file has been converted from a *.OSP file to a *.XML file and placed in the selected location as shown below.

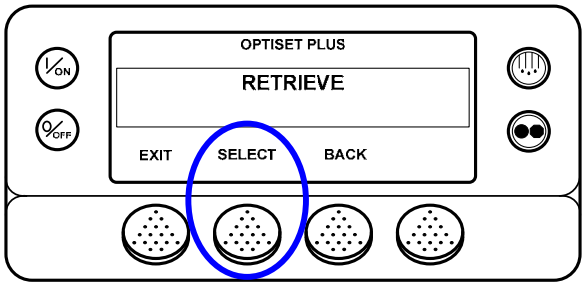


Retrieving OptiSet Plus Files from the SR-3 Unit using a USB Flash Drive and WinTrac

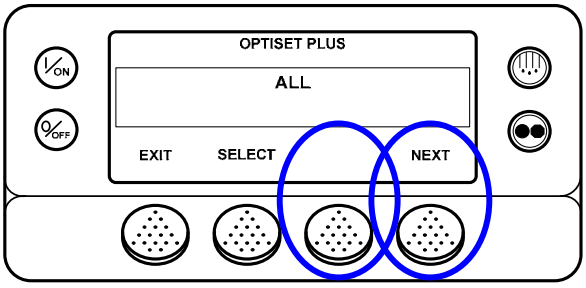
OptiSet Plus Configuration files can be retrieved for modification or for use with other units. To retrieve an OptiSet Plus Configuration File from the Base Controller, press the OPTISET PLUS Key.



The SEND Menu is the first menu to appear as shown below. Press the NEXT Key to display RETRIEVE and press the SELECT Key to choose the RETRIEVE option.



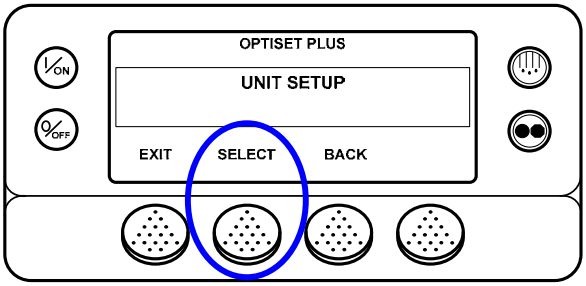
The files available for retrieval are shown, one at a time. The NEXT Key and BACK Key are used to select the desired file. The first choice is ALL as shown below. **NOTE:** The BACK Key will appear after the NEXT Key is pressed.



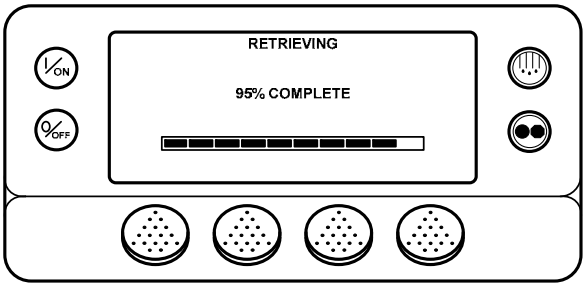
The following choices are available:

- ✓ ALL – Includes all of the files shown below.
  - ✓ CARGO SETUP + TEMP
  - ✓ UNIT SETUP + TEMP PROFILES
  - ✓ UNIT + CARGO WATCH SETUP
  - ✓ TEMPERATURE PROFILES
  - ✓ CARGO WATCH SETUP
  - ✓ UNIT SETUP

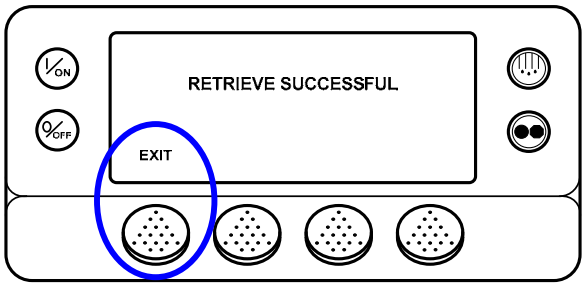
When the desired file is shown, press the SELECT Key to choose it.



The desired file is retrieved and saved to the flash Drive. A progress bar indicates percent completion.

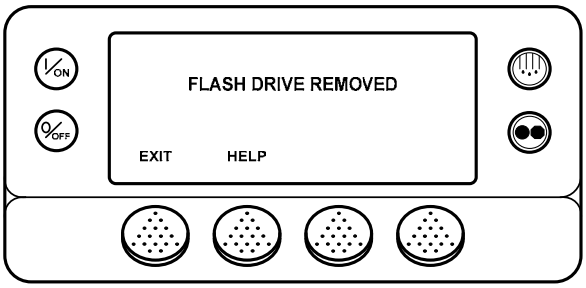


A successful retrieval is confirmed on the display. Press the EXIT Key to return to the Flash Drive Menu.



Removing a USB Flash Drive from the Unit USB Port

BE sure all USB Flash Drive operations have completed before removing the Flash Drive from the USB Port on the unit. To remove the USB Flash Drive, simply unplug it from the USB Port. The display shown below will appear briefly, followed by the Standard Display. The USB Icon will no longer be present.

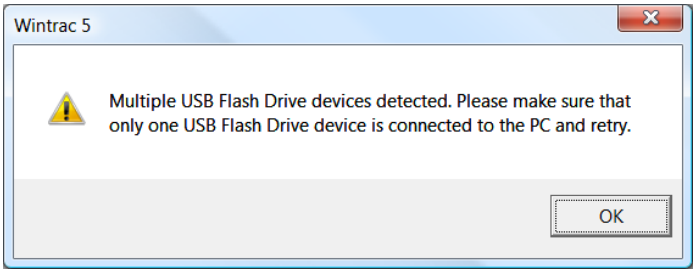


IMPORTANT: Never remove the USB Flash Drive from the USB Port when it is actively doing a read or write operation.

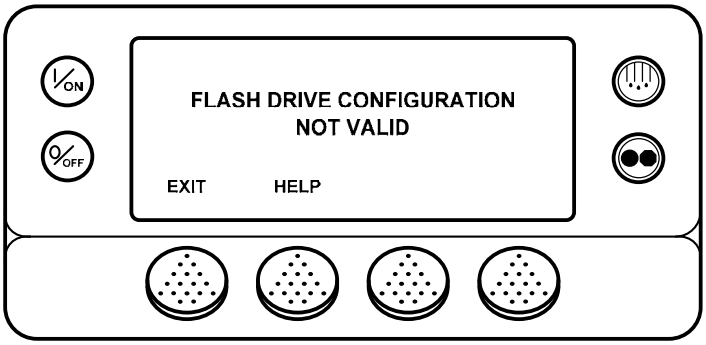
WinTrac Error Messages when using a USB Flash Drive

If either of the error messages shown below appears, the connected flash drive may not be able to be configured. If the error message continues to appear, a different flash drive may need to be used.

NOTE: Some larger flash drives are formatted by the manufacturer as two separate drives. For example, when the flash drive is connected to a PC computer it may appear as two drives – (F:) and (G:).



If the HMI Control Panel displays a message similar to the one shown below the WinTrac configuration has failed, even if the configuration process using WinTrac was reported to be successful. If the error message continues to appear, a different flash drive may need to be used.



Languages

If the Language Feature has been enabled from the Guarded Access Language Menu, an alternate language or languages can be selected from the Language Menu. After a new language is chosen all displays will appear in that language. If the Language Feature has not been enabled this menu does not appear. The default language is English. Only languages specifically enabled from the Guarded Access Language Menu are available.

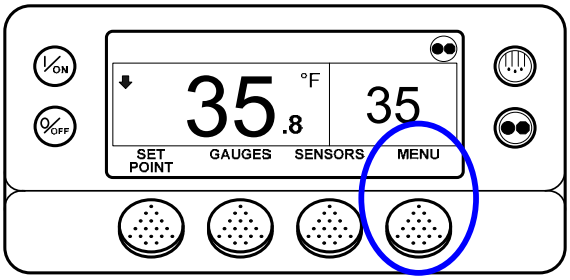
IMPORTANT: Exercise care when changing languages, as once changed all HMI Control Panel displays will be in the new language. If the user is not familiar with the new language, problems may be experienced returning to the default language.

The languages available are dependent on the HMI Control Panel software revision.

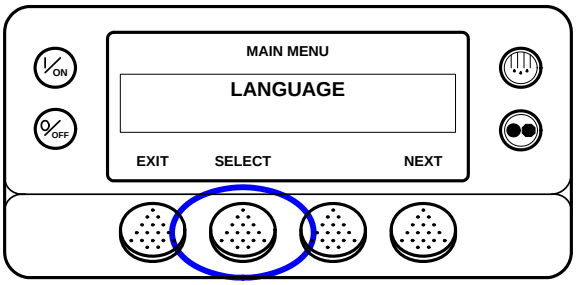
- Software Revision 65xx supports English, Spanish, French, German, Italian, Dutch, Portuguese, Greek, Turkish, Hebrew and Arabic.
- Software Revision 66xx supports English, Danish, Russian, Norwegian, Swedish, Finnish, Polish, Hungarian, Romanian, Bulgarian and Czech.
- Software Revision 67xx supports English, Japanese and Chinese.
- Software Revision 68xx supports English, English and Spanish or allows any 5 languages from Software Revision 65xx and Software Revision 66xx to be selected. Note that Japanese and Chinese are not available for use with this feature.

Other than the languages supported, software revisions 65xx, 66xx, 67xx and 68xx are identical.

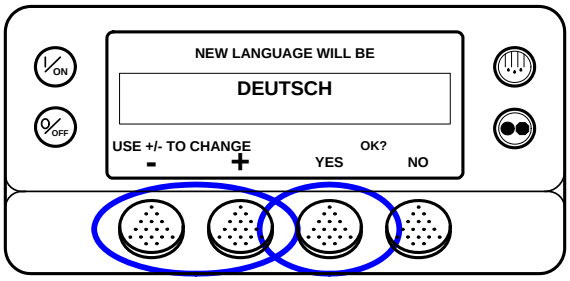
To select an alternate language, press the MENU Key.



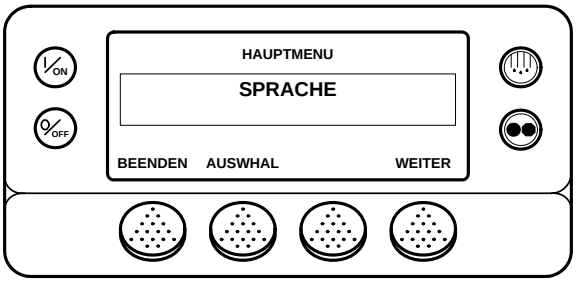
If more than one language is enabled, the Language Menu is the first Main Menu item to appear as shown below. Press the SELECT Key to choose the Language menu.



The Language menu will appear as shown below. Press the + or – Keys to select the desired language. Only languages enabled from the Guarded Access Menu are available. When the desired language is shown press the YES Key to confirm the choice.



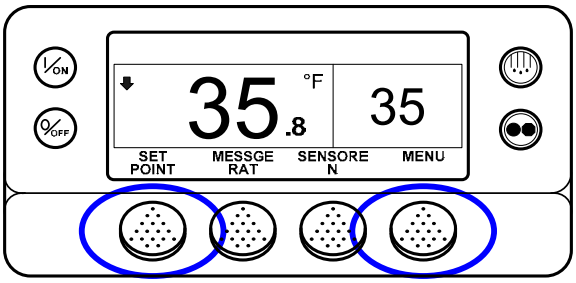
The display will briefly show PROGRAMMING LANGUAGE – PLEASE WAIT in the new language. The display will then return to the Language Menu, but will show the new language. German is shown below.



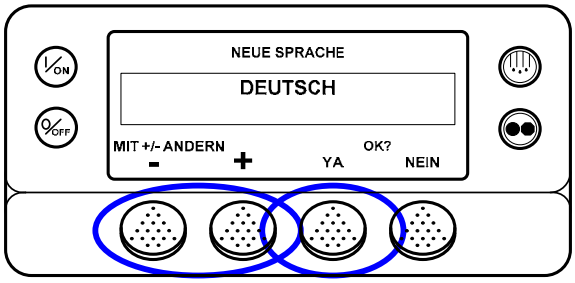
Repeat the process to select a different language. To select a different Main Menu item press the NEXT Key. To return to the Standard Display press the EXIT Key.

IMPORTANT: If necessary, English and all other languages in the software version may be accessed from the Standard Display.

Should it be necessary at any time to change to English or any other language in the installed software, return to the Standard Display and then press and hold the first and last soft keys for 5 seconds as shown below. The Standard Display here is shown in Deutsch (German).



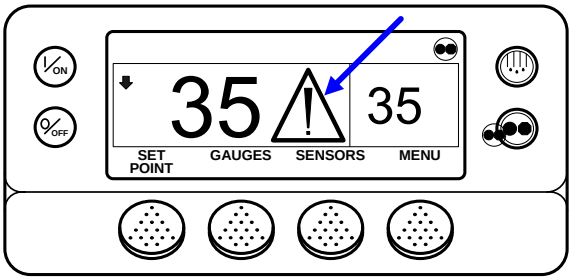
After 5 seconds the Language Menu will appear in the current language as shown below. Press the + or – Keys to select the desired language. When the desired language is shown press the YES Key to confirm the choice.



Note that all languages in the installed software can be selected using this method.

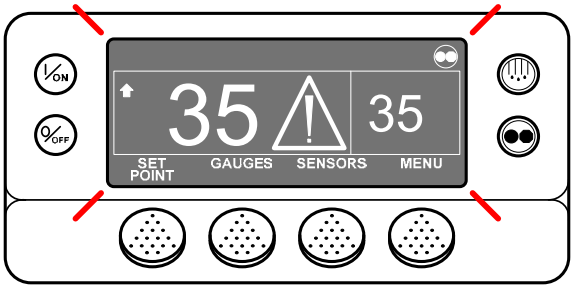
Alarms

If an alarm condition occurs the alarm icon will appear as shown below.



If a Shutdown Alarm occurs it will be indicated by all of the following:

- The Alarm Icon will appear.
- The display and backlight will flash on and off.
- The display will switch from normal video to reverse video and back to normal video. (Light areas become dark and dark areas become light.)



Pretrip Alarm Codes

If an alarm occurs during a Pretrip Test the alarm code will be displayed as Pretrip Alarm XX, where XX is the alarm code.

Alarm Codes When Switching Between Diesel and Electric

If a shutdown alarm occurs that affects only diesel mode operation and the unit is switched to electric, the diesel mode shutdown alarm becomes an electric mode log alarm. This allows the unit to run in electric mode without clearing the shutdown alarm that is preventing diesel mode operation. If the unit is switched back to diesel mode, the alarm again become a diesel mode shutdown alarm and prevents unit operation.

In the same manner, if a shutdown alarm occurs that affects only electric mode operation and the unit is switched to diesel, the electric mode shutdown alarm becomes a diesel mode log alarm to allow diesel mode operation. If the unit is switched back to electric mode, the alarm reverts to an electric mode shutdown alarm and prevents unit operation. If the unit is configured for electric to diesel autoswitch, it automatically starts and runs in diesel mode if an electric shutdown occurs.

Clearing Alarm Codes

Most alarm codes can be cleared conventionally from the Alarm Menu using the CLEAR Key.

The following control and display sensor alarm codes can only be cleared from the Maintenance Menu or Guarded Access Menu:

- Alarm Code 03 Check Control Return Air Sensor
- Alarm Code 04 Check Control Discharge Air Sensor
- Alarm Code 203 Check Display Return Air Sensor
- Alarm Code 204 Check Display Discharge Air Sensor

The following alarm codes clear automatically:

- Alarm Code 64 Pretrip Reminder – Clears when a Pretrip Test is performed.
- Alarm Code 84 Restart Null – Clears when the unit is no longer in a restart null due to a Prevent Alarm.
- Alarm Code 85 Forced Unit Operation – Clears when the unit is no longer running in a forced mode due to a Prevent Alarm.
- Alarm Code 91 Check Electric Ready Input – Clears automatically when the unit starts running.
- Alarm Code 92 Sensor Grades Not Set – Clears when the sensor grade is changed from 5H.

If the Limited Alarm Restarts feature is enabled the following additional alarm codes may only be cleared from the Guarded Access Menu. If this is the case, the CLEAR soft key will not appear if the alarms are displayed from the Main Menu or the Maintenance Menu. See the Limited Alarm Restarts feature in Section 3 for details.

- Alarm Code 10 High Discharge Pressure
- Alarm Code 23 Cooling Cycle Fault
- Alarm Code 24 Heating Cycle Fault
- Alarm Code 32 Refrigeration Capacity Low

SR-3 Alarm Codes

NOTE: Not all alarm codes are used with all applications

Code	Description	Operator Help
00	No Alarms Exist	
02	Check Evaporator Coil Sensor	Manually monitor load temperature. Report alarm at end of the day.
03	Check (Control) Return Air Sensor	Manually monitor load temperature. Report alarm at end of the day.
04	Check (Control) Discharge Air Sensor	Manually monitor load temperature. Report alarm at end of the day.
05	Check Ambient Air Sensor	Report alarm at end of the day.
06	Check Coolant Temp Sensor	Report alarm at end of the day.
07	Check Engine RPM Sensor	Report alarm at end of the day.
09	High Evaporator Temperature	Manually monitor load temperature. Report alarm at end of the day.
10	High Discharge Pressure	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
11	Unit Controlling on Alternate Sensor	Manually monitor load temperature. Report alarm at end of the day.
12	Sensor or Digital Input Shutdown	The indicated zone is not longer able to operate and has been shut down. Repair immediately.
13	Sensor Check	Manually monitor load temperature. Report alarm at end of the day.
15	Check Glow Plugs or Intake Air Heater	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
17	Engine Failed to Crank	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.

NOTE: Not all alarm codes are used with all applications

Code	Description	Operator Help
18	High Engine Coolant Temperature	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
19	Low Engine Oil Pressure	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
20	Engine Failed to Start	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
21	Cooling Cycle Check	Manually monitor load temperature. Report alarm at end of the day.
22	Heating Cycle Check	Manually monitor load temperature. Report alarm at end of the day.
23	Cooling Cycle Fault	The indicated zone is not longer able to operate and has been shut down. Repair immediately.
24	Heating Cycle Fault	The indicated zone is not longer able to operate and has been shut down. Repair immediately.
25	Alternator Check	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
26	Check Refrigeration Capacity	Manually monitor load temperature. Report alarm at end of the day.
28	Pretrip or Self Check Abort	Report alarm at end of the day.
29	Defrost Damper Circuit Check	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
30	Defrost Damper Stuck	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
31	Check Oil Pressure Switch	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
32	Refrigeration Capacity Low	The indicated zone is not longer able to operate and has been shut down. Repair immediately.

NOTE: Not all alarm codes are used with all applications

Code	Description	Operator Help
33	Check Engine RPM	Report alarm at end of the day.
35	Check Run Relay Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
36	Electric Motor Failed to Run	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
37	Check Engine Coolant Level	Report alarm at end of the day.
38	Electric Phase Reversed	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
40	Check High Speed Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
41	Check Engine Coolant Temperature	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
42	Unit Forced to Low Speed	Report alarm at end of the day.
43	Unit Forced to Low Speed Modulation	Report alarm at end of the day.
44	Check Fuel System	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
45	Hot Gas or Hot Gas Bypass Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
46	Check Air Flow	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
48	Check Belts or Clutch	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
50	Reset Clock	Report alarm at end of the day.

NOTE: Not all alarm codes are used with all applications

Code	Description	Operator Help
52	Check Heat Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
54	Test Mode Timeout	Service Test or Interface Board Test timed out after 15 minutes. Report alarm at end of the day.
61	Low Battery Voltage	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
62	Ammeter Out of Calibration	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
63	Engine Stopped	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
64	Pretrip Reminder	Report alarm at end of the day.
65	Abnormal Temperature Differential	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
66	Low Engine Oil Level	Check engine oil level. If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
67	Check Liquid Line Solenoid Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
68	Internal Controller Fault Code	Report alarm at end of the day.
70	Hourmeter Failure	Report alarm at end of the day.
74	Controller Reset to Defaults	Report alarm at end of the day.
77	Controller EPROM Checksum Failure	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
79	Internal Data Logger Overflow	Report alarm at end of the day.

NOTE: Not all alarm codes are used with all applications

Code	Description	Operator Help
80	Check Compressor Temp Sensor	Report alarm at end of the day.
81	High Compressor Temp	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
82	High Compressor Temp Shutdown	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
83	Low Engine Coolant Temperature	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
84	Restart Null	Report alarm at end of the day.
85	Forced Unit Operation	Report alarm at end of the day.
86	Check Discharge Pressure Sensor	Report alarm at end of the day.
87	Check Suction Pressure Sensor	Report alarm at end of the day.
89	Check Electronic Throttling Valve Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
90	Electric Overload	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
91	Check Electric Ready Input	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
92	Sensor Grades Not Set	Report alarm at end of the day.
93	Low Compressor Suction Pressure	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
94	Check Loader #1 Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.

NOTE: Not all alarm codes are used with all applications

Code	Description	Operator Help
95	Check Loader #2 Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
96	Low Fuel Level	Check engine fuel level. If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
98	Check Fuel Level Sensor	Report alarm at end of the day.
99	High Compressor Pressure Ratio	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
105	Check Receiver Tank Pressure Solenoid Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
106	Check Purge Valve Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
107	Check Condenser Inlet Solenoid Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
108	Door Open Timeout	Close Doors. Report alarm at end of the day.
110	Check Suction Line Solenoid Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
111	Unit Not Configured Correctly	Report alarm at end of the day.
112	Check Remote Fans	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
113	Check Electric Heat Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
114	Multiple Alarms – Can Not Run	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
115	Check High Pressure Cut Out Switch	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.

NOTE: Not all alarm codes are used with all applications

116	Check High Pressure Cut In Switch	Report alarm at end of the day.
117	Auto Switch from Diesel to Electric	Report alarm at end of the day.
118	Auto Switch from Electric to Diesel	Report alarm at end of the day.
120	Check Alternator Excite Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
121	Check Liquid Injection Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
122	Check Diesel/Electric Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
127	Setpoint Not Entered	Be sure the setpoint is set to the required temperature.
128	Engine Run Time Maintenance Reminder #1	Report alarm at end of the day.
129	Engine Run Time Maintenance Reminder #2	Report alarm at end of the day.
130	Electric Run Time Maintenance Reminder #1	Report alarm at end of the day.
131	Electric Run Time Maintenance Reminder #2	Report alarm at end of the day.
132	Total Unit Run Time Maintenance Reminder #1	Report alarm at end of the day.
133	Total Unit Run Time Maintenance Reminder #2	Report alarm at end of the day.
134	Controller Power On Hours	Report alarm at end of the day.

NOTE: Not all alarm codes are used with all applications

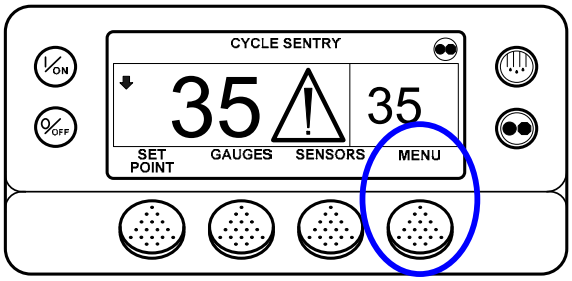
Code	Description	Operator Help
135	Check Spare Digital Inputs	Report alarm at end of the day.
136	Check Spare Digital Outputs	Report alarm at end of the day.
137	Check Damper Gear Motor Heater Output	Report alarm at end of the day.
141	Autoswitch Diesel to Electric Disabled	Report alarm at end of the day.
143	Check Remote Zone Drain Hose Heater Output	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
144	Lost Expansion Module CAN Communication	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
145	Loss of Controller “On” Feedback Signal	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
146	Software Version Mismatch	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
147	Check Multi-Temperature Fan Speed Control Output	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
148	Autoswitch Electric to Diesel Disabled	Report alarm at end of the day.
149	Alarm Not Identified	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
150	Out of Range Low	Manually monitor load temperature. Report alarm at end of the day.
151	Out of Range High	Manually monitor load temperature. Report alarm at end of the day.

NOTE: Not all alarm codes are used with all applications

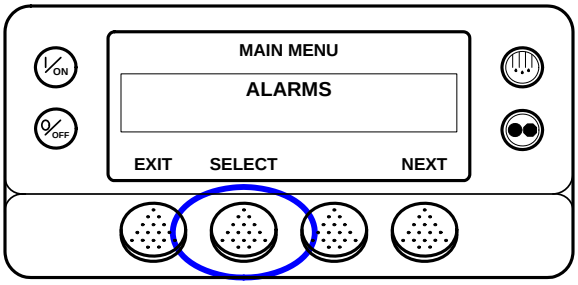
Code	Description	Operator Help
153	Expansion Module Flash Load Failure	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
154	Low Suction Pressure Switch Failure	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
156	Check Suction/Liquid Heat Exchanger Bypass Valve Circuit	If unit is shut down repair immediately. Otherwise, report alarm at end of the day.
157	OptiSet File Mismatch	Report alarm at end of the day.
158	Software Failed to Load	Report alarm at end of the day.
203	Check Display Return Air Sensor	Manually monitor load temperature. Report alarm at end of the day.
204	Check Display Discharge Air Sensor	Manually monitor load temperature. Report alarm at end of the day.
252	Check Fresh Air Exchange Circuit	Manually monitor load temperature. Report alarm at end of the day.

Displaying and Clearing Alarm Codes

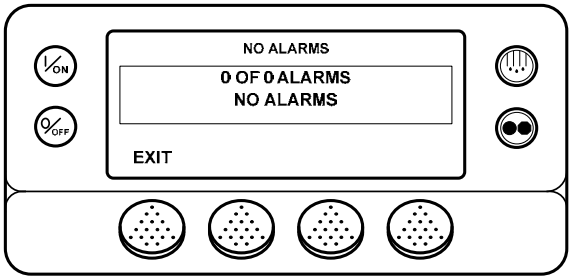
Alarms are displayed and cleared using the Alarm Menu. From the Standard Display, press the MENU Key.



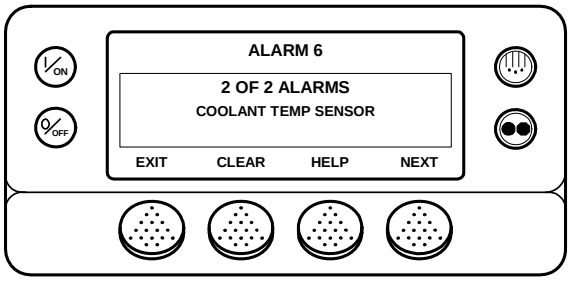
The Language Menu or Alarm Menu will appear. If the Language Menu appears press the NEXT Key to show the Alarm Menu. When the Alarm Menu is shown press the SELECT Key.



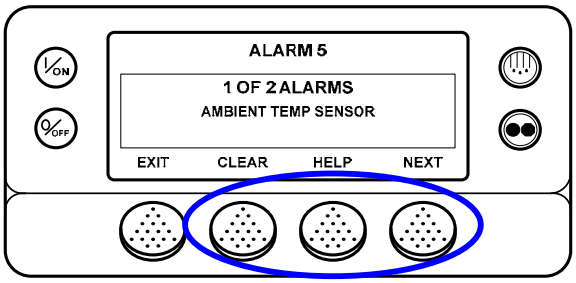
The Alarm Display will appear. If no alarms are present NO ALARMS will be shown.



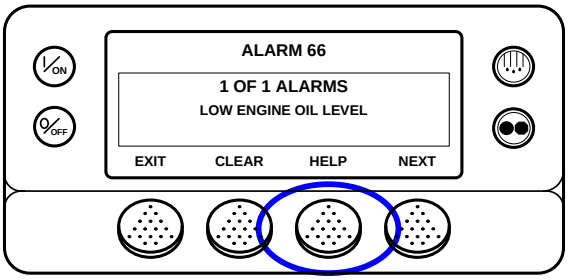
If alarms are present, the quantity of alarms (if more than one) and the most recent alarm code number will be shown. In the example below, there are two alarms present. The most recent is Alarm Code 6. It indicates a problem with the coolant temperature sensor.



After the alarm situation is resolved press the CLEAR Key to clear the alarm. For additional information regarding the alarm shown on the display, press the HELP Key. To display the next alarm, press the NEXT Key.



If a serious condition occurs, the unit will be shut down to prevent damage to the unit or the load. If this occurs, the display will show that the unit is shut down and display the alarm code that caused the shutdown. In the example below, the unit is shut down due to low oil level. For additional information regarding the alarm shown on the display, press the HELP Key.



A help message will appear. For the alarm shown above, the message “CHECK OIL LEVEL. IF UNIT IS SHUT DOWN, REPAIR IMMEDIATELY. OTHERWISE, REPORT ALARM AT END OF THE DAY” will be shown on the display. Check the oil level and add oil as required, clear the alarm and restart the engine.

To select a different Main Menu item press the NEXT Key. To return to the Standard Display press the EXIT Key.

Important Alarm Notes

- If an alarm will not clear, it may still exist. If the alarm is not corrected, it will not clear or may be immediately set again.

- If an alarm cannot be cleared from the Main menu, the Clear Key will not appear. These alarms must be cleared from the Maintenance or Guarded Access Menus.

- All alarms must be viewed before any of the alarms can be cleared.

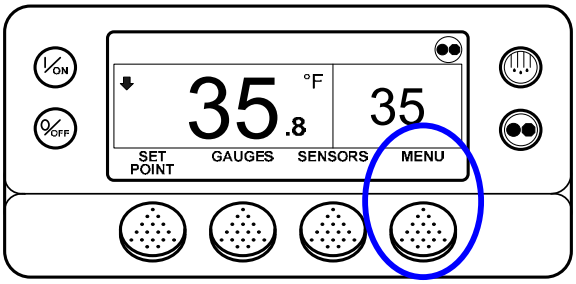
Data Logger (CargoWatch)

The CargoWatch Data Logger is physically located in the HMI Control Panel. It can support up to 6 optional temperature sensors.

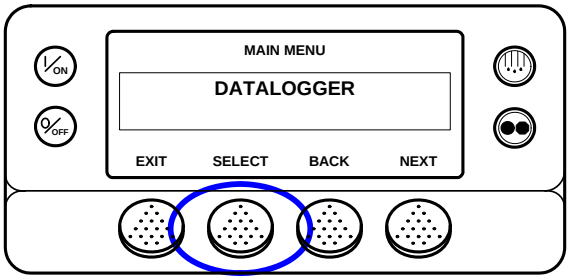
When shipped from the factory, CargoWatch sensors 1 and 2 are turned on to be logged and CargoWatch sensors 3 through 6 are turned off. Also, digital input 1 is turned on to be logged and digital inputs 2 through 4 are turned off. Sensors and digital inputs can be turned on, off and configured using the CargoWatch menu in Guarded Access or with Wintrac. The CargoWatch Data Logger can also be configured using the USB Flash Drive OptiSet Plus Feature.

A Start of Trip can be sent to the unit ServiceWatch and CargoWatch Data Loggers. In addition, the CargoWatch Data Logger contents can be printed with a hand-held printer.

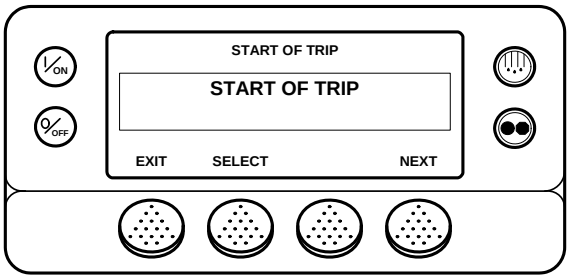
The ServiceWatch and CargoWatch Data Logger are accessed using the Data Logger Menu. From the Standard Display, press the MENU Key.



The Language Menu or Alarm Menu will appear. Press the NEXT Key as required to display the Data Logger Menu. When the Data Logger Menu is shown press the SELECT Key.

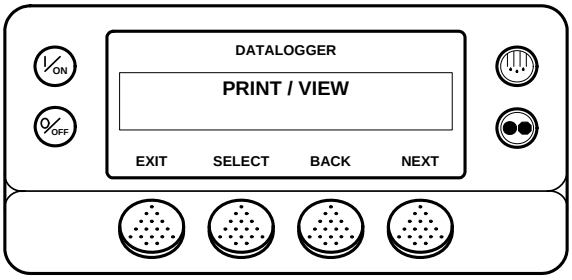


The first feature that appears is the Start of Trip. To send a Start of Trip press the SELECT Key to select the feature, and then press it again to send the Start of Trip. The display will briefly show START OF TRIP COMPLETE to confirm that a Start of Trip marker was set in the data logger.

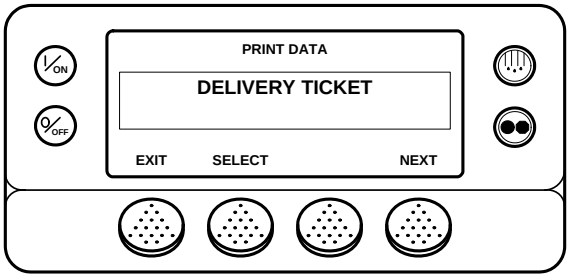


NOTE: The start of trip marker is sent to both the CargoWatch and ServiceWatch data loggers.

Press the NEXT Key to select the PRINT / VIEW feature. The PRINT / VIEW screen will appear.



Press the SELECT Key. The first PRINT / VIEW screen allows the operator to print a Delivery Ticket. Pressing the SELECT Key will print a delivery ticket. The Delivery Ticket is a short ticket that shows delivery specific details including the current temperature.



A sample Delivery Ticket is shown on the next page.

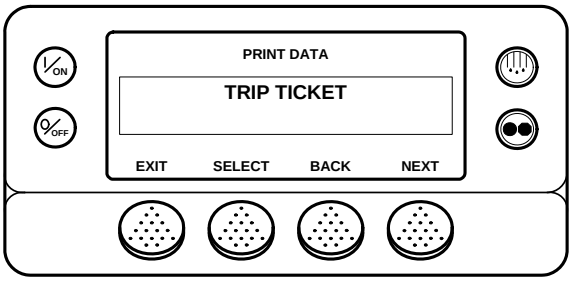
UNIT SERIAL NUMBER:	**xxxxxxxxxx**
CONTROLLER SERIAL NUMBER:	**A00021506190T3**
TRAILER ID:	**xxxxxxxxxx**
CONTROLLER VERSION NUMBER:	**B007**
CONTROLLER TYPE:	**SR2**
DATALOGGER VERSION NUMBER:	**6512**
TEMPERATURE UNITS:	**FAHRENHEIT**
START:	**05/30/08 08:29:08**
FINISH:	**05/30/08 09:18:33**
SENSORS:	**2**
SETPOINT:	**32.0**

Sensor	Min	Ave	Max	Last
#1:	35	35	35	35
#2:	- - -	- - -	- - -	- - -

SENSOR #1:	**LOG SENSOR 1**
SENSOR #2:	**LOG SENSOR 2**

CargoWatch Delivery Ticket

Pressing the NEXT Key allows the operator to print a Trip Ticket using a hand held printer. Pressing the SELECT Key will print a Trip Ticket. The Trip Ticket is a long ticket that shows details for the current trip including a temperature history. The Trip Ticket is also called a Journey Ticket.



A sample delivery ticket is shown on the next page.

UNIT SERIAL NUMBER:	**xxxxxxxxxx**
CONTROLLER SERIAL NUMBER:	**A00021506190T3**
TRAILER ID:	**xxxxxxxxxx**
CONTROLLER VERSION NUMBER:	**B007**
CONTROLLER TYPE:	**SR2**
DATALOGGER VERSION NUMBER:	**6512**
TEMPERATURE UNITS:	**FAHRENHEIT**
START:	**05/30/08 09:50:08**
FINISH:	**05/30/08 13:07:33**
SENSORS:	**1**
SETPOINT:	**32.0**

30 - MAY - 2008	
1305	**35.0**
1250	**35.2**
1235	**35.1**
1220	**35.2**
1205	**35.1**
30 - MAY - 2008	
1150	**35.0**
1135	**35.0**
1120	**35.0**
1105	**34.9**
1050	**35.0**
1035	**35.0**
1020	**35.0**
1005	**35.1**
0950	**35.1**

SENSOR #1:	**LOG SENSOR 1**
SENSOR #2:	**LOG SENSOR 2**

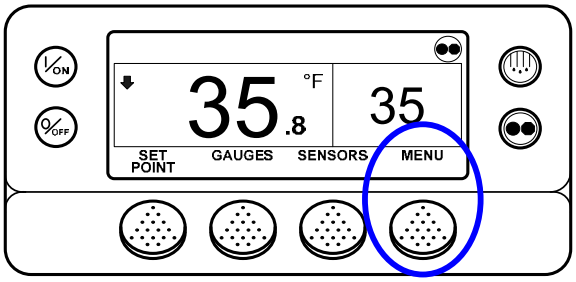
CargoWatch Delivery Ticket

Pressing the EXIT Key returns the display to the Main Menu.

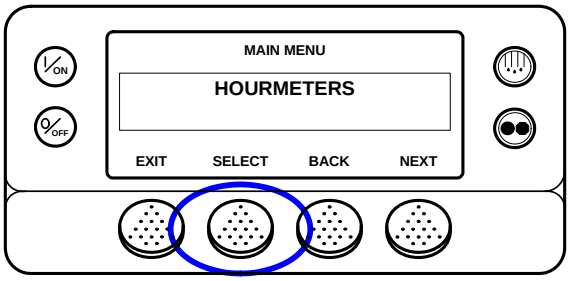
For additional information concerning the CargoWatch Data Logger see Service Procedure A49A in Section 6 of this manual.

Hourmeters

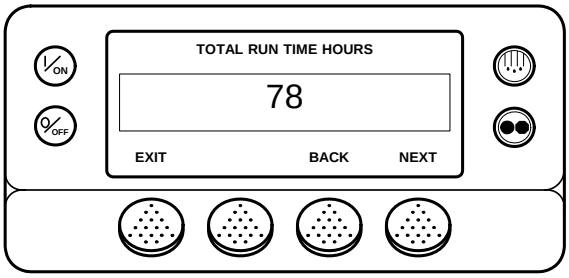
Hourmeters are displayed using the Hourmeter Display. From the Standard Display, press the MENU Key.



The Language Menu or Alarm Menu will appear. Press the NEXT Key as required to show the Hourmeter Menu. When the Hourmeter Menu is shown press the SELECT Key. The Hourmeter Display will appear.



Press the NEXT or PREVIOUS Key to scroll through the hourmeters.



Hourmeter names and definitions are shown in the table on the next page in the order they appear. Only hourmeters enabled in the Guarded Access Menu will be shown. To return to the Standard Display, press the EXIT Key.

Hourmeter Names and Definitions

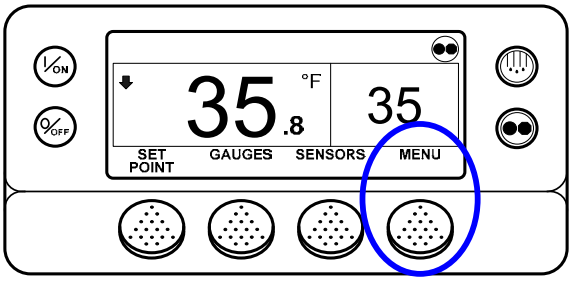
Only configured hourmeters that have been enabled in the Viewable Hourmeter Setup Menu will be shown

Hourmeter Name	Definition
Total Hours	Total number of hours the unit has been turned on (protection hours).
Total Run Time Hours	Total number of hours the unit has run in both diesel and electric mode.
Engine Hours	Total number of hours the unit has run in diesel mode.
Electric Run Hours	Total number of hours the unit has run in electric mode.
Total Run Reminder 1	User Programmable – The number of hours before a Total Unit Run Time Maintenance Reminder 1 occurs.
Total Run Reminder 2	User Programmable – The number of hours before a Total Unit Run Time Maintenance Reminder 2 occurs.
Controller Power On	Total hours the controller and HMI Control Panel have been turned on.
Pretrip Reminder	User Programmable – number of hours before a Pretrip Reminder occurs.
Engine Reminder 1	User Programmable – The number of hours before an Engine Run Time Maintenance Reminder 1 occurs.
Engine Reminder 2	User Programmable – The number of hours before an Engine Run Time Maintenance Reminder 2 occurs.
Electric Reminder 1	User Programmable – The number of hours before an Electric Run Time Maintenance Reminder 1 occurs.
Electric Reminder 2	User Programmable – The number of hours before an Electric Run Time Maintenance Reminder 2 occurs.

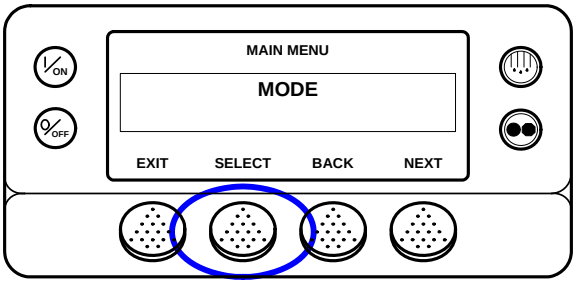
Important: If a programmable hourmeter is not enabled or the view for that hourmeter is not turned on it will not appear in the display sequence.

Mode

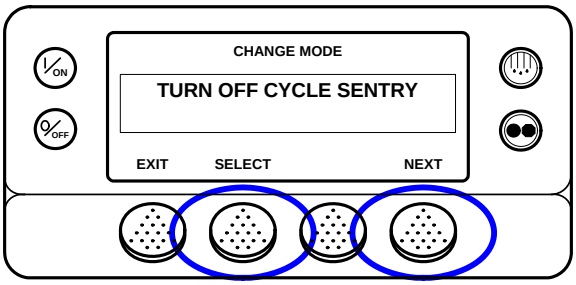
Mode changes are made using the Mode Menu. From the Standard Display, press the MENU Key.



The Language Menu or Alarm Menu will appear. Press the NEXT Key as required to show the Mode Menu. When the Mode Menu is shown press the SELECT Key.



The first enabled mode change screen will appear. To choose that function, press the SELECT Key. To Scroll thru the enabled features in the Mode Menu press the NEXT Key.



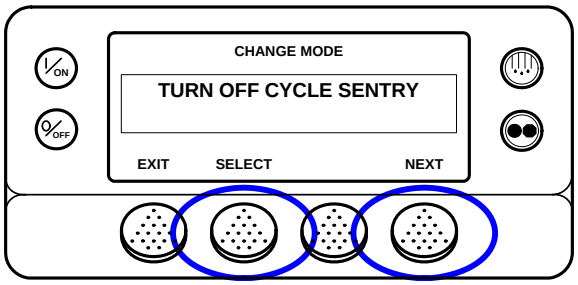
Possible Mode selections are shown on the following pages. Not all modes may be available, depending on OptiSet Plus usage and the settings of other programmable features.

To return to the Standard Display press the EXIT Key.

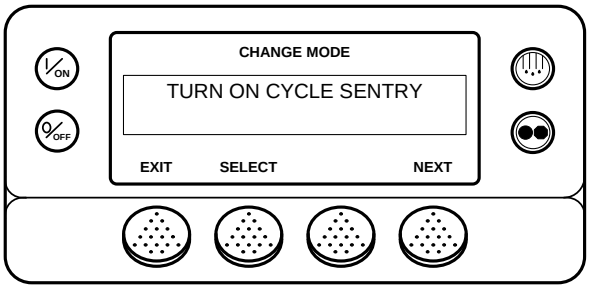
Various operating modes can be selected using the Mode menu. Not all modes may be available, depending on OptiSet Plus usage and settings of other programmable features. The following modes may be available.

Turn Cycle Sentry On or Off

Cycle Sentry Mode can be turned On or Off if Cycle Sentry Mode is allowed by OptiSet Plus. If Cycle Sentry is turned off the unit runs in Continuous mode, unless Continuous Mode is not allowed by OptiSet Plus. Either Cycle Sentry or Continuous operation can be disabled via OptiSet Plus. If the unit is running in Cycle Sentry Mode, press the SELECT Key to turn off Cycle Sentry Mode as shown below.



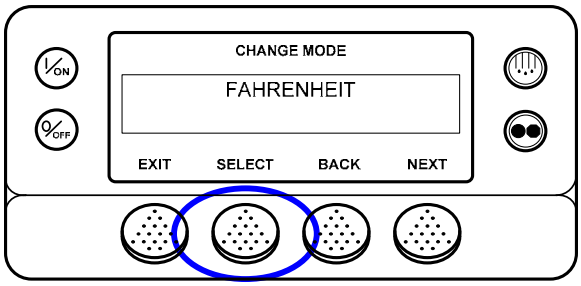
Confirmation screens will appear briefly, and the unit will switch to Continuous Mode operation. To turn Cycle Sentry back on press the SELECT Key again.



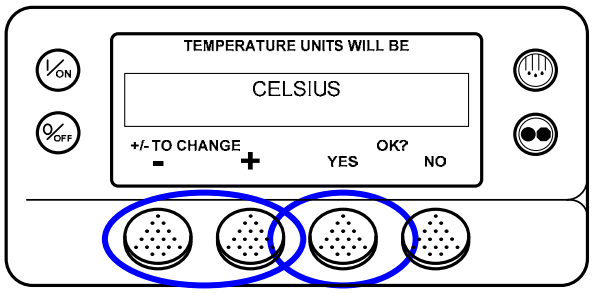
NOTE: Cycle Sentry Mode can also be turned on and off using the Cycle Sentry Key on the HMI Control Panel.

Select Temperature Units

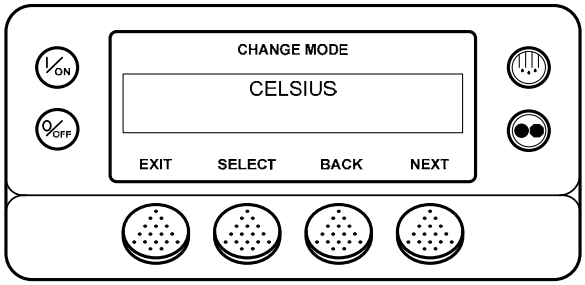
If this feature enabled in Guarded Access > Main Menu Configuration, the operator can select temperature units to be displayed as either degrees Fahrenheit or degrees Celsius. To change the temperature units from Fahrenheit to Celsius, press the SELECT Key as shown below.



Press the "+" and "-" Keys to select the desired temperature units and press the YES Key to confirm.



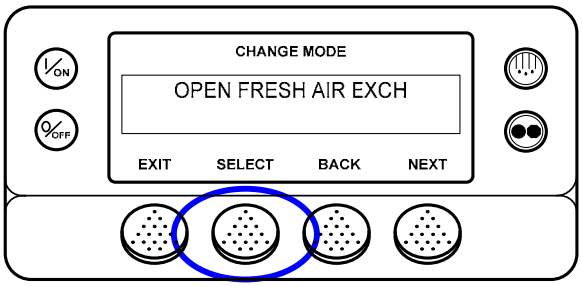
Confirmation screens will appear briefly, and the unit will display temperature units in Celsius. To return the display to Fahrenheit press the SELECT Key again.



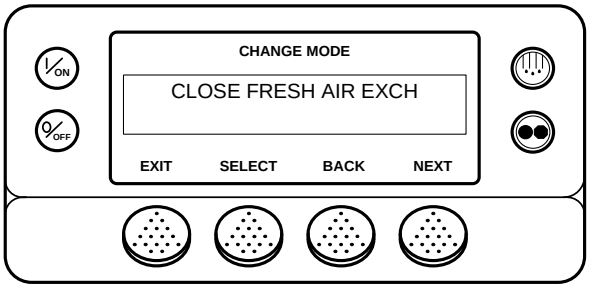
Fresh Air Exchange Open or Closed

If installed and enabled, the Fresh Air Exchange option allows fresh outside air to be drawn into the trailer and the interior air to be exhausted by opening the Fresh Air Exchange door. This feature is beneficial when hauling loads that release gas as they ripen, such as potatoes. The Fresh Air Exchange feature is only available with setpoints above 32°F (0°C). The feature is disabled with setpoints of 32°F (0°C) and below.

The Fresh Air Exchange feature should be used exactly as specified by the customer. To open the Fresh Air Exchange door press the SELECT Key as shown below.



Confirmation screens will appear briefly, and the Fresh Air Exchange door will open. To close the Fresh Air Exchange door press the SELECT Key again.



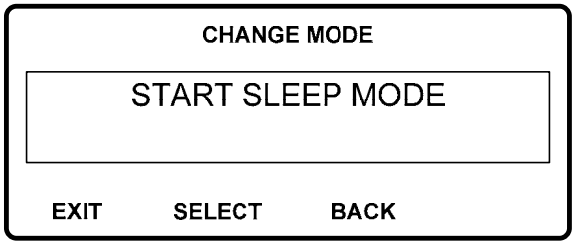
IMPORTANT: The Fresh Air Exchange door will only be open when the unit engine is running. The door will close when the engine shuts down to preserve unit battery life. The setting of the Fresh Air Exchange door will survive power off/power on cycles – if the door is set to “Open” by the operator it will continue to open any time the engine is running until it is set to “Close” by the operator.

Keypad Lockout

If enabled in Guarded Access > Main Menu Configuration, the keypad can be locked to prevent unauthorized use. If the keypad is locked, only the On Key and Off Key function. The keypad will remain locked even if the unit is turned off and back on. If Keypad Lockout is active, press and hold any soft key for 5 seconds to deactivate the feature.

Start Sleep Mode

If this feature enabled in Guarded Access > Main Menu Configuration, the operator can select and set Sleep Mode from the Mode Menu. Sleep Mode is used to keep the engine warm and the battery charged when the unit is not in use. When the unit is Sleep Mode the display will show “SLEEP” and the current time.



The following features are available in Sleep Mode.

- **Program Wakeup Time** This feature allows a wakeup time to be specified. When the selected time is reached the unit will start and resume normal operation.

  If a Wakeup Time is selected the following features are available:
- **Day to Wake Up** This feature allows the day the unit is to wake up to be specified.
- **Hour to Wake Up** This feature allows the hour the unit is to wake up to be specified.
- **Minute to Wake Up** This feature allows the minute the unit is to wake up to be specified.
- **Run Pretrip on Wakeup** This feature allows a Pretrip Test to be automatically run when the unit wakes up.

Pretrip

A Pretrip Test verifies unit operation. This display allows a Pretrip Test to be selected and initiated by the operator. If the Pretrip Test is entered with the unit shut down a Full Pretrip Test with device amp checks will be performed. If the Pretrip Test is entered with the unit running in either diesel or electric mode a Running Pretrip Test is performed. Test results are reported as PASS, CHECK or FAIL when the Pretrip Test is completed.

Pretrip Test Conditions

* Current unit settings are saved and restored at the end of the Pretrip Test or if the unit is turned off and back on.
* Pretrip Test can be run in either Diesel or Electric Mode.
* The unit will auto switch from Diesel Mode to Electric Mode or from Electric Mode to Diesel Mode during a Pretrip Test if these features are enabled and the auto switch conditions occur.

Conditions where Pretrip Tests are not allowed

* If any shutdown alarms are present. Pretrip tests are allowed with some Check and Log alarms.
* If the unit is in Sleep Mode.
* If the unit is in Service Test Mode, Interface Board Test Mode or Evacuation Mode.

Pretrip Test Sequence

Pretrip tests proceed in the order shown below. A Full Pretrip Test includes all tests. A Running Pretrip Test is started with the engine or motor running and does not include the Amp Checks or Engine Start Check.

* Amp Checks – Each electrical control component is energized and the current drawn is confirmed as within specification.
* Engine Start – The Engine will start automatically.
* Defrost – If the coil temperature is below 45°F (7°C), a defrost cycle is initiated.
* RPM Check – The engine RPM in high and low speed is checked during the Cool Check.
* Cool Check – The ability of the unit to cool in low speed is checked.
* Heat Check - The ability of the unit to heat in low speed is checked.
* Report Test Results – The test results are reported as PASS, CHECK or FAIL when the Pretrip Test is completed. If test results are CHECK or FAIL alarm codes will exist to direct the technician to the source of the problem.

Pretrip Test Considerations

When performing a Pretrip Test, the following issues should be considered.

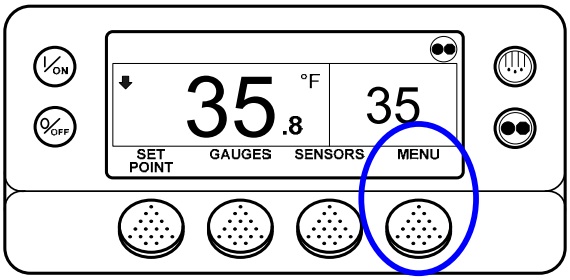
- If running a Pretrip Test on a trailer loaded with dry cargo, insure that proper airflow can occur around the load. If the load restricts airflow, false test results may occur. Also, SR-2 units have high refrigeration capacity which results in rapid temperature changes. Sensitive dry cargo may be damaged as a result.
- If running a Pretrip Test on a trailer that has just been washed down, the extremely high humidity inside the trailer may result in false test results.
- If running a Pretrip Test on a trailer loaded with sensitive cargo, monitor the load temperature during the test as normal temperature control is suspended during pre-trip operation.
- Always perform Pretrip Tests with the trailer cargo doors closed to prevent false test failures.

Performing a Pretrip Test

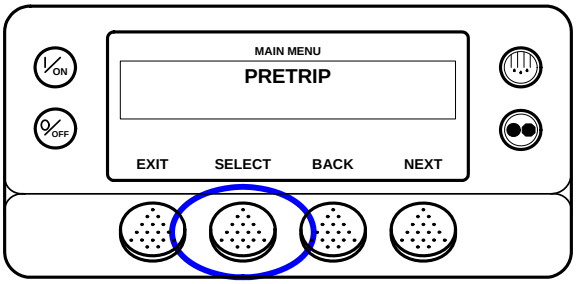
If a Pretrip Test is initiated with the engine shut down a Full Pretrip Test will be performed. If a Pretrip Test is initiated with the engine or motor running a Running Pretrip Test is performed.

- Before initiating a Pretrip Test, clear all alarm codes.
- To stop a Pretrip Test at any time turn the unit off.

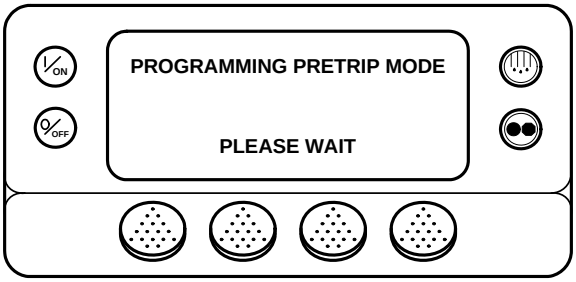
Pretrip Tests are initiated using the Pretrip Menu. From the Standard Display, press the MENU Key.



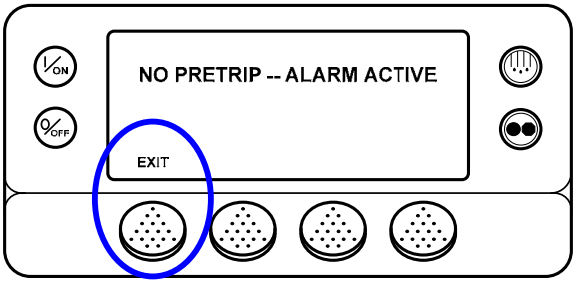
The Language Menu or Alarm Menu will appear. Press the NEXT Key as required to show the Pretrip Menu. When the Pretrip Menu is shown press the SELECT Key to start a Pretrip Test.



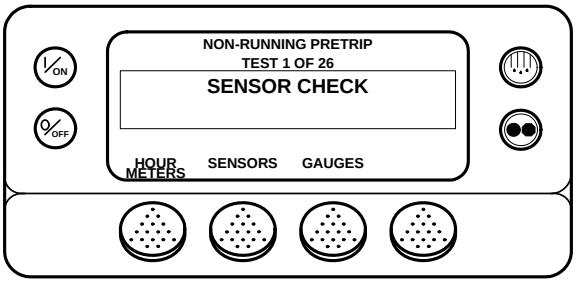
If the unit is not running a Full Pretrip Test will be initiated. If the unit is running in either diesel or electric mode a Running Pretrip will be performed.



If all alarms were not cleared a prompt appears as shown below. Exit the Pretrip Test, clear all alarms and repeat the Pretrip Test.



If all alarms were cleared, the Pretrip Test display appears.



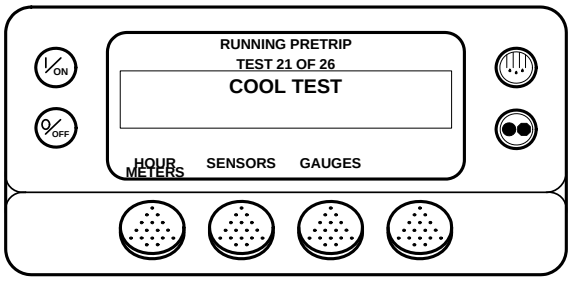
- The top line of the display indicates the unit is performing the non-running portion of the Pretrip Test.

- The second line measures test progress. The number of tests completed of the total number of tests to be performed is shown. In the example above the unit is performing Test 1 of 26, Sensor Check.

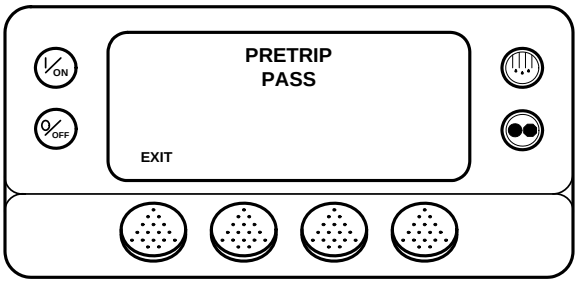
- The soft keys may be used during the Pretrip Test to select the Hourmeter, Gauge or Sensor menus.

- To stop a Pretrip Test at any time turn the unit off. This will generate Alarm Code 28 Pretrip Abort. Other alarm codes may also be generated. This is normal when the Pretrip Test is halted before completion.

When the non-running tests are complete the unit will start automatically and continue with the Running Pretrip Test. In the example shown below the unit is in the Running Pretrip and is performing Test 21 of 26, Cool Test.



When all tests are complete, the results are reported as PASS, CHECK or FAIL. If the results are CHECK or FAIL, the accompanying alarm codes will direct the technician to the cause of the problem.



If the Pretrip Test results are CHECK or FAIL the problem should be diagnosed and corrected before the unit is released for service.

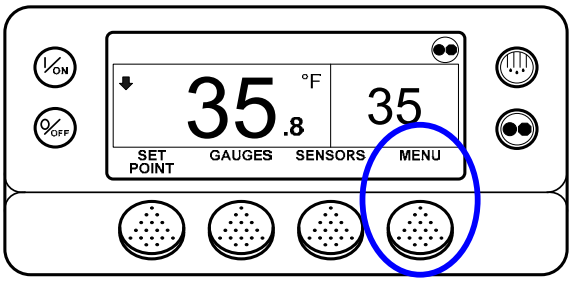
Diesel/Electric Menu

The Diesel/Electric Standby selection from the Main Menu allows the operator to manually select diesel or electric mode operation. The unit can also be programmed to automatically select electric mode operation when standby power is available and to automatically select diesel mode operation if standby power fails or is removed. If the unit is programmed to switch automatically from diesel to electric and electric to diesel these screens do not appear.

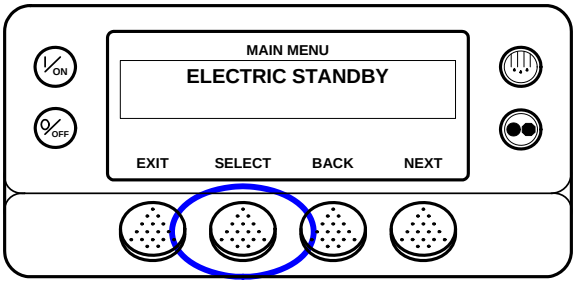
Switching from Diesel to Electric

If the unit is running in Diesel Mode and the Diesel to Electric Autoswitch Enabled feature in Guarded Access is set YES then the unit will automatically switch to Electric Mode operation when standby power is connected and available. The screens shown below will not appear.

If the unit is running in Diesel Mode and the Diesel to Electric Autoswitch Enabled feature in Guarded Access is set NO, the unit can be switched to Electric Mode using the Electric Standby selection from the Main Menu. From the Standard Display, press the MENU Key.

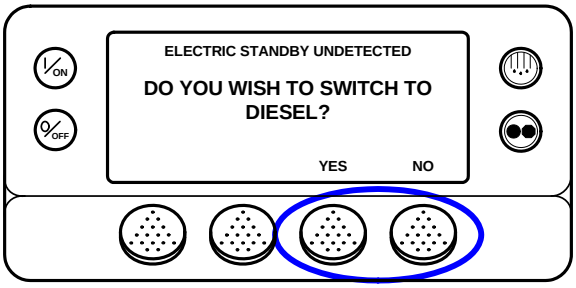


The Language Menu or Alarm Menu will appear. Press the NEXT Key as required to show the Electric Standby selection. When the Electric Standby selection is shown press the SELECT Key.



If the unit has standby power available and is turned on, the electric standby run screen will appear. The new mode is then confirmed for 10 seconds. The unit will start and run in Electric Mode. If electric standby power is not available the display will prompt for a return to Diesel Mode as shown below.

If the electric standby power source fails or is disconnected and manual switching to Diesel Mode is selected, the unit will prompt for a switch to Diesel Mode. Selecting YES will switch unit operation back to Diesel Mode. Pressing the NO Key will allow the unit to remain in Electric Mode even though standby power is not available. The unit will not run and Alarm Code 91 Check Electric Ready Input will be set as a prevent alarm.

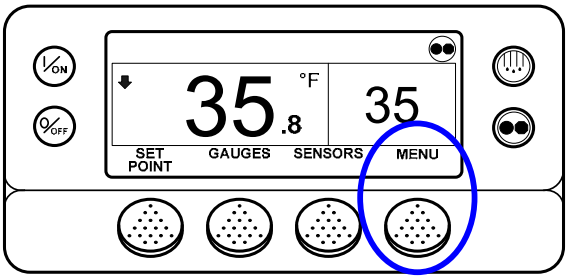


Switching from Electric to Diesel

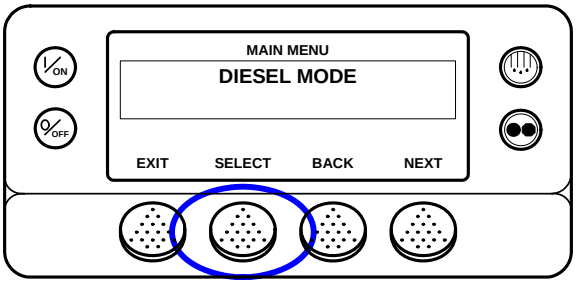
If the unit is running in Electric Mode and the Electric to Diesel Autoswitch Enabled feature in Guarded Access is set YES then the unit will automatically switch to Diesel Mode operation when standby power is no longer available. The screens shown below will not appear.

If the Diesel to Electric Autoswitch Enabled feature in Guarded Access is set NO and standby power is disconnected or fails, the unit will not automatically switch to Diesel mode. This is primarily designed to prevent unauthorized diesel engine starts when the truck is indoors or on a ferry where engine operation is strictly prohibited.

If the unit is running in Electric Mode and the Electric to Diesel Autoswitch Enabled feature in Guarded Access is set NO, the unit can be switched to Diesel Mode using the Diesel selection from the Main Menu. From the Standard Display, press the MENU Key.



The Language Menu or Alarm Menu will appear. Press the NEXT Key as required to show the Diesel Mode selection. When the Diesel Mode selection is shown press the SELECT Key.

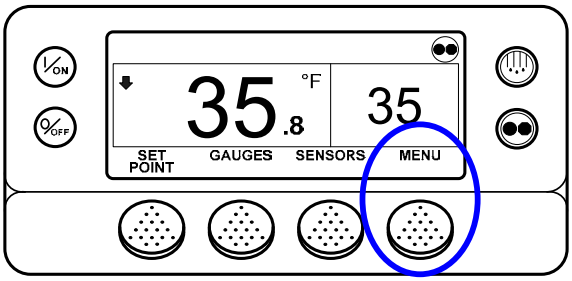


The new mode is confirmed for 10 seconds and the unit will return to Diesel Mode operation.

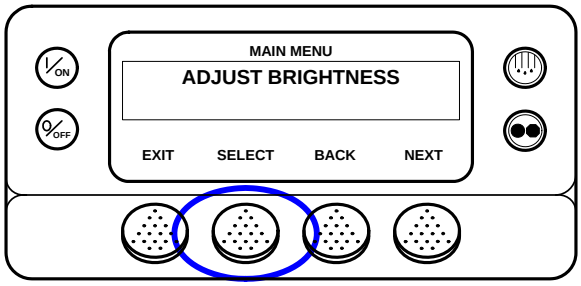
Adjust Brightness

The brightness of the HMI Control Panel display can be adjusted to allow for changing ambient light conditions. The choices available to the operator are HIGH, MEDIUM, LOW and OFF. OFF actually results in a very dim screen suitable for low light conditions.

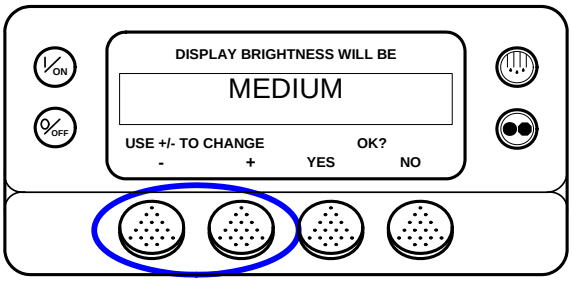
Display brightness is adjusted using the Adjust Brightness Menu. From the Standard Display, press the MENU Key.



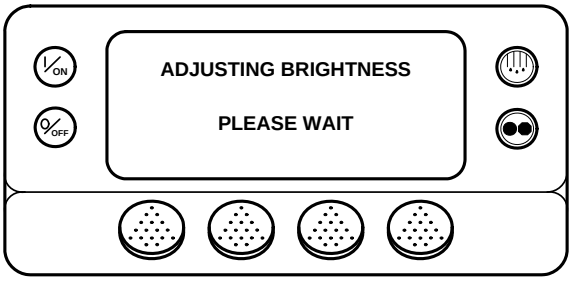
The Language Menu or Alarm Menu will appear. Press the NEXT Key as required to show the Adjust Brightness Menu. When the Adjust Brightness Menu is shown press the SELECT Key.



The Display Brightness menu will appear as shown below. Press the + or – Keys to select the desired display brightness. When the desired brightness is shown press the YES Key to confirm the choice.



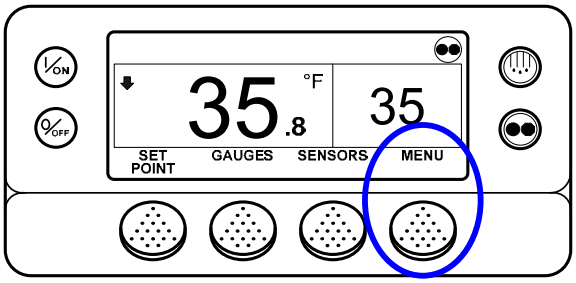
The display will briefly show ADJUSTING BRIGHTNESS – PLEASE WAIT



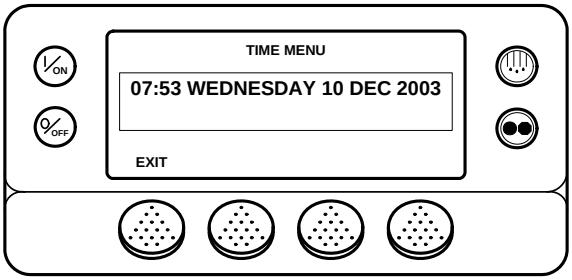
Time

The Time and Date held by the Base Controller can be checked. Time and Date cannot be changed from the Main Menu.

The time and date is accessed using the Main Menu. From the Standard Display, press the MENU Key.

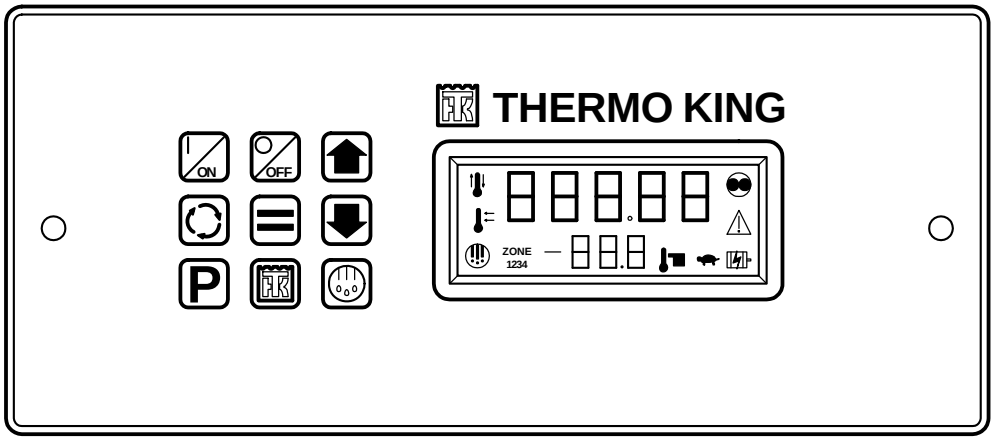


The Language Menu or Alarm Menu will appear. Press the NEXT Key as required to show the Time. When Time is shown press the SELECT Key. The current time and date will appear.



OPTIONAL REAR REMOTE CONTROL PANEL

The optional Rear Remote Control Panel is connected to the control system and is used to operate the unit from a remote location, typically at the rear of the trailer. In the illustration below all display segments are turned on.



IMPORTANT: There are several versions of the Rear Remote Control Panel available. They can be identified by the color of the wide border around the actual control panel. SR-3 Single Temperature Rear Remote Control Panels have a black border. SR-3 SPECTRUM Multi-Temperature Rear Remote Control Panels have a blue border. They are two separate control panels and are not interchangeable.

Rear Remote Control Panel Functionality

The Rear Remote Control Panel functions that are available to the user are determined by the setting of the Rear Remote Control and Rear Remote Control Action features in the Guarded Access / Unit Configuration Menu. See Unit Configuration in Section 3 of this manual for details of these features.

When the unit is turned on at the Rear Remote Control Panel either the Remote Standard Display or [STAnd by] will appear on the display.

Rear Remote Control Action set to Run

If the Rear Remote Control Action is set to RUN the Remote Standard Display will be present on the Rear Remote Control Panel and the unit will start and run when the Rear Remote Control Panel ON Key is pressed. Pressing the Rear Remote Control Panel OFF Key will turn the unit off.

If the control system is powered up from the Rear Remote Control Panel the Remote Standard Display will appear in both the Rear Remote Control Panel display and the unit HMI Control Panel display. In addition to turning the unit on and off and starting the unit, when set to RUN the Rear Remote Control Panel allows the following:

- Turn the unit off and on
- The unit will start and run
- Change the Setpoint
- Select Cycle Sentry or Continuous Mode (unless prevent by OptiSet Plus)
- Display discharge air temperature
- Display and clear alarm codes
- Initiate a manual defrost cycle
- Send a Start of Trip marker to the ServiceWatch and CargoWatch Data Loggers
- Initiate a Pretrip Test

Rear Remote Control Action set to Stand By

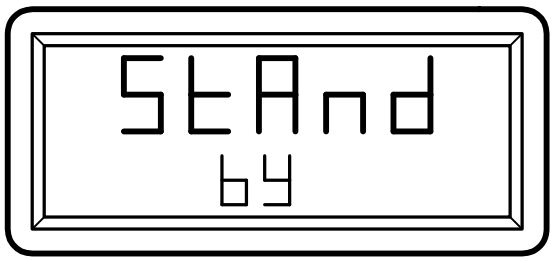
If the Rear Remote Control Action is set to STAND BY, pressing the Rear Remote Control Panel ON Key will power up the control system, but the unit will not start and run. Pressing the Rear Remote Control Panel OFF Key will turn the unit off. The HMI Control Panel on the unit must be used to start and stop unit operation.

In addition to turning the unit on and off, when set to STAND BY the Rear Remote Control Panel allows the following:

- Turn the unit on and off
- The unit will not start and run
- Change the Setpoint
- Select Cycle Sentry or Continuous Mode (unless prevent by OptiSet Plus)
- Display discharge air temperature
- Display and clear alarm codes
- Send a Start of Trip marker to the ServiceWatch and CargoWatch Data Loggers

However, when in STAND BY, the engine will not start and a Defrost Cycle or Pretrip Test cannot be initiated.

If the control system is powered up from the remote control panel a stand by message will appear in both the remote control panel display and the unit HMI Control Panel display as shown below.

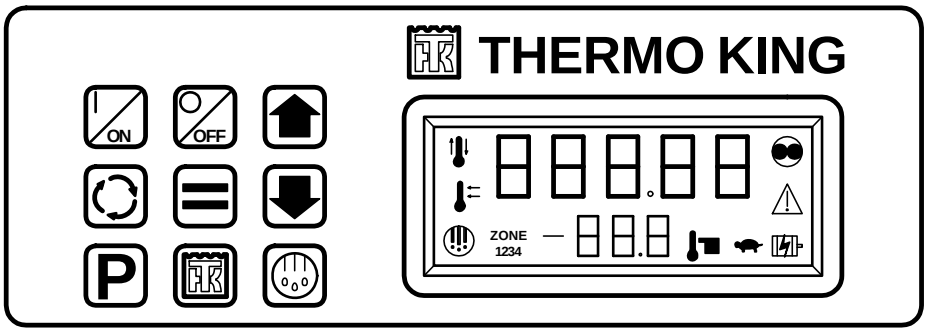


Rear Remote Control Panel

Unit HMI Control Panel

When the StAnd bY display is shown, press the Select Key to show the Remote Standard Display. When the remote standard Display is shown, the setpoint and operating mode can be changed, the discharge air temperature can be displayed and alarms can be viewed and cleared. In addition, a Start of Trip can be sent to the data loggers.

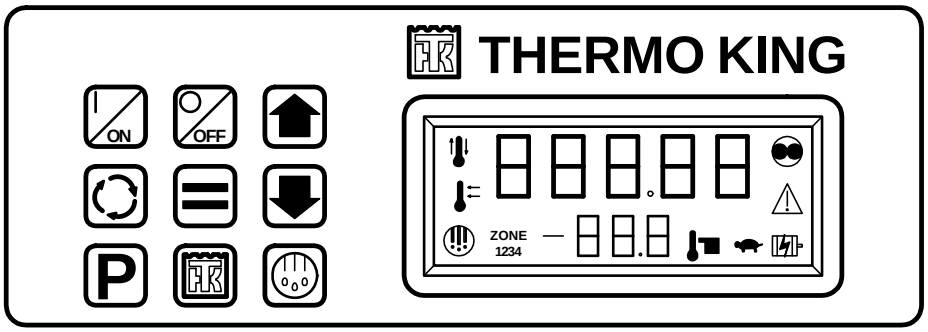
After the last key is pressed, the display will return to the StAnd bY display shown above in about 10 seconds.



Keypad

The nine touch sensitive keys are used to turn the unit on and off. They also allow the setpoint to be changed, Cycle Sentry or Continuous Mode to be selected, Alarm Codes and other operating data to be displayed and Pretrip Tests and Defrost Cycles to be performed. A Start of Trip marker can also be sent to the data loggers.

ON KEY	Turns the unit on as determined by the setting of Rear Remote Control Action.
OFF KEY	Turns the unit off.
UP ARROW KEY	Increases setpoint or changes other setting.
DOWN ARROW KEY	Decreases setpoint or changes other setting.
SELECT KEY	Allows Cycle Sentry to be turned on and off, displays the discharge air temperature and alarms.
ENTER KEY	Executes a prompt or loads a new setpoint or other setting.
PRETRIP KEY	Initiates a Pretrip Test
TK LOGO KEY	Sends a Start of Trip marker to the data logger.
DEFROST KEY	Initiates a defrost cycle if conditions allow.



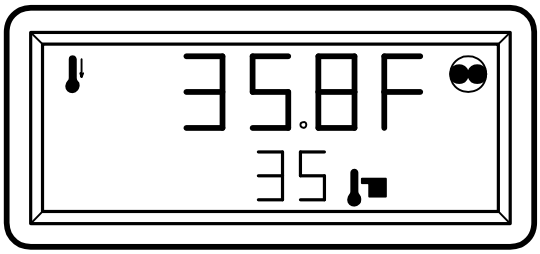
Display

The display normally shows the Standard Display of return air temperature and setpoint. The icons on either side of the display indicate operating modes and alarms. The display shown here has all possible segments lighted. The display icons are defined below.

	Cool Icon	This icon appears when the unit is cooling.
	Heat Icon	This icon appears when the unit is heating.
	Modulation Icon	This icon appears when the unit is in modulation.
	Defrost Icon	This icon appears when the unit is defrosting.
	Cycle Sentry Icon	This icon appears when the unit is operating in Cycle Sentry mode.
⚠	Alarm Icon	This icon appears when an alarm condition has been detected.
	Electric Standby Icon	This icon appears when the unit is operating in the optional electric standby mode.
	Setpoint Icon	This icon appears when the setpoint is being shown in the display.
	Not Used	This icon appears during a remote control panel test but is not currently used.

Reading a Typical Remote Standard Display

The Remote Standard Display shows the temperature and setpoint. The icons at the sides of the display indicate operating conditions.

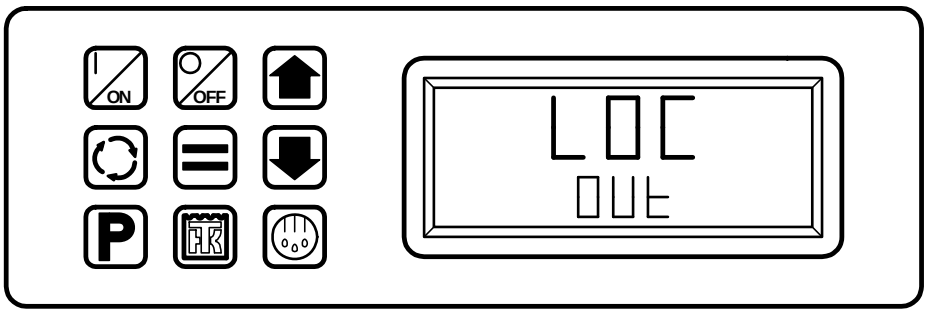


The Remote Standard Display above shows the following information:

- The temperature (typically return air temperature) is 35.8°F.
- The setpoint is 35°F.
- The unit is cooling as shown by the icon at the upper left side of the display.
- The unit is operating in Cycle Sentry mode as shown by the icon at the upper right side of the display.

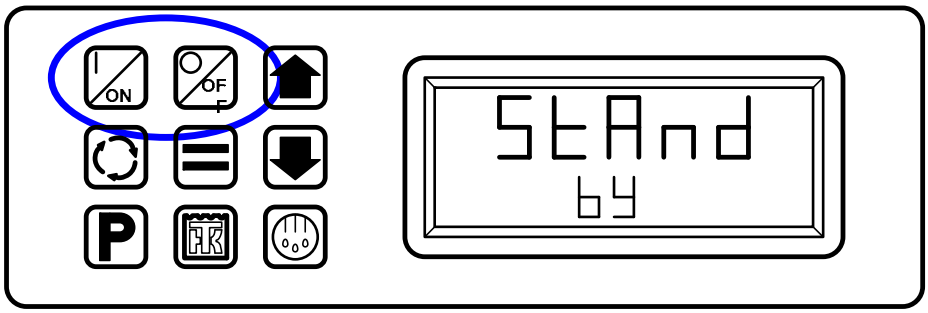
Remote Control Panel Lockout

The remote control panel may be locked out during some control system functions such as Service Test Mode, Interface Board Test Mode and while setting programmable features. If this is the case the display shown below will appear. The display will return to the Remote Standard Display when allowed by the control system.



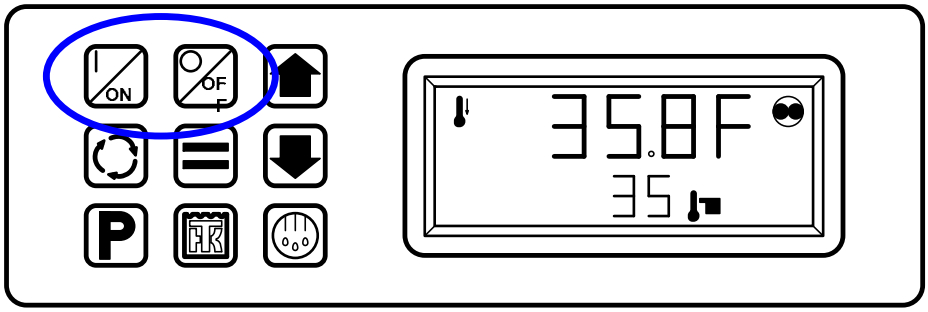
Turning the Unit On or Off (Configured for STAND BY operation)

The control system is turned on by pressing the ON Key and off by pressing the OFF Key. When the On Key is pressed the remote display briefly shows all segments and then STAnd by as shown below. A stand by message will also appear on the unit HMI Control Panel display. The setpoint can be changed but the unit will not start and run. Only the Select Key, Enter Key and Up and Down Arrow Keys are functional. The unit can be started and run by pressing the unit HMI Control Panel ON Key. **IMPORTANT:** To change the setpoint, press the Select Key to show the Remote Standard Display. The setpoint can now be changed as shown on the next page.



Turning the Unit On and Off (Configured for RUN operation)

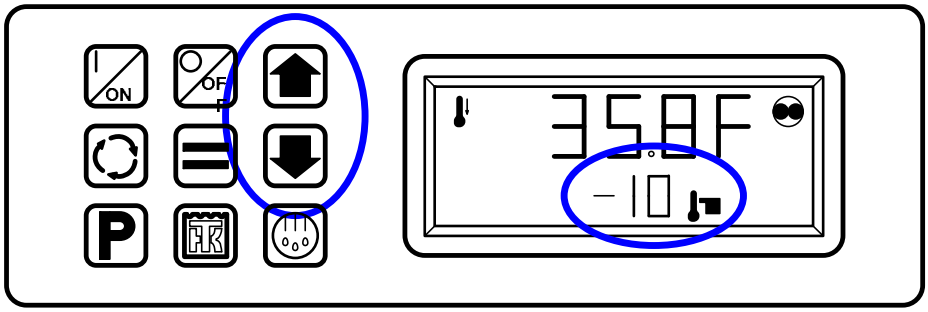
The unit is turned on by pressing the ON Key and off by pressing the OFF Key. When the On Key is pressed the remote display briefly shows all segments and then COn FIg as the control system initializes. Then the Remote Standard Display will appear as shown below. The unit will start and run if necessary.



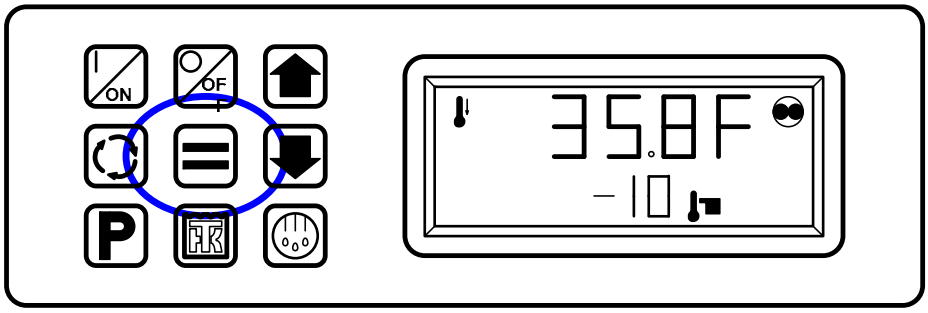
Changing the Setpoint

The setpoint can be changed when the Remote Standard Display is shown.

1. When the Remote Standard Display is shown, press the Up or Down Arrow Keys to select the desired setpoint.



2. When the desired setpoint is shown on the display, immediately press the Enter Key to load the new setpoint. The display will briefly show [Lod] and then the new setpoint will reappear in the display.



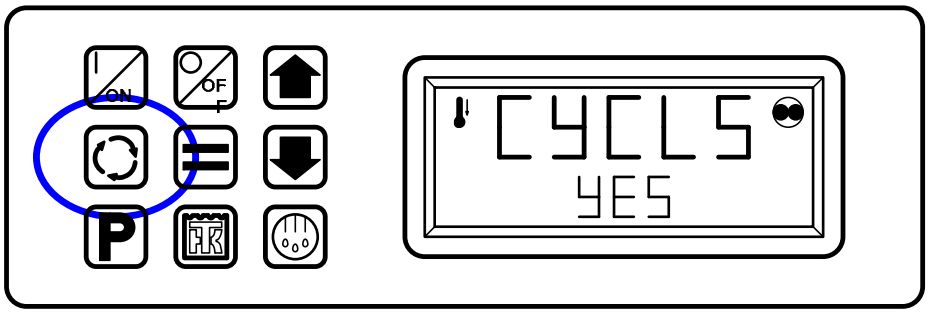
IMPORTANT: The Enter Key must be pressed or the setpoint will not be changed. The display will return to the Standard Display and the setpoint will return to the old setpoint in about 10 seconds if the Enter Key is not pressed. **Alarm Code 127 Setpoint Not Entered** is set, to indicate that the setpoint change was started but not completed.

IMPORTANT: Confirm that the correct setpoint is set.

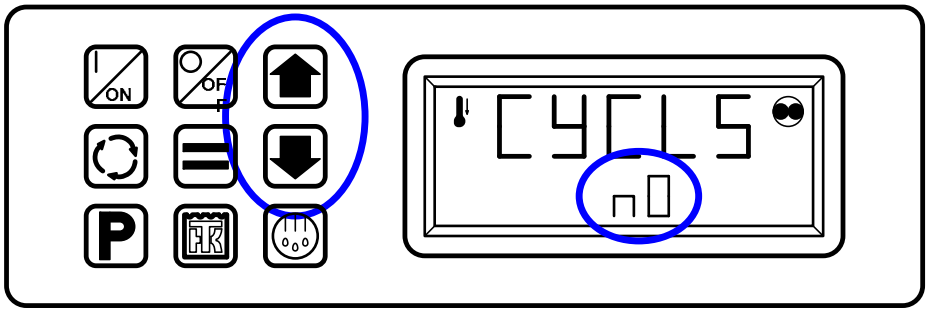
Selecting Cycle Sentry or Continuous Mode

Cycle Sentry or Continuous Mode operation can be changed using the Select Key.

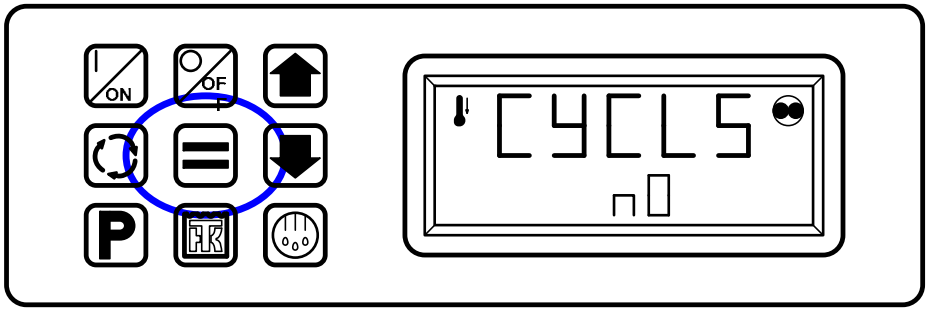
1. When the Remote Standard Display is shown, press the Select Key once to display the Cycle Sentry prompt.



2. Use the Up and Down Arrow Keys to chose either YES or nO. Yes = Cycle Sentry Mode. nO = Continuous Mode.



3. When the desired selection is shown, press the Enter Key to load the setting. The display will briefly show [Lod] and then the new selection will briefly appear in the display.

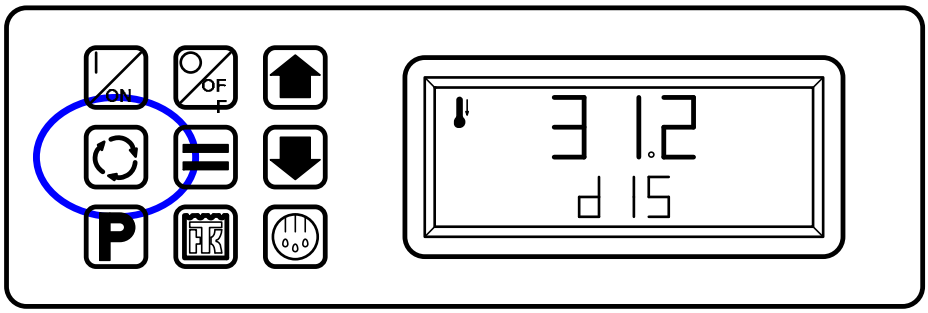


4. The display will then return to the Remote Standard Display.

Displaying the Discharge Air Temperature

The discharge air temperature can be shown using the Select Key.

1. When the Remote Standard Display is shown, press the Select Key twice. The discharge air temperature will be shown in the display for about 10 seconds.

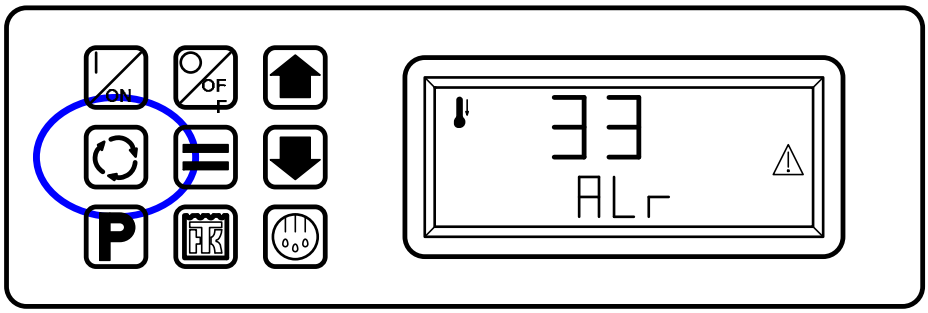


2. The display will then return to the Remote Standard Display.

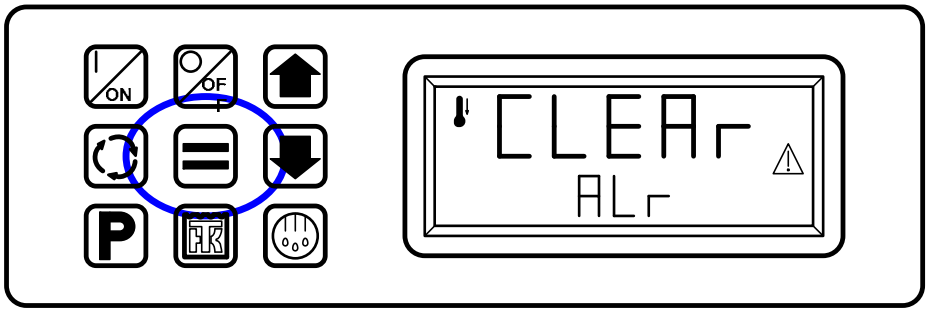
Viewing and Clearing Alarm Codes

Alarm Codes can be displayed and cleared using the Select Key.

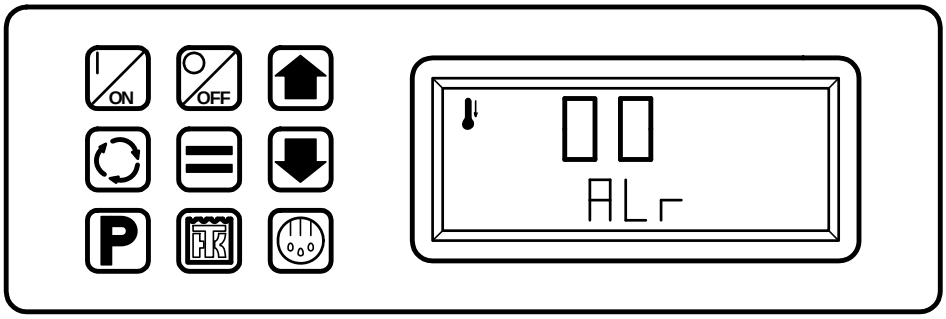
1. When the Remote Standard Display is shown, press the Select Key three times. Any alarm codes present will be shown in the display, with the most recent alarm code shown first. If no alarm codes are present the display will show [00].



2. To clear a displayed alarm code, press the Enter Key. The display will briefly show CLEAr ALm.



3. If any additional alarms are present, the next alarm will be shown. If no other alarms are present the display will briefly show [00].

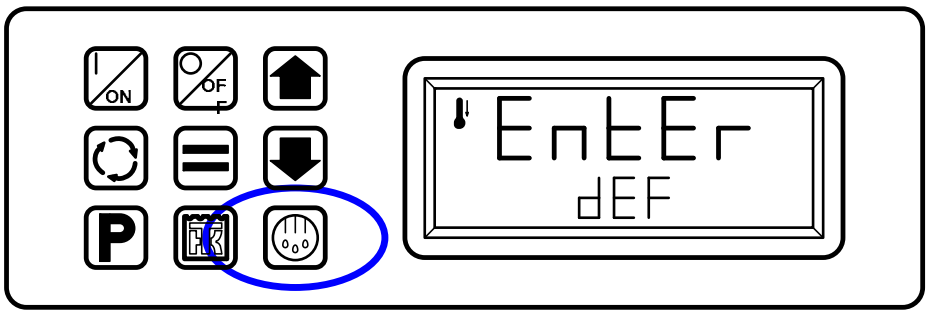


4. The display will then return to the Remote Standard Display.

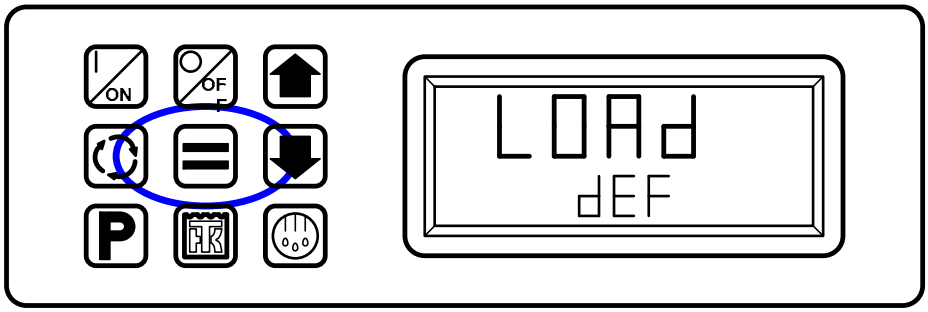
Starting a Manual Defrost Cycle

If conditions allow, a manual defrost cycle can be initiated using the Defrost Key.

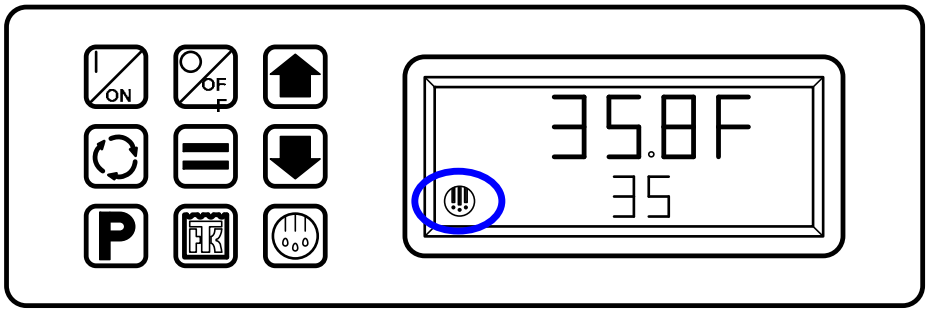
1. Press the Defrost Key. The defrost prompt [EnTEr dEF] will appear in the display.



2. When the defrost prompt is shown, press the Enter Key to start a manual defrost. The display will briefly show LOAd dEF and then a defrost cycle will begin if conditions allow.



3. The display will return to the Remote Standard Display. The Defrost Icon will be shown in the display.

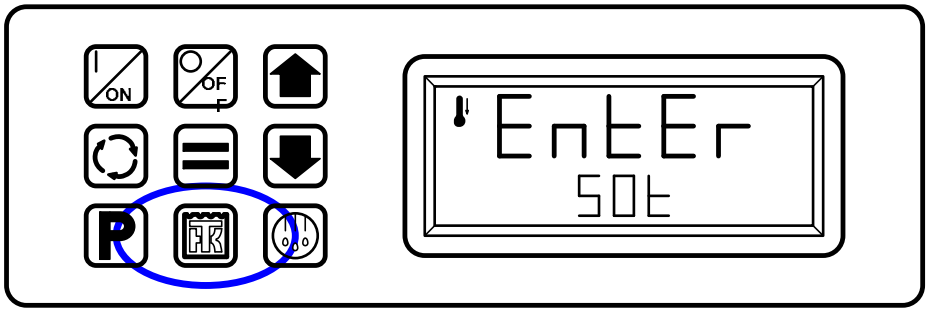


4. The defrost cycle will terminate automatically.

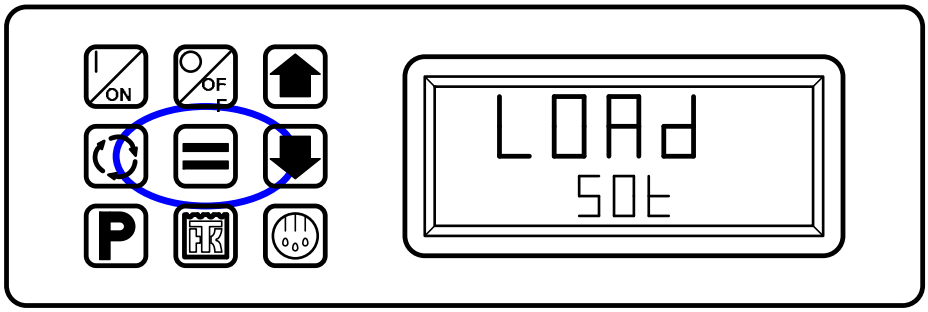
Sending a Start of Trip Marker

A Start of Trip marker can be sent to the data loggers using the Thermo King Logo Key.

1. Press the Thermo King Logo Key. The Start of Trip [EnTEr SOt] prompt will appear in the display.



2. When the Start of Trip prompt is shown, press the Enter Key to send a Start of Trip marker to the CargoWatch and ServiceWatch data loggers. The display will briefly show LOAd SOt.



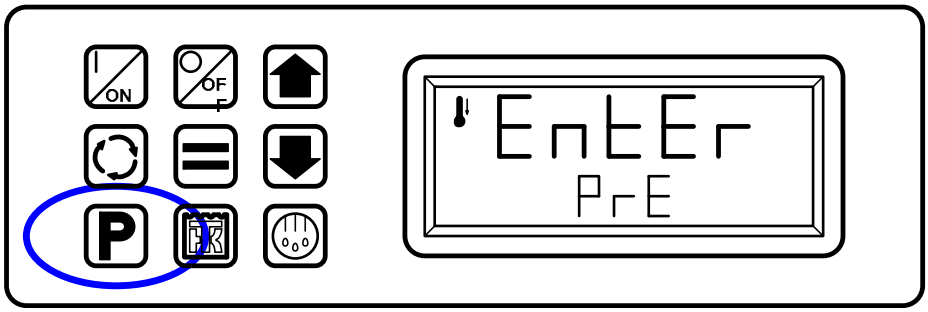
3. The display will return to the Remote Standard Display.

Running a Pretrip Test

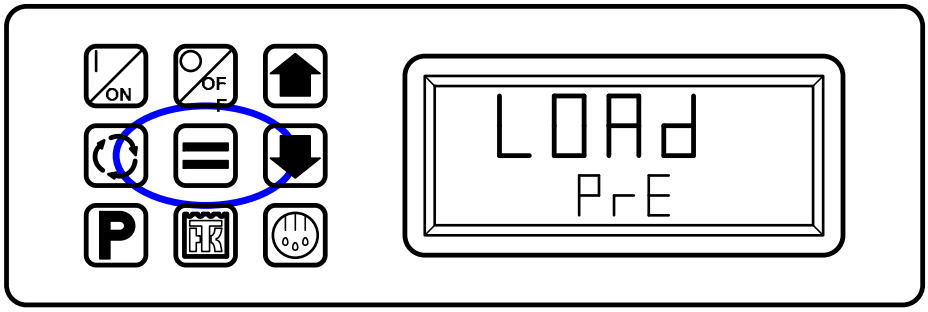
A Pretrip Test can be started using the Pretrip Key. If the unit is not running when the Pretrip Test is started a Full Pretrip Test will be performed. If the unit is running when the Pretrip Test is started a Running Pretrip Test will be performed.

1. Clear any alarm codes as shown previously.

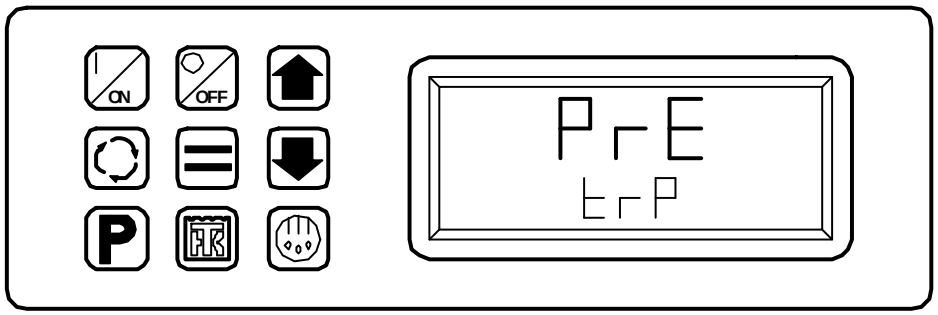
2. Press the Pretrip Key. The Pretrip [EntEr PrE] prompt will appear in the display.



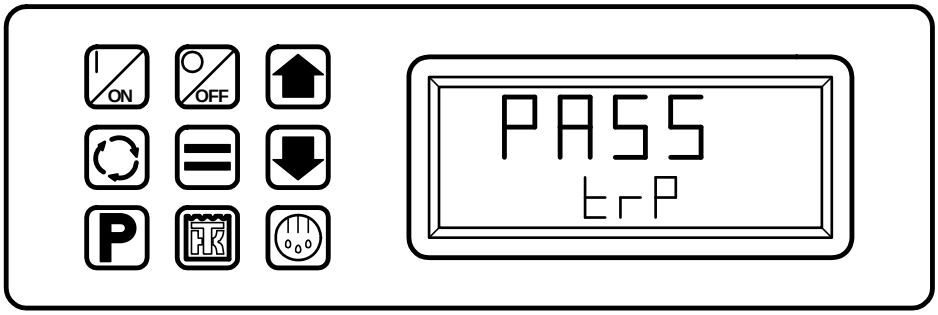
3. When the Pretrip prompt is shown, press the Enter Key to start a Pretrip Test. The display will briefly show LOAd PrE. If the unit is not running a Full Pretrip Test will be performed. If the unit is running a Running Pretrip Test will be performed.



4. When the Pretrip Test is running the display will show PrE trP. The HMI Control Panel will show the Pretrip Test progress.



5. When the Pretrip Test is complete the display will show PASS, CHEC or FAIL. Pressing the Select Key will return to the Remote Standard Display.



MAINTENANCE MENU OVERVIEW

D006/D007 and 6560/6561 SR-3 Trailer S/T Maintenance Menu (1 of 2)

Features shown are for units configured Trailer

Maintenance Menu
1 of 3

Hourmeters - View and Reset Time
- Total Hours
- Total Run Time Hours
- Engine Hours
- Electric Run Hours
- Total Run Time Reminder #1 Hours
- Total Run Time Reminder #2 Hours
- Controller Power On Hours
- Pretrip Reminder Hours
- Engine Run Time Reminder #1 Hours
- Engine Run Time Reminder #2 Hours
- Electric Run Time Reminder #1 Hours
- Electric Run Time Reminder #2 Hours

Gauges
- Coolant Temperature
- Coolant Level
- Oil Pressure
- Oil Level
- Amps
- Battery Voltage
- Engine RPM
- Fuel Level Sensor
- Discharge Pressure
- Suction Pressure
- ETV Position
- Fresh Air Exchange
- I/O (Input/Output State)
  - High Speed Relay
  - Run Relay
  - Run Relay Feedback
  - Alternator Excite Output
  - Defrost Damper
  - Heat Output
  - Alternator Frequency
  - Fresh Air Exchange Output
  - Diesel/Electric Relay (50 only)
  - Electric Ready Input (50 Only)
  - Electric Overload (50 only)
  - Hot Gas Bypass (ETV only)

Not all menu features may appear

Maintenance Menu
2 of 3

Sensors
- Control Return Air Temperature
- Display Return Air Temperature
- Control Discharge Air Temperature
- Display Discharge Air Temperature
- Temperature Differential
- Evaporator Coil Temperature
- Ambient Air Temperature
- Spare 1 Temperature
- Log Sensor 1
- Log Sensor 2
- Datalogger Sensor 3 Temperature
- Datalogger Sensor 4 Temperature
- Datalogger Sensor 5 Temperature
- Datalogger Sensor 6 Temperature
- Board Temperature Sensor

Alarms
- Display all alarms
- Clear most alarms

Service Test

Test with Unit Running?
- Off
- Null
- High Speed Cool
- Low Speed Cool
- Low Speed Heat
- High Speed Heat
- Defrost
- Cool Bypass
- Mod Cool /HGB
- Modulation Cool
- Modulation Heat

Interface Board Test
- Preheat Relay
- Buzzer
- Run Relay
- Alternator Excite Output
- Heat Output
- Damper Relay
- Indicator Light
- Alarm Light
- Diesel/Electric Relay
- Electric Heat
- High Speed Relay
- Hot Gas Bypass Valve
- Fresh Air Exchange

Rev D006/D007 and 6560/6561 Trailer S/T 03 Apr 2011

Maintenance Menu Overview - Continued

D006/D007 and 6560/6561 SR-3 Trailer S/T Maintenance Menu (2 of 2)

Features shown are for units configured Trailer

Maintenance Menu
3 of 3

Display Self Test
- LCD Test
- Keypad Test
- Backlight Test
- Brightness Test
- Buzzer Test
- Heater Output
- Serial E2
- Datalog Flash
- RTC Update

Evacuation Test
- Connect Battery Charger

Software Revision
- Display Software Rev
- Controller Software Rev
- Supervisor Software Revision

Set Time and Date
- Hour
- Minutes
- Date
- Month
- Year

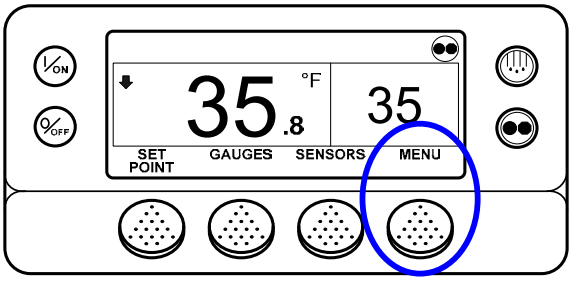
Not all menu features may appear

Rev D006/D007 and 6560/6561 Trailer S/T 03 Apr 2011

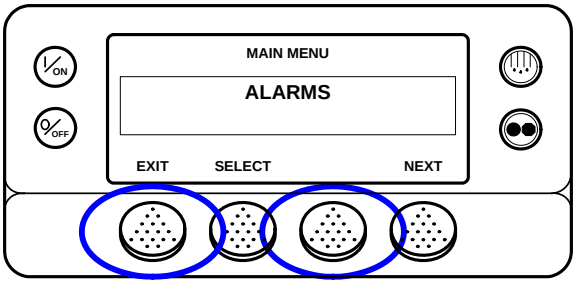
USING THE MAINTENANCE MENU

The Maintenance Menu contains features that allow the technician to view additional information, perform unit diagnostics using Service Test Mode and Interface Board Test Mode and evacuate and charge the unit with refrigerant using Evacuation Mode. Software revisions can be checked and the time and date can be set.

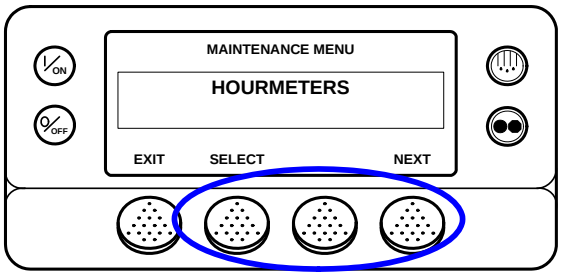
To access the Maintenance Menu press the MENU Key.



The Maintenance Menu is accessed from the first Main Menu screen that appears; either the Language Display or the Alarms Display. The Alarms Display is shown here. Press and hold both the unlabelled soft key and the Exit Key for 5 seconds.



The first Maintenance Menu feature will appear. Press the NEXT and BACK Keys to scroll thru the Maintenance Menu choices. When the desired choice is shown on the display, press the SELECT Key to access it.



The Maintenance Menu choices are shown on the next page. For detailed information see the individual explanations of each item later in this section of the manual.

To return to the Standard Display press the EXIT Key.

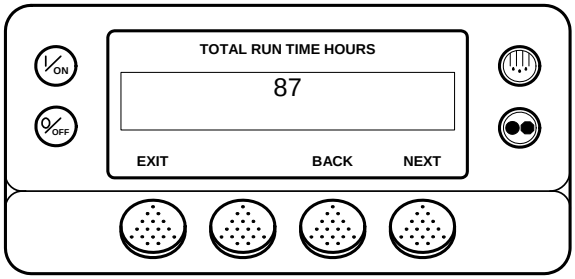
The HMI Control Panel will also return to the Standard Display 30 seconds after the last key is pressed.

MAINTENANCE MENU CHOICES

Hourmeters

The Hourmeters Menu allows the technician to view all the active unit hourmeters, even if the Main Menu view has been turned off. The Maintenance Menu Hourmeter Display also allows the technician to reset the time on hourmeters with a programmed time limit. Hourmeters can also be viewed from the Main Menu if enabled in Guarded Access.

Choose Hourmeters by pressing the SELECT Key when HOURMETERS is shown in the Maintenance Menu. The hourmeter screen appears as shown below.



The NEXT and BACK Keys are used to scroll through the hourmeters.

The EXIT Key returns to the Maintenance Menu

See the definition of hourmeters on the next page.

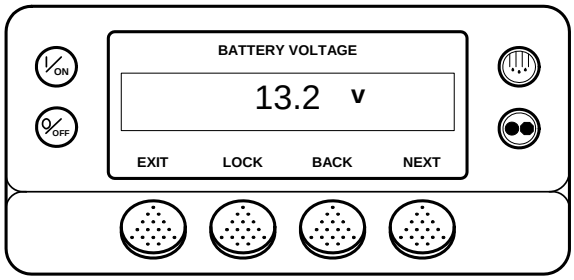
Hourmeter Definitions

Hourmeter Name	Definition
Total Hours	Total number of hours the unit has been turned on (protection hours).
Total Run Time Hours	Total number of hours the unit has run in both diesel and electric mode.
Engine Hours	Total number of hours the unit has run in diesel mode.
Electric Run Hours	Total number of hours the unit has run in electric mode.
Total Run Reminder 1 Hours	User Programmable – The number of hours before a Total Unit Run Time Maintenance Reminder 1 occurs.
Total Run Reminder 2 Hours	User Programmable – The number of hours before a Total Unit Run Time Maintenance Reminder 2 occurs.
Controller Power On Hours	Total hours the controller and HMI Control Panel have been turned on.
Pretrip Reminder Hours	User Programmable – number of hours before a Pretrip Reminder occurs.
Engine Reminder 1 Hours	User Programmable – The number of hours before an Engine Run Time Maintenance Reminder 1 occurs.
Engine Reminder 2 Hours	User Programmable – The number of hours before an Engine Run Time Maintenance Reminder 2 occurs.
Electric Reminder 1 Hours	User Programmable – The number of hours before an Electric Run Time Maintenance Reminder 1 occurs.
Electric Reminder 2 Hours	User Programmable – The number of hours before an Electric Run Time Maintenance Reminder 2 occurs.

Gauges

The Gauge Menu allows the technician to view the unit gauges. The Gauge Menu can also be accessed from the Standard Display.

Choose Gauges by pressing the SELECT Key when GAUGES is shown in the Maintenance Menu. The Gauges screen appears as shown below.



The NEXT and BACK Keys are used to scroll through the gauges.

The LOCK Key allows a gauge display to be “locked” on the display for 15 minutes at the operator’s discretion.

The EXIT Key returns to the Maintenance Menu

Not all gauges are available on all units. Only gauges used by the specific unit configuration will appear.

See the list of gauges on the next page.

The I/O submenu shows the state of each named device – either On or Off, or Low or OK.

Gauge List

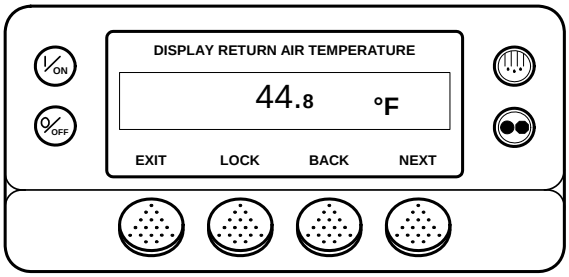
NOTE: Not all gauges may appear

- Coolant Temperature
- Coolant Level
- Oil Pressure
- Oil Level
- Amps
- Battery Voltage
- Engine RPM
- Fuel Level
- Discharge Pressure
- Suction Pressure
- ETV Position
- Fresh Air Exchange Door Position
- I/O (Input/Output State)
    - High Speed Relay
    - Run Relay
    - Run Relay Feedback
    - Defrost Damper
    - Heat Output
    - Alternator Frequency
    - Fresh Air Exchange Output
    - Diesel/Electric Relay (50 only)
    - Electric Ready Input (50 only)
    - Electric Overload (50 only)
    - Hot Gas Bypass (ETV only)

Sensors

The Sensors Menu allows the technician to view the unit temperature sensors. The Sensors Menu can also be accessed from the Standard Display.

Choose sensors by pressing the SELECT Key when SENSORS is shown in the Maintenance Menu. The SENSORS screen appears as shown below.



The NEXT and BACK Keys are used to scroll through the sensors.

The LOCK Key allows a sensor display to be “locked” on the display to prevent the display from timing out.

The EXIT Key returns to the Maintenance Menu

See the list of sensors on the next page.

Sensor List

- Control Return Air Temperature
- Display Return Air Temperature
- Control Discharge Air Temperature
- Display Discharge Air Temperature
- Temperature Differential
- Evaporator Coil Temperature
- Ambient Air Temperature
- Spare 1 Temperature
- Log Sensor 1
- Log Sensor 2
- Datalogger Sensor 3 Temperature
- Datalogger Sensor 4 Temperature
- Datalogger Sensor 5 Temperature
- Datalogger Sensor 6 Temperature
- Board Temperature Sensor (HMI Control Panel internal circuit board)

Alarms

The Alarms Menu allows the technician to view all alarms and clear most alarms. The Alarms Menu is also available from the Main Menu.

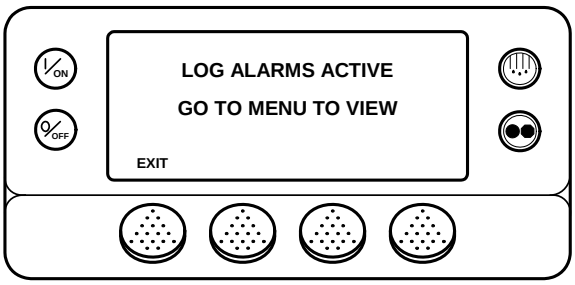
Alarms may be one of four types as shown below.

Log Alarms

Log Alarms are indicated for 60 seconds each time the unit is turned on. This level of alarm serves as a notice to take corrective action before a problem becomes severe. Maintenance items such as maintenance hourmeter time-outs are log alarms. The TemperatureWatch screen is not disabled if only log alarm(s) are active.

When the unit is turned on the display will show the Thermo King Logo and then the “Configuring System” message. If log alarm(s) are present the Log Alarm notice will appear on the display for 60 seconds as shown below. The remote indicator alarm light (if installed) will also be on during this period. The Standard Display will appear and the remote indicator alarm light will go off after 60 seconds.

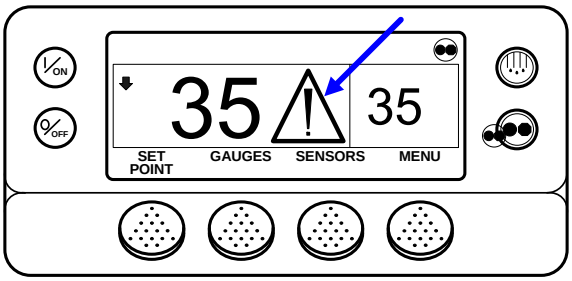
NOTE: The Alarm Icon does not appear on startup with log alarms present.



NOTE: If required, an engine start may occur while the display above is shown. This is normal operation.

Check Alarms

Prevent Alarms are indicated by a steady Alarm Icon. This level of alarm serves as a notice to take corrective action before a problem becomes severe. The remote indicator alarm light (if installed) will be on. The unit will run with check alarms but some features and functions may be inhibited. The TemperatureWatch screen is disabled if a check alarm is active.



Prevent Alarms

Prevent Alarms are also indicated by a steady Alarm Icon in the display. The remote indicator alarm light (if installed) will be on. The unit will attempt to resolve the situation as shown below.

- The unit will be temporarily shut down if a Prevent Alarm is active.
- The TemperatureWatch screen is disabled if a prevent alarm is active.
- The unit will remain shut down for a timed restart interval or until the fault conditions are corrected.
- If the unit is in a temporary shutdown, Alarm Code 84 Restart Null will be present along with the associated Prevent Alarm.
- The unit will restart and run (in most cases with forced reduced performance) to determine if continued operation is possible. The unit will run in this manner for a timed interval. If the unit is running with forced reduced performance, Alarm Code 85 Forced Unit Operation will also be present under some conditions.

- If the alarm does not reoccur during the timed running interval with reduced performance, the unit will return to full performance to determine if continued operation is possible. The unit will run in this manner for a timed interval. If the unit is successfully able to return to full performance for the timed interval without the alarm re-occurring, the alarm is auto cleared and the unit will run normally.

- All Prevent Alarm events and conditions are logged by the ServiceWatch Data Logger.

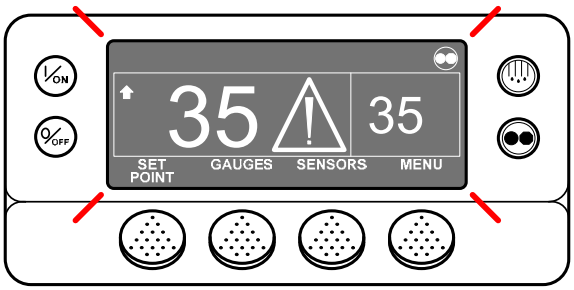
- In general, if the alarm condition re-occurs a defined number of times, the alarm is set as a shutdown alarm and no further restarts are possible.

NOTE: If the Restart After Shutdown feature in the Guarded Access Menu is set for CONTINUOUS, then an unlimited number of restart attempts are allowed.

Shutdown Alarms

Shutdown Alarms are indicated by the following:

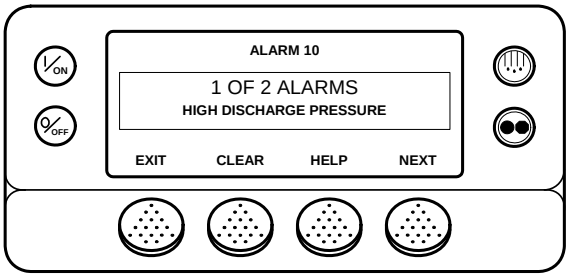
- The Alarm Icon will appear.
- The display and backlight will flash on and off.
- The display will switch from normal video to reverse video and back to normal video. (Light areas become dark and dark areas become light.)



Shutdown alarms will force the unit into shutdown. The unit will remain in shutdown until the shutdown alarm is manually cleared. Exceptions are some engine and electric shutdown alarms that become log alarms when switched to the alternate operating mode (diesel to electric or electric to diesel). The TemperatureWatch screen is disabled if a unit level shutdown alarm is active.

Displaying Alarms

Choose Alarms by pressing the SELECT Key when ALARMS is shown in the Maintenance Menu. The Alarms screen appears as shown below.



The NEXT Key is used to scroll through the alarms.

The HELP Key accesses an Operator level help screen.

The CLEAR Key clears most alarms. Some alarms can only be cleared from the Guarded Access Menu.

The EXIT Key returns to the Maintenance Menu.

For a list of Alarm Codes and Alarm Code Diagnostics see Section 5 of this manual.

Clearing Alarms

Most alarm codes can be cleared conventionally from the Alarm Menu using the CLEAR Key.

The following control and display sensor alarm codes can only be cleared from the Maintenance Menu or Guarded Access Menu:

- Alarm Code 03 Check Control Return Air Sensor
- Alarm Code 04 Check Control Discharge Air Sensor
- Alarm Code 74 Controller Reset to Defaults (Guarded Access Only)
- Alarm Code 203 Check Display Return Air Sensor
- Alarm Code 204 Check Display Discharge Air Sensor

The following alarm codes clear automatically.

- Alarm Code 64 Pretrip Reminder – Clears when a Pretrip Test is performed.
- Alarm Code 84 Restart Null – Clears when the unit is no longer in a restart null due to a Prevent Alarm.
- Alarm Code 85 Forced Unit Operation – Clears when the unit is no longer running in a forced mode due to a Prevent Alarm.
- Alarm Code 91 Check Electric Ready Input – Clears automatically when the unit starts running.
- Alarm Code 92 Sensor Grades Not Set – Clears when all required sensor grades are changed from 5H.

If the Limited Alarm Restarts feature is enabled the following additional alarm codes may only be cleared from the Guarded Access Menu. If this is the case, the CLEAR Key will not appear if the alarms are displayed from the Main Menu or the Maintenance Menu. See the Limited Alarm Restarts feature in Section 3 for details.

- Alarm Code 10 High Discharge Pressure
- Alarm Code 23 Cooling Cycle Fault
- Alarm Code 24 Heating Cycle Fault
- Alarm Code 32 Refrigeration Capacity Low

Alarm Notes

- **IMPORTANT:** If an alarm will not clear, it may still exist. If the alarm is not corrected, it will not clear or may be immediately set again.

- **IMPORTANT:** If an alarm cannot be cleared from the Main menu, the Clear Key will not appear. These alarms must be cleared from the Maintenance or Guarded Access Menus.

- **IMPORTANT:** All alarms must be viewed before any of the alarms can be cleared.

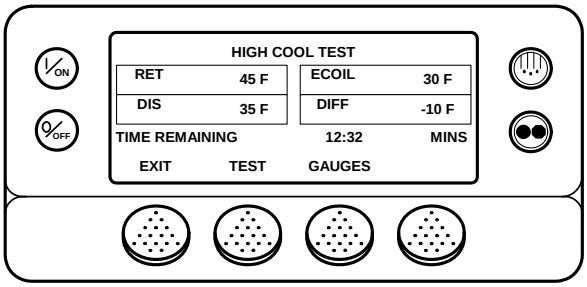
- **IMPORTANT:** Shutdown alarms should receive immediate attention if the truck or trailer is loaded.

Service Test Mode

Service Test Mode allows the technician to force the unit to a known operating mode for diagnostic purposes. The unit can be either running or not running. If the unit is not running and a running test is selected the unit will start and run.

IMPORTANT: Service Test Mode is not allowed if any shutdown alarms exist or if the unit is in a Prevent Mode Shutdown Null (Alarm Code 84 is set). Clear all alarms before attempting to use Service Test Mode.

Choose Service Test by pressing the SELECT Key when SERVICE TEST is shown in the Maintenance Menu. Select Running or Non Running tests. The SERVICE TEST screen appears as shown below. The test shown is the High Speed Cool test.



Return, Discharge and Evaporator Coil temperatures are shown. The Temperature Differential is also calculated and displayed.

The GAUGES Key is used to scroll through the gauges.
The TEST Key allows the various tests to be selected.
The EXIT Key returns to the Maintenance Menu

A test will remain active for 15 minutes. A countdown counter shows the time remaining for the test. If the test times out the test will terminate, the unit will be shut down (if running) and Alarm Code 54 Test Mode Timeout is set.

Not all tests are available on all units. Only tests used by the specific unit configuration will appear.

See the list of tests on the next page.

Service Test Modes

- Off
- Null
- High Speed Cool
- Low Speed Cool
- Low Speed Heat
- High Speed Heat
- Defrost
- Cool Bypass (ETV units only)
- Modulation Cool 100% with Hot Gas Bypass (ETV units only)
- Modulation Cool 100% (ETV units only)
- Modulation Heat 100% (ETV units only)

Devices Energized – Reciprocating Compressor – Diesel Mode

Service Test Mode Test	Run Relay	High Speed	Heat	D/E Relay	Hot Gas Bypass	ETV	Damper
Null							
High Speed Cool	ON	ON				Enabled	
Low Speed Cool	ON					Enabled	
Low Speed Heat	ON		ON			Enabled	
High Speed Heat	ON	ON	ON			Enabled	
Defrost	ON		ON			Enabled	ON
Cool Bypass	ON				ON	Enabled	
Mod Cool 100% HGB	ON				ON	100 Steps Open	
Mod Cool 100%	ON					100 Steps Open	
Mod Heat 100%	ON		ON			100 Steps Open	

Devices Energized – Reciprocating Compressor – Electric Mode

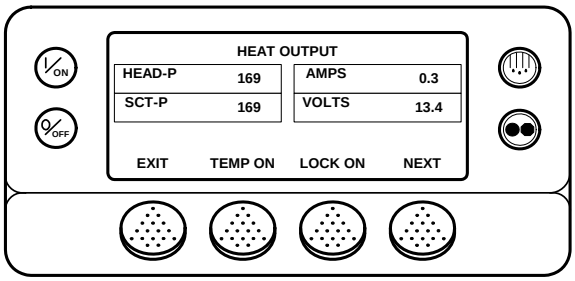
Service Test Mode Test	Run Relay	High Speed/ Electric Heat	Heat	D/E Relay	Hot Gas Bypass	ETV	Damper
Null							
Cool	ON			ON		Enabled	
Hot Gas Heat	ON		ON	ON		Enabled	
Hot Gas & Elec Heat	ON	ON	ON	ON		Enabled	
Defrost	ON	ON	ON	ON		Enabled	ON
Cool Bypass	ON			ON	ON	Enabled	
Mod Cool 100% HGB	ON			ON	ON	100 Steps Open	
Mod Cool 100%	ON			ON		100 Steps Open	
Mod Heat 100%	ON		ON	ON		100 Steps Open	

Interface Board Test

Interface Board Test Mode allows the technician to energize and de-energize individual control devices for diagnostic purposes. The unit cannot be running to use this test. If the test is entered with the unit running, the unit will shut down.

IMPORTANT: Interface Board Test Mode is not allowed if any shutdown alarms exist or if the unit is in a Prevent Mode Shutdown Null (Alarm Code 84 is set). Clear all alarms before using Interface Board Test Mode.

Choose Interface Board Test by pressing the SELECT Key when INTERFACE BOARD TEST is shown in the Maintenance Menu. The Interface Board Test screen appears as shown below. The test shown is the Heat Output test.



Discharge Pressure, Suction Pressure, Amps and Volts are shown.

The TEMP ON Key is used to momentarily energize the device.

The LOCK ON Key energizes the device for 15 minutes. A countdown counter shows the time remaining for the test. If the test times out Alarm Code 54 Test Mode Timeout is set. Not all devices can be locked on.

The UNLOCK Key unlocks the display and returns to the Interface Board Test.

The EXIT Key returns to the Maintenance Menu.

Not all tests are available on all units. Only tests used by the specific unit will appear.

See the list of tests on the next page.

Interface Board Test Modes and Current Draw

NOTE: Device current will vary dependant on battery voltage and battery condition.

Interface Board Test	Approximate Device Current Draw	Comments
Preheat Relay	70 Amps	Temporary On only
Buzzer	Negligible	Temporary On only
Run Relay	2.0 Amps	
Alternator Excite Output	0.5 – 2.0 Amps	
Heat Output	0.4 Amps	
Damper Relay	6.0 Amps	
Indicator Light	0.1 Amps	
Alarm Light	0.1 Amps	
Diesel/Electric Relay	1.1 Amps	Not available if ER is high
Electric Heat	1.5 Amps	
High Speed Relay	4.6 Amps	
Hot Gas Bypass	1.5 Amps	ETV units only.
Fresh Air Exchange	6.0 Amps	

Display Self Test

The Display Self Test allows the technician to perform a number of self tests on the unit HMI Control Panel. The tests available are shown below.

Choose Display Self Test by pressing the SELECT Key when DISPLAY SELF TEST is shown in the Maintenance Menu. The Display Self Test screen appears. Select a test from the list below

- LCD Test – This test allows the technician to select a normal or inverted display. If inverted is chosen the display is reversed – segments that were turned on are now turned off and segments that were turned off are now turned on. The technician visually verifies that all display segments are functioning properly.
- Keypad Test – This test prompts the technician to press the four soft keys, the Defrost Key and the Cycle Sentry Key. Each time the requested key is pressed the next prompt is displayed, allowing the technician to verify proper operation of these keys.
- Backlight Test – This test allows the technician to turn the backlight on and off to confirm operation.
- Brightness Test – This test allows the technician to select Low, Medium or High backlight intensity.
- Buzzer Test – This test allows the technician to turn the HMI buzzer on and off to verify operation.
- Heater Output – This test allows the technician to turn the HMI display heater on and off.
- Serial E2 – This test allows the technician to perform an internal HMI memory test. The test takes less than 1 second and the results are reported as PASS or FAIL.
- Data Log Flash – This test allows the technician to perform an internal HMI CargoWatch data logger memory test. The test takes less than 1 second and the results are reported as PASS or FAIL.
- RTC Update – This test allows the technician to perform an internal HMI real time clock test. The test takes less than 3 seconds and the results are reported as PASS or FAIL.

Evacuation Test

This menu allows the technician to open all normally closed refrigeration system valves to evacuate and charge the unit with refrigerant. If the battery voltage falls below 13.0 VDC the technician is prompted to connect a battery charger to maintain sufficient voltage to hold all valves open.

IMPORTANT: Evacuation mode has no time-out. The unit will remain in Evacuation Mode indefinitely unless the battery voltage becomes excessive.

All selectable unit features will be disabled when in evacuation mode. Auto switch from diesel to electric or from electric to diesel is allowed, but unit will not start.

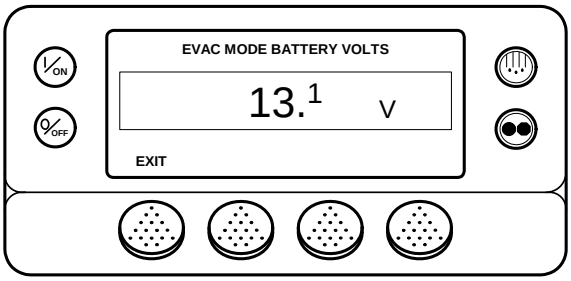
Evacuation mode is not allowed if:

- Any shutdown alarms are present.
- The unit is in restart null.
- The unit is in a start sequence.

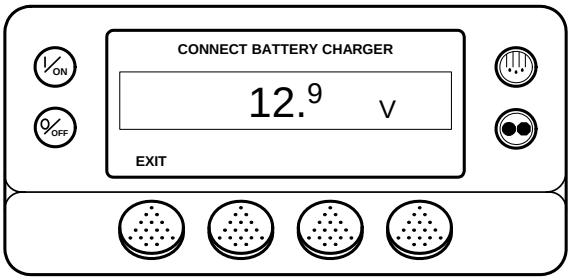
When in evacuation mode:

- If the unit is running it will shut down automatically when entering Evacuation Mode.
- Alarm Code 86 Check Discharge Pressure Sensor is disabled.
- Alarm Code 87 Check Suction Pressure Sensor is disabled.
- Door switch operation is disabled.

Choose Evacuation Test by pressing the SELECT Key when EVACUATION TEST is shown by the Maintenance Menu. The Evacuation Test display shown below will appear and remain on the display so long as the battery voltage does not fall below 13.0 VDC. All normally closed refrigerant valves are energized to the open position to allow system evacuation to effectively remove air and moisture from the refrigeration system.



If the battery voltage falls below 13.0 VDC the technician is prompted to install a battery charger to guarantee sufficient voltage to keep all valves open during the evacuation process.



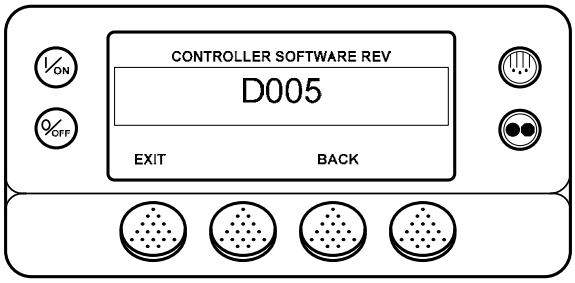
If the voltage from the battery charger rises above 16 Vdc, the controller will be turned off to prevent damage to the electronics and/or system components.

To exit Evacuation Mode press the EXIT Key or turn the unit off.

Software Revision

This menu allows the technician to view the software revision for the HMI Control Panel and the Base Controller.

Choose Software Revision by pressing the SELECT Key when SOFTWARE REVISION is shown by the Maintenance Menu. The Software Revision display appears as shown below.



The NEXT and BACK Keys allow the technician to scroll through the software revisions. Software revisions appear in the order shown below:

- Display Software Revision
- Controller Software Revision
- Supervisor Software Revision (Determined by HMI Control Panel software revision)

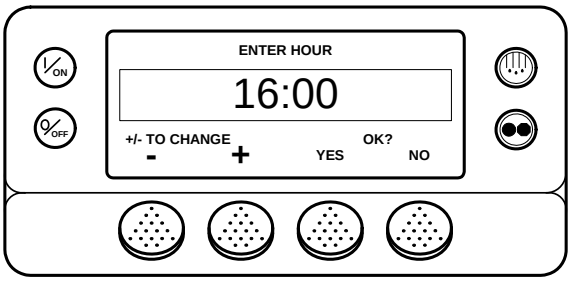
To flash load new HMI Control Panel software see Service Procedure A46B Flash Loading HMI Control Panel Software in Section 6 of this manual.

To flash load new Base Controller software see Service Procedure A46A Flash Loading HMI Control Panel Software in Section 6 of this manual.

Set Time and Date

This menu allows the technician to view and change the HMI Control Panel clock/calendar.

Choose Set Time and Date by pressing the SELECT Key when SET TIME AND DATE is shown by the Maintenance Menu. The Set Time and Date display appears as shown below.



The – and + Keys are used to change the hour as required. Pressing YES changes the hour to the selected time and then shows the next Time/Date screen. The screens appear in the order shown below.

- Hour
- Minute
- Date (Day)
- Month
- Year

GUARDED ACCESS MENU OVERVIEW

D006/D007 and 6560/6561 SR-3 Trailer S/T Guarded Access Menu (1 of 2)

Features shown are for units configured Trailer

Guarded Access Menu
1 of 4

Security Code (if enabled)
- Enter Access Code

Programmable Features
- Temperature Units (F)
- Pressure Units (PSIG)
- Restart Unit After Shutdown (Enabled)
- Setpoint High Limit (80°F)
- Setpoint Low Limit (-20°F)
- Fuel Saver II (Enabled)
- High Speed Pulldown (Enabled)
- Fresh Frozen Range (15°F)
- Door Open Forces (Log Only)
  - Door Open Timeout (HRS:MIN)
- Sleep Mode After Pretrip(Disabled)
- Rail Option (Disabled)
  - Rail Alternate (Disabled)
- Blocked Air Chute Detect (Disabled)
  - Temperature Differential (9.9)
  - Time to Alarm (0:30)
  - Door Open Override (Disabled)
- Discharge Pressure Setpoint (415 PSI)
- Water Temperature Setpoint (210°F)
- Limited Alarm Restarts (Disabled)
- Remote Device (Disabled)
- COM 1 Default Baud Rate (1200
- COM 2 Default Baud Rate (9600)
- COM 3 Default Baud Rate (9600)
- High Temperature Defrost (Disabled)
- Local Authorization of OS+ Upload (Enabled)
- Local Authorization of Flash Load (Enabled)

Main Menu Configuration
- Add Keypad Lockout to Mode Menu (Disabled)
- Add Sleep to Mode Menu (Disabled)
- Add Temperature Units to Mode Menu (Disabled)

Alarms
- Display all alarms
- Clear most alarms

Not all menu features may appear

Guarded Access Menu
2 of 4

Hourmeter Setup

Program Hourmeter
- Total Run Time Reminder #1 Hours (Off)
- Total Run Time Reminder #2 Hours (Off)
- Controller Power On Hours (Off)
- Pretrip Reminder Hours (Off)
- Engine Run Time Reminder #1 Hours (Off)
- Engine Run Time Reminder #2 Hours (Off)
- Electric Run Time Reminder #1 Hours (Off)
- Electric Run Time Reminder #2 Hours (Off)

Viewable Hourmeter Setup
- Total Hours (Disabled)
- Total Run Time Hours (Enabled)
- Engine Hours (Enabled)
- Electric Run Hours (Enabled)
- Total Run Time Reminder #1 Hours (Disabled)
- Total Run Time Reminder #2 Hours (Disabled)
- Controller Power On Hours (Disabled)
- Pretrip Reminder Hours (Disabled)
- Engine Run Time Rem #1 Hours (Disabled)
- Engine Run Time Rem #2 Hours (Disabled)
- Electric Run Time Rem #1 Hours (Disabled)
- Electric Run Time Rem #2 Hours (Disabled)

Program Service Due Date
- Engine Run Time Service Due Date (Disabled)

Sensor Calibration
- Control Return Air Sensor Grade (5H)
- Control Discharge Air Sensor Grade (5H)
- Display Return Air Sensor Grade (5H)
- Display Discharge Air Sensor Grade (5H)
- Spare 1 Sensor Grade (5H)

Cycle Sentry Setup
- Cycle Sentry Amps Level (5)
- Battery Sentry Voltage Level (12.2)

Defrost Setup
- Defrost Interval In Range w Fresh Setpoint (6)
- Defrost Interval Not In Range w Fresh Setpoint (4)
- Defrost Interval In Range w Frozen Setpoint (6)
- Defrost Interval Not In Range w Frozen Setpoint (4)
- Maximum Defrost Duration (45)

Rev D006/D007 and 6560/6561 Trailer S/T 03 Apr 2011

Guarded Access Menu Overview - Continued

D006/D007 and 6560/6561 SR-3 Trailer S/T Guarded Access Menu (2 of 2)

Features shown are for units configured Trailer

Guarded Access Menu
3 of 4

Language Setup

HMI Rev 65xx	HMI Rev 66xx	HMI Rev 67xx
English	English	English
Spanish	Danish	Japanese
French	Russian	Chinese
German	Norwegian	
Italian	Swedish	
Dutch	Finnish	**HMI Rev 68xx**
Portuguese	Polish	Mix and Match
Greek	Hungarian	Languages
Turkish	Romanian	
Hebrew	Bulgarian	
Arabic	Czech	

Access Code Setup
- Enter Access Code

OptiSet Plus
- OptiSet Plus Reset
- Temperature Profile Selection (Numeric Setpoint)

Sensor Configuration (CargoWatch)
- (See Cargo Watch description in Diagnostic Manual)
- Logging Interval (15 Minutes)
- Log Sensor 1(On)
  - Independant Sensor #1 Name (Log Sensor 1)
  - Out of Range Checking (Off)
    - Low (-10.8°F)
    - High (10.8°F)
  - Italian Option - Available with Sensor 1 only (Off)
  - Sensor Averaging (Off)
- Log Sensor 2 (On)
  - Independent Sensor #1 Name (Log Sensor 2)
  - Out of Range Checking (Off)
    - Low (-10.8°F)
    - High (10.8°F)
  - Sensor Averaging (Off)
- Log Sensor 3 (Off) Same features as Sensor 2 if On
- Log Sensor 4 (Off) Same features as Sensor 2 if On
- Log Sensor 5 (Off) Same features as Sensor 2 if On
- Log Sensor 6 (Off) Same features as Sensor 2 if On
- Digital In 1 (On)
  - Door Open Logging (On)
  - Digital Input #1 Name (Digital Input #1)
- Digital In 2 (Off) Same as Digital Input 1 if On
- Digital In 3 (Off) Same as Digital Input 1 if On
- Countdown Timer (Off)
- Conservative Log Count (Off)
- SOT on Setpoint (Disabled)

Guarded Access Menu
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Unit Configuration
- Unit Type (Truck - Trailer)
- Engine Type (Yanmar 2.1)
- Compressor Type (Recip, Screw)
- ETV Configured (Yes)
- Electric Standby Equipped? (Yes)
- Electric Heat Option (Yes)
- Electric Motor Type (14 HP Type, 24 HP Type)
- Diesel to Electric Autoswitch Enabled? (No)
- Electric to Diesel Autoswitch Enabled? (No)
- Unit Model (SB, Super-II, SL-400, SLX-100, SLX-200, SLX-300, SLX-400, SLX-LDB)
- High Capacity Unit? (No)
  - High Capacity Fresh? (No)
- Defrost Motor Equipped? (No)
- Fuel Sensor Type (None)
- Rear Remote Control (None)
  - Rear Remote Control Action (Stand By)
- Pretrip/Sleep Switch Options (Disabled)
- 3rd Party Device Control (None, COM 1, COM 2)
- Low Fuel Shutdown (Disabled)
- Fresh Air Exchange (Disabled)

Not all menu features may appear

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USING THE GUARDED ACCESS MENU

The Guarded Access Menu contains menus that allow the technician to check and change the unit's programmable features. These features are detailed in Section 3 of this manual. Service Procedure A02A explains how to display and record the Guarded Access programmable feature settings. Service Procedure A04A explains how to set the Guarded Access programmable features.

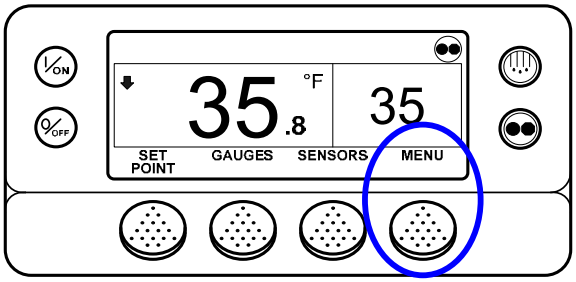
The Guarded Access programmable features can also be changed using an OptiSet Plus Unit Setup file. Once created, the Unit Setup file can be transferred to a USB Flash Drive to send the file to the unit. For more information see the following resources:

- ✓ OptiSet Plus 3.0 User Guide (TK 54686-8-MS) .
- ✓ USB Flash Drive under Main Menu Features in this section of the manual.
- ✓ Extensive help information is also available from the OptiSet Plus 4.1 Help Menu.

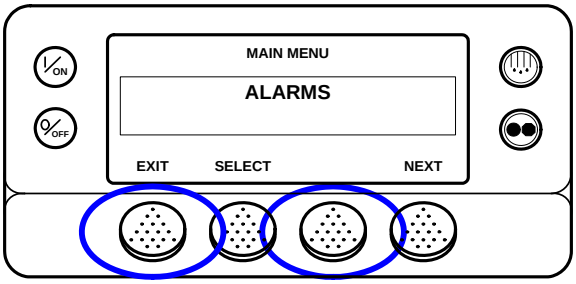
NOTE: A warm restart is performed when the Guarded Access menu is exited. The unit is reconfigured so that any changes that were made from the Guarded Access menu take effect.

HINT: The Guarded Access Menu is entered from the last feature of the Maintenance Menu. The unit must not be running in order to enter the Guarded Access Menu. If the unit is running, entering Interface Board Test Mode from the Maintenance menu will shut the unit down. Press the EXIT Key to return to the Maintenance Menu and continue scrolling to the end of the Maintenance Menu to enter the Guarded Access Menu.

To access the Guarded Access menu from the Standard Display press the MENU Key.

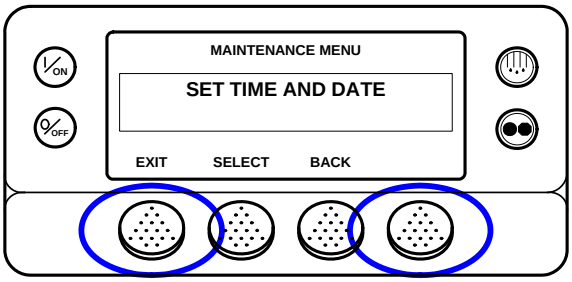


The Maintenance Menu is accessed from the first Main Menu screen that appears; the Flash Drive Display, Language Display or the Alarms Display. The Alarms Display is shown here. Press and hold both the unlabelled soft key and the Exit Key for 5 seconds.



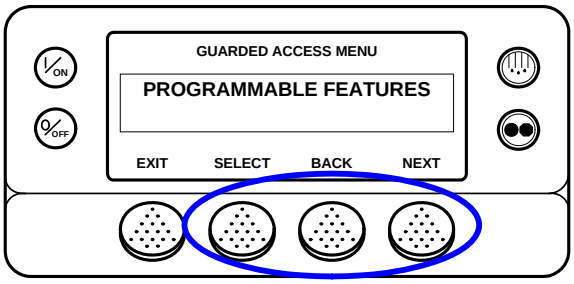
The first Maintenance Menu feature will appear. Press the NEXT Key to scroll to Set Time and Date selection at the end of the Maintenance Menu choices. Press and hold both the unlabelled soft key and the Exit Key for 5 seconds.

NOTE – Guarded Access cannot be entered if the unit is running. If the unit is running, when scrolling thru the Maintenance Menu enter Interface Board Test Mode to shut the unit down. Press the EXIT Key to return to the Maintenance Menu and continue scrolling to the end of the Maintenance Menu.



IMPORTANT: If a Security Code has been set the correct code must be entered here to gain access to the Guarded Access Menu. If an Access Code is requested and the code is not known, enter 4444.

If an Access Code is not enabled or when the correct security code is entered (4444 always works), the first Guarded Access Menu feature will appear. Press the NEXT and BACK Keys to scroll thru the Guarded Access Menu choices. When the desired choice is shown on the display, press the SELECT Key to access it.



The Guarded Access Menu choices are shown on the next pages. For detailed information see the individual explanations of each item in Section 3 of this manual.

Service Procedure A02A explains how to read and record the programmable feature settings using the HMI Control Panel. Service Procedure A04A explains how to set the programmable features using the HMI Control Panel.

To return to the Standard Display press the EXIT Key.

NOTE: A warm restart is performed when the Guarded Access menu is exited. The unit is reconfigured so that any changes that were made from the Guarded Access menu take effect.

IMPORTANT: If Unit Type in the Guarded Access / Unit Configuration Menu is changed from trailer to truck or truck to trailer, it is necessary to exit the Guarded Access Menu after making the change. This will reset the software to the new setting. Failure to do so will cause the wrong selections to be present in other Guarded Access Menu settings. For example, if the feature was set TRAILER and changed to TRUCK, the reset changes the trailer settings to truck settings. Failure to do so would result in trailer feature settings being shown, even though the Unit Type had been changed to truck.

After the unit is reset, the Guarded Access Menu should be re-entered to complete other required feature changes.

The Unit Type default setting is (Trailer).

GUARDED ACCESS MENU CHOICES

See Section 3 of this manual for a complete description of Guarded Access Menu features.

Programmable Features (some features are not available if OptiSet Plus is in use)

- Temperature Units (F)
- Pressure Units (PSIG)
- Restart Unit After Shutdown (Enabled)
- Setpoint High Limit (80°F) or (27°C)
- Setpoint Low Limit (-20°F) or (-29°C)
- Fuel Saver II (Enabled)
- High Speed Pulldown (Enabled)
- Fresh Frozen Range (15°F) or (-9°C)
- Door Open Forces (Log Only)
  - Door Open Timeout (HRS:MIN)
- Sleep Mode After Pretrip (Disabled)
- Rail Option (Disabled)
  - Rail Alternate (Disabled)
- Blocked Air Chute Detect (Disabled)
  - Temperature Differential (9.9)
  - Time to Alarm (0:30)
  - Door Open Override (Disabled)
- Discharge Pressure Setpoint (415 PSI)
- Water Temperature Setpoint (210°F) or (99°C)
- Limited Alarm Restarts (Disabled)
- Remote Device (Disabled)
- COM 1 Default Baud Rate (1200)
- COM 2 Default Baud Rate (9600)
- COM 3 Default Baud Rate (9600)
- Local Authorization of OS+ Upload (Enabled) – Future Use
- Local Authorization of Flash Load (Enabled) – Future Use

Main Menu Configuration

- Add Keypad Lockout to Mode Menu (Disabled)
- Add Sleep to Mode Menu (Disabled)
- Add Temperature Units to Mode Menu (Disabled)

Alarms

- Display all alarms
- Clear most alarms.

Hourmeter Setup

Program Hourmeter

- Total Run Time Reminder #1 Hours (Off)
- Total Run Time Reminder #2 Hours (Off)
- Controller Power On Hours (Off)
- Pretrip Reminder Hours (Off)
- Engine Run Time Reminder #1 Hours (Off)
- Engine Run Time Reminder #2 Hours (Off)
- Electric Run Time Reminder #1 Hours (Off)
- Electric Run Time Reminder #2 Hours (Off)

Viewable Hourmeter Setup

- Total Hours (Disabled)
- Total Run Time Hours (Enabled)
- Engine Hours (Enabled)
- Electric Run Hours (Enabled)
- Total Run Time Reminder #1 (Disabled)
- Total Run Time Reminder #2 (Disabled)
- Controller Power On Hours (Disabled)
- Pretrip Reminder Hours (Disabled)
- Engine Run Time Reminder #1 (Disabled)
- Engine Run Time Reminder #2 (Disabled)
- Electric Run Time Reminder #1 (Disabled)
- Electric Run Time Reminder #2 (Disabled)

Program Service Due Date

- Engine Run Time Service Due Date (Disabled)

Sensor Calibration

- Control Return Air Sensor Grade (5H)
- Control Discharge Air Sensor Grade (5H)
- Display Return Air Sensor Grade (5H)
- Display Discharge Air Sensor Grade (5H)
- Spare 1 Sensor Grade (5H)

Cycle Sentry Setup

- Cycle Sentry Amps Level (5)
- Battery Sentry Voltage Level (12.2)

Defrost Setup

- Defrost Interval In Range with Fresh Setpoint (6)
- Defrost Interval Not In Range with Fresh Setpoint (4)
- Defrost Interval In Range with Frozen Setpoint (6)
- Defrost Interval Not In Range with Frozen Setpoint (4)
- Maximum Defrost Duration (45)

Language Setup

HMI Rev 65xx	HMI Rev 66xx	HMI Rev 67xx
English	English	English
Spanish	Danish	Japanese
French	Russian	Chinese
German	Norwegian	
Italian	Swedish	**HMI Rev 68xx**
Dutch	Finnish	Mix and Match
Portuguese	Polish	Languages
Greek	Hungarian	
Turkish	Romanian	
Hebrew	Bulgarian	
Arabic	Czech	

Access Code Setup

- If a security code is desired for entry to the Guarded Access menu, it is set up here.

OptiSet Plus

- OptiSet Plus Reset
- Temperature Profile Selection (Numeric Setpoint)

Sensor Configuration (Cargo Watch)

See Service Procedure A49A in Section 6 of this manual for details

- Logging Interval (15 Minutes)
- Log Sensor 1 (On)
  - Independent Sensor #1 Name (Log Sensor 1)
  - Out of Range Checking (Off)
    - Low (-10.8°F) or (-24°C)
    - High (10.8°) or (-12°C)
  - Italian Option – Available with Sensor 1 Only (Off)
  - Sensor Averaging (Off)
- Log Sensor 2 (On)
  - Independent Sensor #1 Name (Log Sensor 1)
  - Out of Range Checking (Off)
    - Low (-10.8°F) or (-24°C)
    - High (10.8°) or (-12°C)
  - Sensor Averaging (Off)
- Log Sensor 3 (Off)
  - Same features as Sensor 2 if On
- Log Sensor 4 (Off)
  - Same features as Sensor 2 if On
- Log Sensor 5 (Off)
  - Same features as Sensor 2 if On
- Log Sensor 6 (Off)
  - Same features as Sensor 2 if On

~ Continued Next Page ~

- Digital In 1 (On)
  - Door Open Logging (On)
  - Digital Input # 1 Name (Digital Input #1)
- Digital In 2 (Off)
  - Door Open Logging (On)
  - Same features as Digital Input 1 if On
- Digital In 3 (Off)
  - Door Open Logging (On)
  - Same features as Digital Input 1 if On
- Countdown Timer (Off)
- Conservative Log Count (Off)
- SOT on Setpoint

Unit Configuration

- Unit Type (Trailer) **SEE NOTE 1 BELOW**
- Engine Type (Yanmar 2.1)
- Compressor Type (Recip)
- ETV Configured (Yes)
- Electric Standby Equipped (Yes)
  - Electric Heat Option (Yes)
  - Electric Motor Type (14 HP Type)
  - Diesel to Electric Autoswitch Enabled (No)
  - Electric to Diesel Autoswitch Enabled (No)
- Unit Model (SB, Super-II, SL-400, SLX-100, SLX-200, SLX-300, SLX-400, SLX-LDB)
- High Capacity Unit (No)
  - High Capacity Fresh (No)
- Defrost Motor Equipped (No)
- Fuel Sensor Type (None)
- Rear Remote Control (None)
  - Rear Remote Control Action (Stand By)
- Pretrip/Sleep Switch Options (None)
- 3rd Party Device Control (None)
- Low Fuel Shutdown (Disabled)
- Fresh Air Exchange (Disabled)

NOTE 1 – **IMPORTANT** If Unit Type is changed, it is necessary to exit the Guarded Access Menu after making the change. This will reset the software to the new setting. Failure to do so will cause the wrong selections to be present in other Guarded Access Menu settings. For example, if the feature was set TRAILER and changed to TRUCK, the reset changes the trailer settings to truck settings. Failure to do so would result in trailer feature settings being shown, even though the Unit Type had been changed to truck.

After the unit is reset, the Guarded Access Menu should be re-entered to complete other required feature changes.

The Unit Type default setting is (Trailer).

TABLE OF CONTENTS – SECTION 5

SR-3 DIAGNOSTICS

Section 5 is devoted to diagnostic routines designed to help the technician quickly identify the cause of a problem and repair it using the correct tools, information and procedures. It is important that the required procedures be followed exactly. Failure to do so may result in an incomplete repair.

The following hints will prove helpful.

- Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

- Every effort should be made to perform a Pretrip Test on a suspect unit. In almost all cases, the Pretrip Test will result in one or more alarm codes that will lead you directly to the problem.

- Operators should record all alarm codes in sequence for reference. Alarm codes are displayed in order of occurrence, with the most recent alarm code displayed last.

- Clear all alarm codes before starting a Pretrip Test.

- Use Interface Board Test and Service Test Mode as appropriate to verify unit operation

- Be certain all connectors on the Base Controller/Interface Board and HMI Control Panel are properly seated.

- Be certain all outboard harness connectors are properly seated.

- Make sure all programmable features are set to the customer's specifications before releasing the unit for service.

SR-3 CONTROL SYSTEM NOTES

The following procedures must be followed when working on units equipped with SR-3 Base Controller/Interface Boards.

- **Never use testers consisting of a battery and a light bulb to test circuits on any microprocessor-based device.**

- **Any time a Return Air or Discharge Air sensor is changed, it must be calibrated using the Sensor Calibration feature in the Guarded Access Menu.**

- **Any time the Base Controller/Interface Board is replaced, these Service Procedures must be used:**

  A02A - Recording Existing Base Controller/Interface Board Setup

  A03A - Base Controller/Interface Board Removal and Replacement

  A04A - Base Controller/Interface Board Setup

- **Any time welding is necessary, Service Procedure A26A must be followed.**

ELECTROSTATIC DISCHARGE

The following electrostatic precautions must be taken.

- Keep all SR-3 Base Controller/Interface Boards and HMI Control Panels in anti-static bags at all times.

PHYSICAL PROTECTION

- Protect any defective SR-3 Base Controller/Interface Board and HMI control panels from physical damage by placing them in the shipping carton supplied with the replacement. They will be returned for failure analysis and possible re-manufacture.

CORRECTIVE ACTIONS AS A RESULT OF ALARM CODES

Every effort should be made to perform a Pretrip Test on a unit suspected of having a defect. In almost all cases, the Pretrip Test will result in one or more alarm codes that will lead you directly to the problem.

ALARM TYPES

Alarms may be one of four types as shown below.

Log Alarms

Log Alarms are indicated for 60 seconds each time the unit is turned on. This level of alarm serves as a notice to take corrective action before a problem becomes severe. Maintenance items such as maintenance hourmeter time-outs are log alarms. The Temperature Watch screen is not disabled if only log alarm(s) are active.

When the unit is turned on the display will show the Thermo King Logo and then the “Configuring System” message. If log alarm(s) are present the Log Alarm notice will appear on the display for 60 seconds. The remote indicator alarm light (if installed) will also be on during this period. The Standard Display will appear and the remote indicator alarm light will go off after 60 seconds.

NOTE: The Alarm Icon does not appear on startup with log alarms present.

Check Alarms

Check Alarms are indicated by a steady alarm indication at the top of the display and the message “Service Required within 24 Hours”. The Alarm Icon will appear. This level of alarm serves as a notice to take corrective action before a problem becomes severe. The unit will run with check alarms but some features and functions may be inhibited. The TemperatureWatch screen is disabled if a check alarm is active.

Prevent Alarms

Prevent Alarms are indicated by a steady alarm indication at the top of the display and the message “Service Required within 24 Hours”. The Alarm Icon will appear. The unit will be temporarily shut down if a prevent alarm is active. The unit will remain shut down for a timed restart interval or until the fault conditions are corrected and then restart. If the unit is in a temporary shutdown, Alarm Code 84 Restart Null will be present along with the associated Prevent Alarm. In most cases the unit will restart with reduced performance to determine if continued operation is possible. If the alarm does not reoccur with reduced performance then the unit will then return to full performance. If the unit is operating with reduced performance Alarm Code 85 Forced Unit Operation will also be present under some conditions. In general, if the alarm condition reoccurs a defined number of times then the alarm is set as a shutdown alarm and no further restarts are possible. The Temperature Watch screen is disabled if a prevent alarm is active.

NOTE: If the Restart After Shutdown feature in the Guarded Access Menu is set for CONTINUOUS, then an unlimited number of restart attempts are allowed.

Shutdown Alarms

Depending on software revisions, Shutdown Alarms may be indicated by the following:

- The Alarm Icon will appear.
- The display and backlight will flash on and off.
- The display will switch from normal video to reverse video and back to normal video. (Light areas become dark and dark areas become light.)

Shutdown alarms will force the unit into shutdown. The unit will remain in shutdown until the shutdown alarm is manually cleared. Exceptions are some engine and electric shutdown alarms that become log alarms when switched to the alternate operating mode (diesel to electric or electric to diesel). The TemperatureWatch screen is disabled if a unit level shutdown alarm is active.

SPECIAL ALARM CODE CONSIDERATIONS

Pretrip Alarm Codes

If an alarm occurs during a Pretrip Test the alarm code will be displayed as Pretrip Alarm XX, where XX is the alarm code.

Alarm Codes When Switching Between Diesel and Electric

If a shutdown alarm occurs that affects only diesel mode operation and the unit is switched to electric, the diesel mode shutdown alarm becomes an electric mode log alarm. This allows the unit to run in electric mode without clearing the shutdown alarm that is preventing diesel mode operation. If the unit is switched back to diesel mode, the alarm again become a diesel mode shutdown alarm and prevents unit operation.

In the same manner, if a shutdown alarm occurs that affects only electric mode operation and the unit is switched to diesel, the electric mode shutdown alarm becomes a diesel mode log alarm to allow diesel mode operation. If the unit is switched back to electric mode, the alarm reverts to an electric mode shutdown alarm and prevents unit operation.

CLEARING ALARM CODES

Most alarm codes can be cleared conventionally from the Alarm Menu using the CLEAR soft key.

The following alarm codes can only be cleared from the Guarded Access Menu. The CLEAR soft key will not appear if the alarms are displayed from the Main Menu or the Maintenance Menu.

- Alarm Code 03 Check (Control) Return Air Sensor for all zones.
- Alarm Code 04 Check (Control) Discharge Air Sensor for all zones.
- Alarm Code 203 Check (Display) Return Air Sensor for all zones.
- Alarm Code 204 Check (Display) Discharge Air Sensor for all zones.
- Alarm Code 74 Controller Reset to Defaults

The following alarm codes clear automatically.

- Alarm Code 64 Pretrip Reminder – Clears when a Pretrip Test is performed.
- Alarm Code 84 Restart Null – Clears when the unit is no longer in a restart null due to a Prevent Alarm.
- Alarm Code 85 Forced Unit Operation – Clears when the unit is no longer running in a forced mode due to a Prevent Alarm.
- Alarm Code 91 Check Electric Ready Input – Clears automatically when the unit starts running or the unit is switched to diesel mode.
- Alarm Code 92 Sensor Grades Not Set – Clears when all installed graded sensor grades are changed from 5H.

If the Limited Alarm Restarts feature is enabled the following additional alarm codes may only be cleared from the Guarded Access Menu. If this is the case, the CLEAR soft key will not appear if the alarms are displayed from the Main Menu or the Maintenance Menu. See the Limited Alarm Restarts feature in Section 3 for details.

- Alarm Code 10 High Discharge Pressure
- Alarm Code 23 Cooling Cycle Fault
- Alarm Code 24 Heating Cycle Fault
- Alarm Code 32 Refrigeration Capacity Low

ALARM CODE DIAGNOSTICS

00 NO ALARMS EXIST

02 CHECK EVAPORATOR COIL SENSOR

Alarm Type	Check Alarm (Shutdown Alarm during a Pretrip Test).
Associated Alarm Codes	Alarm Code 13 Sensor Calibration Check

Component Description and Location

This sensor is an un-graded sensor and does not require calibration. The sensor is located on the evaporator coil header plate.

Circuit Description

The evaporator coil temperature sensor circuit is a two wire circuit. The CTP-01 (+) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 Pin 25 to the blue sensor wire. The CTN-01 (-) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 Pin 14 to the brown sensor wire. The sensor wires are routed in the Sensor Harness. The sensor is hard-wired to the sensor harness.

Considerations

1. Sensors should be positioned to minimize the potential for moisture entry where the wires enter the sensor shell. Mount sensors with the barrel up and the wires down wherever possible.

2. See Alarm Code 13 for an explanation of “Soft Failures” and “Hard Failures”.

How Alarm is Set

1. If the sensor reading is over 200°F (93°C) for 10 seconds then Alarm Code 02 is set as a check alarm. The sensor reading will display dashes [- - -] and may return to normal. This condition is termed a “hard” sensor failure.

2. If the sensor reading is under -50°F (-46°C) for 10 seconds then Alarm Code 02 is set as a check alarm. The sensor reading will display dashes [- - -] and may return to normal. The -50°F (-46°C) check is ignored when the zone is in a Low Evaporator Coil Temperature Demand Defrost. This condition is termed a “hard” sensor failure.

3. If the differential between the coil and other sensors is too large when Alarm Code 02 is cleared then Alarm Code 02 and Alarm Code 13 Sensor Calibration Check are set as check alarms. This condition is termed a “soft” sensor failure.

4. If the sensor reading is erratic over time but does not go above 200°F (93°C) or below -50°F (-46°C) then Alarm Code 02 and Alarm Code 13 Sensor Calibration Check are set as check alarms. This condition is termed a “soft” sensor failure.

02 CHECK EVAPORATOR COIL SENSOR

How Alarm is Cleared

This alarm can be cleared manually. When the alarm is cleared the return air sensors, discharge air sensors and evaporator coil sensor must all read within 30°F (17°C) of each other. If they do not, it is assumed that the sensor reading is not accurate. The alarm code is not cleared and Alarm Code 13 Sensor Calibration Check will also be set. Also, if the sensor is over or under range when the alarm clear is attempted, the alarm will not be cleared.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

Alarm Code 02 (Sensor was out of range)

1. Display the sensor reading using the Sensor Menu. If the display shows [----], the sensor is defective and should be replaced. If the condition still exists, check the sensor circuit for an open wire or short to ground. See Service Procedure D01A. Check the Base Controller/Interface Board using Service Procedure A01A.

2. If the display is normal proceed as shown below.

Alarm Code 02 and Alarm Code 13 (Sensor was reading erratically)

1. Review the ServiceWatch data logger and check the sensor reading at the time the alarm was set. Also review the history to see if previous alarm codes exist that would indicate an intermittent problem. If the sensor appears to have read incorrectly, it should be replaced.

2. If the problem reoccurs, check the sensor connector as shown in Service Procedure D01A.

3. Check the sensor circuit as shown by Service Procedure D01A.

If all or many of the Sensor Codes (02, 03, 04, 05, 06, 11, 12 and 13) are set

1. Be sure the 35 pin Base Controller/Interface Board sensor connector J3 is securely attached.

2. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

03 CHECK (CONTROL) RETURN AIR SENSOR

Alarm Type	Check Alarm (Shutdown Alarm during a Pretrip Test).
Associated Alarm Codes	Alarm Code 11 Unit Controlling on Alternate Sensor Alarm Code 13 Sensor Check Alarm Code 92 Sensor Grades Not Set Alarm Code 203 Check Display Return Air Sensor

Component Description and Location

This sensor is one of a pair of return air sensors. Both return air sensors must agree within specified limits. The sensor associated with Alarm Code 03 Check (Control) Return Air Sensor is used for unit control. The sensor is located next to the display return air sensor in the return air stream. The harness wires to this sensor are marked with one yellow cable tie near the sensor connection. It is a graded sensor.

A brass clamp should be installed between the two return air sensors. This clamp increases the thermal coupling between the sensors to provide more accurate temperature readings when the temperature is changing rapidly. Rapid temperature changes may occur during pulldown or when the door has been opened. This clamp is not required on the discharge air sensors.

Circuit Description

The control return air temperature sensor circuit is a two wire circuit. The RTP-01 (+) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 pin 1 to the blue sensor wire. The RTN-01 (-) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 pin 2 to the brown sensor wire. The sensor wires are routed in the Sensor Harness. The harness wires to this sensor are marked with <u>one</u> yellow cable tie near the sensor connection. The sensor is hard wired to the sensor harness.

Considerations

1. If the unit is controlling on return air temperature and a problem occurs with either return air sensor, the unit will switch to Discharge Air Control and Alarm Code 11 Unit Controlling on Alternate Sensor will be set. The appropriate sensor alarm codes will also be set.

2. Sensor codes must be cleared from the Guarded Access Menu before Alarm Code 11 Unit Controlling on Alternate Sensor can be cleared.

3. Sensor grades must be correctly set to the actual grade of the sensor installed. Failure to do so may result in nuisance sensor alarm codes.

4. Sensors should be positioned to minimize the potential for moisture entry where the wires enter the sensor shell. Mount sensors with the barrel up and the wires down wherever possible.

5. See Alarm Code 13 for an explanation of “Soft Failures” and “Hard Failures”.

03 CHECK (CONTROL) RETURN AIR SENSOR

How Alarm is Set

1. If the sensor reading is over 200°F (93°C) for 10 seconds then Alarm Code 03 is set as a check alarm. The sensor reading will display dashes [- - -] and may return to normal. This condition is termed a "hard" sensor failure.

2. If the sensor reading is under -50°F (-46°C) for 10 seconds then Alarm Code 03 is set as a check alarm. The sensor reading will display dashes [- - -] may return to normal. This condition is termed a "hard" sensor failure.

3. If the differential between the return air temperature and other temperature sensors is too large when Alarm Code 03 is cleared then Alarm Code 03 and Alarm Code 13 Sensor Calibration Check are set as check alarms. This condition is termed a "soft" sensor failure.

4. If the sensor reading is erratic over time but does not go above 200°F (93°C) or below -50°F (-46°C) then Alarm Code 03 and Alarm Code 13 Sensor Calibration Check are set as check alarms. This condition is termed a "soft" sensor failure.

5. If the sensor grade for this sensor is set to 5H then Alarm Code 03 and Alarm Code 92 Sensor Grades Not Set are set as check alarms.

6. The temperatures of the control return air sensor and display return air sensor twins are not within a specified range. If the faulty sensor can be determined, only the alarm code for that sensor and Alarm Code 13 Sensor Check will be set. Alarm Codes 03 Check (Control) Return Air Sensor, 203 Check Display Return Air Sensor, and 13 Sensor Check are set if the faulty sensor cannot be determined.

How Alarm is Cleared

This alarm can only be cleared manually from the Guarded Access menu.

When the alarm is cleared the return air sensors, discharge air sensors and evaporator coil sensor must all read within 30°F (17°C) of each other. If they do not, it is assumed that the sensor reading is not accurate. The alarm code is not cleared and Alarm Code 13 Sensor Calibration Check will also be set. Also, if the sensor is over or under range when the alarm clear is attempted, the alarm will not be cleared.

If the alarm is set by Condition #5 above, Alarm Code 92 will clear automatically if the sensor grade is changed from 5H. If the sensor grade remains 5H, Alarm Code 92 can not be cleared.

Programmable Features

This is a graded sensor. The sensor grade must be correctly set in the Guarded Access Menu.

03 CHECK (CONTROL) RETURN AIR SENSOR

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

Alarm Code 03 (Sensor was out of range)

1. Display the sensor reading using the Sensor Menu. If the display shows [----], the sensor is defective and should be replaced. If the condition still exists, check the sensor circuit for an open wire or short to ground. See Service Procedure D01A. Check the Base Controller/Interface Board using Service Procedure A01A.

2. If the display is normal proceed as shown below.

Alarm Code 03 and Alarm Code 13 (Sensor drifted or was reading erratically)

1. Review the ServiceWatch data logger and check the senor reading at the time the alarm was set. Also, review the history to see if previous alarm codes exist that would indicate an intermittent problem. If the sensor appears to have read incorrectly, it should be replaced.

2. Be sure the sensor grades are set to the actual sensor grade.

3. Check for an airflow obstruction and correct sensor mounting.

4. If the problem reoccurs, check the sensor connector as shown in Service Procedure D01A.

5. Check the sensor circuit, as shown by Service Procedure D01A.

Alarm Code 03 and Alarm Code 92 (Sensor grade set to 5H)

1. Verify and set the sensor grade.

Alarm Code 03 and/or Alarm Code 203 are set with Alarm Code 13 (Dual sensors don't agree)

1. Review the ServiceWatch data logger and check the senor readings at the time the alarm was set. Also, review the history to see if previous alarm codes exist that would indicate the problem sensor. If a sensor appears to have read incorrectly, it should be replaced.

2. Check for an airflow obstruction and correct sensor mounting. Be sure the brass clamp is installed on the two return air sensors.

3. Be sure the sensor grades are set to the actual sensor grade, and are not transposed.

4. If the offending sensor cannot be determined, either ice bath both return air sensors simultaneously to determine which sensor is inaccurate or replace both sensors.

If all or many of the Sensor Codes (02, 03, 04, 05, 06, 11, 12, 203 and 204) are set

1. Be sure the 35 pin Base Controller/Interface Board sensor connector J3 is connected securely.

2. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

04 CHECK (CONTROL) DISCHARGE AIR SENSOR

Alarm Type	Check Alarm (Shutdown Alarm during a Pretrip Test).
Associated Alarm Codes	Alarm Code 11 Unit Controlling on Alternate Sensor Alarm Code 13 Sensor Check Alarm Code 92 Sensor Grades Not Set Alarm Code 204 Check Display Return Air Sensor

Component Description and Location

This sensor is one of a pair of dual discharge air sensors. Both discharge air sensors must agree within specified limits. The sensor associated with Alarm Code 04 Check (Control) Discharge Air Sensor is used for unit control. The sensor is located next to the display discharge air sensor in the discharge air stream. The harness wires to this sensor are marked with one red cable tie near the sensor connection. It is a graded sensor.

Circuit Description

The discharge air temperature sensor circuit is a two wire circuit. The DTP-01 (+) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 pin 24 to the blue sensor wire. The DTN-01 (-) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 pin 13 to the brown sensor wire. The sensor wires are routed in the Sensor Harness. The harness wires to this sensor are marked with one red cable tie near the sensor connection. The sensor is hard wired to the sensor harness.

Considerations

1. If the unit is controlling on discharge air temperature, and a problem occurs with either discharge air sensor, the unit will switch to Return Air Control and Alarm Code 11 Unit Controlling on Alternate Sensor will be set. The appropriate sensor alarm codes will also be set.

2. Sensor codes must be cleared from the Guarded Access Menu before Alarm Code 11 Unit Controlling on Alternate Sensor can be cleared.

3. Sensor grades must be correctly set to the actual grade of the sensor installed. Failure to do so may result in nuisance sensor alarm codes.

4. Sensors should be positioned to minimize the potential for moisture entry where the wires enter the sensor shell. Mount sensors with the barrel up and the wires down wherever possible.

5. See Alarm Code 13 for an explanation of “Soft Failures” and “Hard Failures”.

04 CHECK (CONTROL) DISCHARGE AIR SENSOR

How Alarm is Set

1. If the sensor reading is over 200°F (93°C) for 10 seconds then Alarm Code 04 is set as a check alarm. The sensor reading will display dashes [- - -] and may return to normal. This condition is termed a "hard" sensor failure.

2. If the sensor reading is under -50°F (-46°C) for 10 seconds then Alarm Code 04 is set as a check alarm. The sensor reading will display dashes [- - -] may return to normal. This condition is termed a "hard" sensor failure.

3. If the differential between the discharge and other sensors is too large when Alarm Code 04 is cleared then Alarm Code 04 and Alarm Code 13 Sensor Calibration Check are set as check alarms. This condition is termed a "soft" sensor failure.

4. If the sensor reading is erratic over time but does not go above 200°F (93°C) or below -50°F (-46°C) then Alarm Code 04 and Alarm Code 13 Sensor Calibration Check are set as check alarms. This condition is termed a "soft" sensor failure.

5. If the sensor grade for this sensor is set to 5H then both Alarm Code 04 and Alarm Code 92 Sensor Grades Not Set are set as check alarms.

6. The temperatures of the control discharge air sensor and display discharge air sensor twins are not within a specified range. If the faulty sensor can be determined, only the alarm code for that sensor and Alarm Code 13 Sensor Check will be set. Alarm Codes 04 Check (Control) Discharge Air Sensor, 204 Check Display Discharge Air Sensor, and 13 Sensor Check are set if the faulty sensor cannot be determined.

How Alarm is Cleared

This alarm can only be cleared manually from the Guarded Access menu.

When the alarm is cleared the return air sensors, discharge air sensors and evaporator coil sensor must all read within 30°F (17°C) of each other. If they do not, it is assumed that the sensor reading is not accurate. The alarm code is not cleared and Alarm Code 13 Sensor Calibration Check will also be set. Also, if the sensor is over or under range when the alarm clear is attempted, the alarm will not be cleared.

If the alarm is set by Condition #5 above, Alarm Code 92 will clear automatically if the sensor grade is changed from 5H. If the sensor grade remains 5H, Alarm Code 92 can not be cleared.

Programmable Settings

This is a graded sensor. The sensor grade must be correctly set in the Guarded Access Menu.

04 CHECK (CONTROL) DISCHARGE AIR SENSOR

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

Alarm Code 04 (Sensor was out of range)

1. Display the sensor reading using the Sensor Menu. If the display shows [----], the sensor is defective and should be replaced. If the condition still exists, check the sensor circuit for an open wire or short to ground. See Service Procedure D01A. Check the Base Controller/Interface Board using Service Procedure A01A.

2. If the display is normal proceed as shown below.

Alarm Code 04 and Alarm Code 13 (Sensor drifted or was reading erratically)

1. Review the ServiceWatch data logger and check the sensor reading at the time the alarm was set. Also, review the history to see if previous alarm codes exist that would indicate an intermittent problem. If the sensor appears to have read incorrectly, it should be replaced.

2. Be sure the sensor grades are set to the actual sensor grade.

3. Check for an airflow obstruction and correct sensor mounting.

4. If the problem reoccurs, check the sensor connector as shown in Service Procedure D01A.

5. Check the sensor circuit, as shown by Service Procedure D01A.

Alarm Code 04 and Alarm Code 92 (Sensor grade set to 5H)

1. Verify and set the sensor grade.

Alarm Code 04 and/or Alarm Code 204 are set with Alarm Code 13 (Dual sensors don't agree)

1. Review the ServiceWatch data logger and check the senor readings at the time the alarm was set. Also, review the history to see if previous alarm codes exist that would indicate the problem sensor. If a sensor appears to have read incorrectly, it should be replaced.

2. Check for an airflow obstruction and correct sensor mounting.

3. Be sure the sensor grades are set to the actual sensor grade, and are not transposed.

4. If the offending sensor cannot be determined, either ice bath both return air sensors simultaneously to determine which sensor is inaccurate or replace both sensors.

If all or many of the Sensor Codes (02, 03, 04, 05, 06, 11, 12, 203 and 204) are set

1. Be sure the 35 pin Base Controller/Interface Board sensor connector J3 is connected securely.

2. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

05 CHECK AMBIENT TEMPERATURE SENSOR

Alarm Type	Check Alarm (Shutdown Alarm during a Pretrip Test).
Associated Alarm Codes	Alarm Code 13 Sensor Check

Component Description and Location

This sensor is an un-graded sensor and does not require calibration. The sensor is located in the condenser air stream behind the condenser grill.

Circuit Description

The ambient temperature sensor circuit is a two wire circuit. The ATP-01 (+) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 pin 3 to the blue sensor wire. The ATN-01 (-) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 pin 4 to the brown sensor wire. The sensor wires are routed in the Sensor Harness. The sensor is connected to the sensor harness with a Deutsch connector.

Considerations

1. Sensors should be positioned to minimize the potential for moisture entry where the wires enter the sensor shell. Mount sensors with the barrel up and the wires down wherever possible.

2. See Alarm Code 13 for an explanation of “Soft Failures” and “Hard Failures”.

How Alarm is Set

1. If the sensor reading is over 200°F (93°C) for 10 seconds then set alarm code 05 as a check alarm. The sensor reading will display dashes [- - -] and may return to normal. This condition is termed a “hard” sensor failure.

2. If the sensor reading is under -50°F (-46°C) for 10 seconds then set alarm code 05 as a check alarm. The sensor reading will display dashes [- - -] may return to normal. This condition is termed a “hard” sensor failure.

3. If the sensor reading is erratic over time but does not go above 200°F (93°C) or below -50°F (-46°C) then Alarm Code 05 and Alarm Code 13 Sensor Calibration Check are set as check alarms. This condition is termed a “soft” sensor failure.

How Alarm is Cleared

This alarm is cleared manually. If the sensor is over or under range when the alarm clear is attempted, the alarm will not be cleared.

05 CHECK AMBIENT TEMPERATURE SENSOR

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

Alarm Code 05 (Sensor was out of range) Only

1. Display the sensor reading using the Sensor Menu. If the display shows [- - - -], the sensor is defective and should be replaced. If the condition still exists, check the sensor circuit for an open wire or short to ground. See Service Procedure D01A. Check the Base Controller/Interface Board using Service Procedure A01A.

2. If the display is normal proceed as shown below.

Alarm Code 05 and Alarm Code 13 (Sensor drifted or was reading erratically)

1. Review the ServiceWatch data logger and check the sensor reading at the time the alarm was set. Also, review the history to see if previous alarm codes exist that would indicate an intermittent problem. If the sensor appears to have read incorrectly, it should be replaced.

2. Check for an airflow obstruction and correct sensor mounting.

3. If the problem reoccurs, check the sensor connector as shown in Service Procedure D01A.

4. Check the sensor circuit, as shown by Service Procedure D01A.

If all or many of the Sensor Codes (02, 03, 04, 05, 06, 11, 12, 203 and 204) are set

1. Be sure the 35 pin Base Controller/Interface Board sensor connector J3 is connected securely.

2. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

06 CHECK COOLANT TEMPERATURE SENSOR

Alarm Type	Log, Check or Shutdown Alarm (Shutdown Alarm during a Pretrip Test or if Alarm Code 37 Check Engine Coolant Level is set) (Becomes a Log Alarm in the unit is switched to electric operation.)

Associated Alarm Codes

Component Description and Location

This sensor is an un-graded sensor and does not require calibration. The sensor is located in the engine thermostat housing.

Circuit Description

The coolant temperature sensor circuit is a two wire circuit. The WTP-01 (+) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 pin 26 to the blue sensor wire. The WTN-01 (-) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 pin 15 to the brown sensor wire. The sensor wires are routed in the Sensor Harness. The sensor is connected to the sensor harness with a Deutsch connector.

Considerations

1. Connectors should be positioned to minimize the potential for moisture entry where the wires enter the connector shell.

How Alarm is Set

1. If the sensor reading is over 250°F (121°C) for 10 seconds then alarm code 06 is set as a check alarm. The sensor reading will display dashes [- - -] and may return to normal.

2. If the sensor reading is under -50°F (-46°C) for 10 seconds then alarm code 06 is set as a check alarm. The sensor reading will display dashes [- - -] may return to normal.

How Alarm is Cleared

This alarm is cleared manually. If the sensor is over or under range when the alarm clear is attempted, the alarm will not be cleared.

06 CHECK COOLANT TEMPERATURE SENSOR

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

Alarm Code 06 (Sensor was out of range) Only

1. Display the sensor reading using the Sensor Menu. If the display shows [- - - -], the sensor is defective and should be replaced. If the condition still exists, check the sensor circuit for an open wire or short to ground. See Service Procedure D01A. Check the Base Controller/Interface Board using Service Procedure A01A.

If all or many of the Sensor Codes (02, 03, 04, 05, 06, 11, 12, 203 and 204) are set

1. Be sure the 35 pin Base Controller/Interface Board sensor connector J3 is connected securely.

2. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

07 CHECK ENGINE RPM SENSOR

Alarm Type Check Alarm

Associated Alarm Codes

Component Description and Location

The flywheel sensor is a proximity sensor that generates a pulse as each flywheel tooth passes the sensor. The Base Controller/Interface Board counts these pulses and performs the arithmetic necessary to convert the pulses into engine rpm. It is located on the flywheel housing above the starter.

Circuit Description

The flywheel sensor circuit is a two wire circuit and is not polarity sensitive. The FS1-01 wire connects the Base Controller/Interface Board 36 pin connector J7 pin 35 to one side of the flywheel sensor. The FS2-01 wire connects the Base Controller/Interface Board 36 pin connector J7 pin 36 to the other side of the flywheel sensor. The sensor wires are routed in the Main Harness.

How Alarm is Set

1. If the alternator frequency is greater than 100 Hz and oil pressure input is high but the RPM sensor indicates less than 800 RPM then Alarm Code 07 is set as a check alarm.

2. If the alternator frequency is greater than 100 Hz and oil pressure input is high but the RPM sensor indicates less than 300 RPM for 4 seconds then Alarm Code 07 is set as a check alarm.

3. If the RPM is less than 40 during an engine start attempt then Alarm Code 07 is set as a check alarm.

How Alarm is Cleared

This alarm is cleared manually.

07 CHECK ENGINE RPM SENSOR

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Disconnect the sensor wires at the flywheel sensor. Check the ac voltage at the sensor with the engine running. If a small ac voltage (greater than 1.0 VAC) is not present check the sensor adjustment. Turn the unit off, loosen the lock nut and turn the sensor in until it contacts the flywheel. Back the sensor out ½ turn and tighten the lock nut. Start the unit and recheck the sensor voltage. If more than 1.0 VAC is still not present the sensor is defective and must be replaced.

2. If ac voltage is present, disconnect the flywheel harness at the Base Controller/Interface Board and disconnect the flywheel sensor. Using a Fluke meter set for ohms, check for shorts to chassis ground on the FS1-01 and FS2-01 wires. If a short exists, examine the wiring harness for chaffed areas and repair, as required.

3. If no shorts to chassis ground exist, connect the FS1-01 wire to the FS2-01 wire at the sensor. Check continuity from FS1-01 to FS2-01 at the 36 pin Base Controller/Interface Board connector. The circuit should measure less than 1 ohm. If the circuit is open, check the harness using the wiring diagram for the unit.

4. Disconnect the FS1-01 and FS2-01 connections and check the flywheel sensor continuity. The resistance between the flywheel sensor terminals should be approximately 250 to 300 ohms. Also check from each flywheel sensor terminal to ground. If either terminal is shorted to ground the flywheel sensor is defective.

09 HIGH EVAPORATOR TEMPERATURE

Alarm Type Prevent or Shutdown Alarm

Associated Alarm Codes Alarm Code 84 Restart Null

Component Description and Location

See Alarm Code 02 Evaporator Coil Sensor.

How Alarm is Set

If the unit is running and the evaporator coil temperature was greater than or equal to 155°F (68°C) or the discharge air temperature was greater than or equal to 135°F (57°C).

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check refrigeration system operation, especially in heat and defrost.
    a. This alarm may be set if the 3 way valve is stuck in the heat position.
    b. This alarm may be set if the defrost damper is stuck in the closed position.

2. Check the evaporator fan for proper operation.

3. If both the coil temperature sensor and the discharge temperature sensor are failed, then the defrost cycle is terminated on time. If this occurs, the unit may remain in defrost long enough to cause excessive evaporator coil temperature.

4. Check evaporator coil sensor operation, as shown in Alarm Code 02 Check Evaporator Coil Sensor. If the evaporator coil sensor reads high due to a defective sensor then Alarm Code 09 High Evaporator Temperature may be set as a result.

10 HIGH DISCHARGE PRESSURE

Alarm Type Prevent or Shutdown Alarm

Associated Alarm Codes Alarm Code 84 Restart Null

Component Description and Location

The high pressure cutout switch (HPCO) is located on the compressor discharge manifold.

Circuit Description

The high pressure cutout circuit is a two wire circuit. The PHPC-01 wire connects the Base Controller/Interface Board 36 pin connector J7 pin 17 to one side of the high pressure cutout switch. The HPCO-01 wire connects the Base Controller/Interface Board 36 pin connector J7 pin 18 to the other side of the high pressure cutout switch. The switch is not polarity sensitive. The switch wires are routed in the Main Harness. The HPCO switch is connected to the Main Harness with a Deutsch connector.

How Alarm is Set

1. If the HPCO switch opens then alarm code 10 is set as a prevent alarm. Two restart attempts will be made to allow continued operation at temporarily reduced performance. If, at the end of the two attempts full performance is not possible, the alarm is set as a Shutdown alarm. The temporary shutdown period is 15 minutes Code 84 restart null is set along with the code 10 alarm to indicate the unit is in a temporary shutdown mode.

   If continuous restarts are enabled, a shutdown alarm is not set after 2 attempts. The temporary shutdown period is 60 minutes if continuous restarts are enabled. Code 84 restart null is set along with the code 10 alarm to indicate the unit is in a temporary shutdown mode.

   If restarts are disabled, the alarm will be set as a shutdown on the first occurrence.

2. If the discharge pressure transducer exceeds a pre-set value and the discharge pressure transducer is not failed then alarm code 10 is set as a prevent alarm. Two restart attempts will be made to allow continued operation at temporarily reduced performance. If, at the end of the two attempts full performance is not possible, the alarm is set as a Shutdown alarm. The temporary shutdown period is 15 minutes Code 84 restart null is set along with the code 10 alarm to indicate the unit is in a temporary shutdown mode.

   If continuous restarts are enabled, a shutdown alarm is not set after 2 attempts. The temporary shutdown period is 60 minutes if continuous restarts are enabled. Code 84 restart null is set along with the code 10 alarm to indicate the unit is in a temporary shutdown mode.

   If restarts are disabled, the alarm will be set as a shutdown on the first occurrence.

10 HIGH DISCHARGE PRESSURE

How Alarm is Cleared

1. The alarm can be cleared manually if the condition no longer exists.
2. The alarm will clear automatically at the conclusion of a successful prevent routine.

Considerations

If the HPCO switch is open it will always shut the unit down. The switch contacts break power to the Run Relay and the Fuel Solenoid.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the refrigeration system for high discharge pressure and correct as required.
2. Check the High Pressure Cutout Switch for proper operation (closed under normal conditions). Check the switch for excessive resistance. The nominal switch resistance is less than 1 ohm.
3. Check the High Pressure Cutout Switch circuit, as shown by Service Procedure D01A.
4. Check the Base Controller/Interface Board High Pressure Cutout fuse F25.
5. Check the discharge pressure transducer for correct and accurate readings.
6. Check the refrigeration system valves for correct operation. A fault that prevents refrigerant flow from the system high side to the system low side may create high discharge pressure.
7. Review the ServiceWatch download in technician level view. The associated alarm data will show the status of the HPCO switch and the discharge pressure at the time the alarm was set. If this data indicates that the HPCO switch opened but the discharge pressure remained within acceptable limits, the actual problem is a defective HPCO switch, not high discharge pressure.

11 UNIT CONTROLLING ON ALTERNATE SENSOR

Alarm Type	Check Alarm
Associated Alarm Codes	Alarm Code 03 Check (Control) Return Air Sensor Alarm Code 203 Check Display Return Air Sensor Alarm Code 04 Check (Control) Discharge Air Sensor Alarm Code 204 Check Display Discharge Air Sensor

Component Description and Location

See Alarm Codes indicated above.

Circuit Description

See Alarm Codes indicated above.

How Alarm is Set

The primary control sensor (either return or discharge depending on unit settings) has failed and the unit is controlling on the alternate sensor. If the unit is operating with return air sensor control, and either of the dual return air sensors fails, the unit will control using the discharge air sensor. If the unit is operating with discharge air sensor control, and either of the discharge air sensors fails, the unit will control using the return air sensor.

How Alarm is Cleared

This alarm is cleared manually. The associated sensor alarm code must be cleared before Alarm Code 11 can be cleared.

If Alarm Code 12 Sensor Shutdown is set then Alarm Code 11 will be auto cleared.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Determine which sensor Alarm Codes (03, 203 04 or 204) is present. Proceed as shown for that Alarm Code.

12 SENSOR SHUTDOWN

Alarm Type	Check or Shutdown Alarm
Associated Alarm Codes	Alarm Code 03 Check (Control) Return Air Sensor Alarm Code 203 Check Display Return Air Sensor Alarm Code 04 Check (Control) Discharge Air Sensor Alarm Code 204 Check Display Discharge Air Sensor

Component Description and Location

See Alarm Codes indicated above.

Circuit Description

See Alarm Codes indicated above.

How Alarm is Set

Fresh Setpoints

Both return and discharge sensors have failed or have been disabled by the dual sensor alarm control. With a fresh range setpoint the alarm is set as a shutdown alarm.

Frozen Setpoints

Both return and discharge sensors have failed or have been disabled by the dual sensor alarm control. With a frozen range setpoint the alarm is set as a check alarm. The unit will be forced into continuous low speed cool.

How Alarm is Cleared

This alarm is cleared automatically when the associated sensor Alarm Codes 03 and 04 are cleared.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Determine which sensor Alarm Codes (03, 203, 04 or 204) are present. Proceed as shown for that alarm code.

13 SENSOR CHECK

Alarm Type	Check Alarm

Associated Alarm Codes	Alarm Code 02 Check Evaporator Coil Sensor Alarm Code 03 Check (Control) Return Air Sensor Alarm Code 203 Check Display Return Air Sensor Alarm Code 04 Check (Control) Discharge Air Sensor Alarm Code 204 Check Display Discharge Air Sensor Alarm Code 05 Check Ambient Temperature Sensor

Component Description and Location

See Alarm Codes indicated above.

Circuit Description

See Alarm Codes indicated above.

How Alarm is Set

1. Evaporator Coil Sensor Check If the evaporator coil, return and discharge sensors do not read within a specified number of degrees of each other 20 minutes after a defrost cycle terminates then Alarm Code 13 Sensor Check is set as a check alarm. Alarm Code 02 Check Evaporator Coil Sensor will also be set.

2. The alarm is set if, immediately after clearing Alarm Codes 02, 03, 203, 04 or 204, all return, discharge and coil sensors do not read within a specified number of degrees of each other.

3. Return, Discharge and Evaporator Coil Sensor Check If the return, discharge or evaporator coil sensors are reading erratically over a specified time then Alarm Code 13 will be set as a check alarm along with the alarm code for the erratic sensor (Alarm Code 03, 203 or Alarm Code 04, 204).

How Alarm is Cleared

This alarm is cleared manually. The associated sensor code must be cleared from the Guarded Access menu.

13 SENSOR CHECK

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

Determine which sensor Alarm Codes (02, 03, 203, 04, 204 or 05) are present along with Alarm Code 13. Proceed as shown for that Alarm Code.

Sensor alarms are classified as either “Soft Failures” or “Hard Failures”.

A “**Soft Failure**” is defined as erratic operation or sensor drift that exceeds acceptable tolerances. If this occurs, the alarm code for the suspect sensor will be set along with Alarm Code 13. This indicates a potential problem that may not be immediately apparent, and also shows that a hard failure as defined below did not occur. Alarm Code 13 is always set if a soft failure occurs.

> **Note:** Alarm Code 13 can be cleared by the driver, while sensor Alarm Codes 03, 04, 203 and 204 can only be cleared from the Guarded Access Menu. If the unit has only Alarm Code 03, 04, 203 or 204 set when inspected, that alarm code may have been originally set with Alarm Code 13. Checking the ServiceWatch data logger download will indicate the conditions that existed when the failure occurred.

A “**Hard Failure**” is defined by an out of range sensor reading, typically caused by an open or shorted sensor, connector, or harness conductor. The sensor display will show dashes if a hard failure occurs. If this occurs, only the alarm code for that sensor will be set (such as Alarm Code 03 if the control return air sensor failed). Alarm Code 13 will not be set if a hard failure occurs.

> **Note:** The controller may not be currently showing dashes for the sensor reading, but the alarm will be present when the unit is inspected. If a sensor alarm code is set, a failure did occur at some point. Checking the ServiceWatch data logger download will indicate when the hard failure occurred.

15 CHECK INTAKE AIR HEATER

Alarm Type Log, Check or Shutdown Alarm

Associated Alarm Codes Alarm Code 62 Ammeter Out of Calibration

Component Description and Location

The intake air heater is located at the engine intake manifold.

Circuit Description

Power to the intake air heater is supplied by the H circuit. The associated Base Controller/Interface Board fuse is fuse F5. Intake air heater current is monitored by the Base Controller/Interface Board shunt.

How Alarm is Set

1. If the current draw is out of specification during an engine start then Alarm Code 15 is set as a log alarm if the current is below the minimum and the battery voltage is within specifications. The alarm is set as a check alarm if the current exceeds the maximum specification. Minimum preheat current for the Yanmar engine is 63 amps. Maximum preheat current for the Yanmar engine is 80 amps.

2. If the current draw is out of specification during a Pretrip Test then Alarm Code 15 is set as a shutdown alarm. Minimum preheat current on the Yanmar engine is 63 amps. Maximum preheat current on Yanmar engine is 80 amps.

3. If during a Pretrip Test the current does not return to less than 0.5 amps when de-energized then Alarm Code 15 is set as a shutdown alarm.

How Alarm is Cleared

The alarm is cleared manually.

15 CHECK INTAKE AIR HEATER

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the operation of the preheat circuit using Interface Board Test Mode. LED 3 should light. Current draw should be approximately 70 amps.

2. If the current draw is zero, check for an open heater, blown fuse F5 or defective K2 Preheat Relay.

3. If the current draw is low check for low battery voltage or high circuit resistance.

4. If the current draw is in excess of 80 amps, check for a shorted intake air heater.

5. Check for battery voltage at the intake air heater when the preheat circuit is energized. The voltage should be above 11.2 volts. If the voltage is low, check the entire preheat circuit for excessive resistance due to burned preheat relay contacts or loose or corroded connections. Be sure all connections are secure.

6. Verify the current values above with an external ammeter. If the values do not match, the shunt may be defective. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

17 ENGINE FAILED TO CRANK

Alarm Type	Log, Check, Prevent or Shutdown Alarm in Diesel Mode Log Alarm in Electric Mode
Associated Alarm Codes	Alarm Code 84 Restart Null

How Alarm is Set

1. If the engine fails to reach 40 RPM or rises above and then falls below 40 RPM during the engine crank sequence, then this alarm is set as a prevent alarm. Two attempts are made to crank, and then Alarm Code 17 Engine Failed to Crank is set as a shutdown alarm.

An Alarm Code 17 that follows an Alarm Code 20/84 Failed to Start will be set as a shutdown alarm.

If Alarm Code 17 follows an Alarm Code 63 Engine Stopped alarm that has been cleared, only one crank attempt will be made.

How Alarm is Cleared

The alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the battery, battery cables and starter.
2. Be sure the Base Controller/Interface Board fuse F3 is not blown.
3. Check the operation of the starter circuit by forcing an engine start in Continuous mode. LED 25 should light indicating the starter motor is energized and the engine should start.
4. Check the 8S circuit for a pushed pin, loose pin crimp or broken wire.
5. Check the High Current Harness 8S wire with an ohmmeter for continuity, per Service Procedure H04A.
6. Check for a seized compressor or engine.
7. If a Model 50 Electric Standby unit, check for a failed clutch or seized electric motor.

18 HIGH ENGINE COOLANT TEMPERATURE

Alarm Type	Prevent or Shutdown Alarm in Diesel Mode Log Alarm in Electric Mode
Associated Alarm Codes	Alarm Code 84 Restart Null

How Alarm is Set

1. If the coolant temperature is high as determined by the coolant temperature sensor, and the coolant level sensor is not indicating low coolant level then alarm code 18 is set as a prevent alarm. Two attempts will be made to allow continued operation at temporarily reduced performance. If, at the end of the two attempts full performance is not possible, the alarm is set as a Shutdown alarm. The temporary shutdown period is 15 minutes Code 84 restart null is set along with the code 18 alarm to indicate the unit is in a temporary shutdown mode.

   If continuous restarts are enabled, a shutdown alarm is not set after 2 attempts. .The temporary shutdown period is 60 minutes if continuous restarts are enabled. Code 84 restart null is set along with the code 18 alarm to indicate the unit is in a temporary shutdown mode. If restarts are disabled, the alarm will be set as a shutdown on the first occurrence.

2. If the coolant temperature is high as determined by the coolant temperature sensor and the coolant level sensor is indicating low coolant level then alarm Code 18 is set as a shutdown alarm.

How Alarm is Cleared

1. The alarm can be cleared manually if the condition no longer exists.

2. The alarm will clear automatically at the conclusion of a successful prevent routine.

Considerations

This alarm becomes a log alarm if the unit is switched to electric mode. Alarm Code 18 alarm conditions will be monitored while the unit is operating in electric mode, and will auto-clear when the engine coolant temperature is reduced to a safe value.

Diagnostic Procedure

1. Check the engine water temperature using the Gauge Menu. If the temperature is above 220°F (104°C), check the engine cooling system to determine the cause of overheating.

2. Check the engine coolant level. Bleed air from the cooling system if necessary. ***CAUTION: Do not open the cap on the expansion tank when the coolant is hot***!

3. Check the water pump drive belt.

4. Check the radiator for airflow and coolant flow restrictions.

5. Check the Water Temperature Sensor, as shown in Alarm Code 06 above.

19 LOW ENGINE OIL PRESSURE

Alarm Type	Shutdown Alarm in Diesel Mode Log Alarm in Electric Mode
Associated Alarm Codes	Alarm Code 31 Check Oil Pressure Switch Alarm Code 66 Low Engine Oil Level

Component Description and Location

The oil pressure switch is located at the side of the oil filter housing.

Circuit Description

The low oil pressure switch circuit is a single wire circuit. The 20B wire connects the Base Controller/Interface Board 36 pin connector J7 pin 28 to the low oil pressure switch. The switch is not polarity sensitive and is closed on low oil pressure. This applies chassis ground to the Base Controller/Interface Board. The switch wire is routed in the Main Harness.

How Alarm is Set

1. If running in diesel mode and the oil pressure is low for 30 seconds then alarm code 19 is set as a shutdown alarm. If the low oil level switch is indicating low oil level when this occurs then alarm Code 66 Low Engine Oil Level will also be set as a shutdown alarm.

How Alarm is Cleared

This alarm is cleared manually.

Considerations

This alarm becomes a log alarm if the unit is switched to electric mode. It will again become a shutdown alarm if the unit is switched to diesel mode.

19 LOW ENGINE OIL PRESSURE

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check for Alarm Code 31 as a related alarm.
2. Check engine oil level.
3. Display the oil pressure when the unit is running, using the Gauge menu. The oil pressure should be [OK]. If not, the switch may be stuck closed or the switch circuit may be shorted.
4. Verify the oil pressure switch is open with good oil pressure and closed with low oil pressure. The oil pressure switch should be closed when the engine is not running and open when the engine is running. Confirm using an ohmmeter.
5. Check the voltage of the 20B-01 wire at the 36 pin Base Controller/Interface Board connector J7 pin 28. Battery volts should be present when the engine is running.
6. Check the 20B wire in the Main Harness with an ohmmeter for continuity per Service Procedure H04A
7. Connect an external oil pressure gauge and confirm that adequate oil pressure (20 psig or above) is present when the unit is running.

20 ENGINE FAILED TO START

Alarm Type	Log, Check, Prevent or Shutdown Alarm in Diesel Mode Log Alarm in Electric Mode
Associated Alarm Codes	Alarm Code 84 Restart Null Alarm Code 15 Check Air Intake Heater

How Alarm is Set

1. If the engine failed to start after the starter motor was allowed to crank for the maximum allowed time then Alarm Code 20 is set as a prevent alarm. Two start attempts are normally made.

   If the engine coolant sensor temperature is greater than 10°F, (-12°C), the crank timer on the first start attempt is 15 seconds. The crank timer on the second start is 15 seconds.

   If the engine coolant temperature is less than 10°F (-12°C), the crank timer on the first start attempt is 6 seconds. The crank timer on the second start is 30 seconds.

Notes:

If Alarm Code 20 follows an Alarm Code 17/84 Failed to Crank then Alarm Code 20 will be set as a shutdown alarm.

If Alarm Code 20 follows an Alarm Code 63 alarm clear, only one crank attempt will be made.

How Alarm is Cleared

The alarm is cleared manually.

Considerations

This alarm becomes a log alarm if the unit is switched to Electric mode.

20 ENGINE FAILED TO START

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the unit fuel level.
2. Check fuel solenoid, fuel pump, and fuel system electrically, mechanically and for fuel flow restrictions or blockages.
3. Check for cause of slow start or no start of the engine.
4. In cold ambient temperatures check for fuel gelling.
5. Check for restricted air cleaner or air intake system.
6. Verify the intake air heater is operating properly, using Interface Board Test Mode.
7. If a Model 50 electric standby unit, check for a failed clutch or seized electric motor.

21 COOLING CYCLE CHECK

Alarm Type	Prevent Alarm
Associated Alarm Codes	Alarm Code 23 Cooling Cycle Fault Alarm Code 84 Restart Null Alarm Code 85 Forced Unit Operation

How Alarm is Set

1. If the unit or zone is exhibiting a heating temperature differential (ΔT) while operating in cool mode then Alarm Code 21 is set as a prevent alarm.

How Alarm is Cleared

This alarm is cleared automatically or manually.

Considerations

1. This is a Prevent alarm. A second occurrence of this alarm will be set as Alarm Code 23 Cooling Cycle Fault shutdown alarm.

2. If restarts are disabled, Alarm Code 23 will be set as a shutdown alarm on the first occurrence of the alarm.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check temperature differential by displaying the temperature differential, or by checking the difference between the return and discharge air temperature sensors.

2. Check refrigerant level.

3. Attach gauges and evaluate unit refrigeration system performance.

4. Verify that sensor grades are set correctly.

5. Check for proper air flow. Short cycling, caused by a blocked air flow path, may generate this code.

6. Check the three-way valve. A defective valve that does not return to the cooling position may cause this alarm.

7. Check the pilot solenoid valve. A defective valve that is stuck open will prevent the three-way valve from shifting to the cooling position.

22 HEATING CYCLE CHECK

Alarm Type	Prevent Alarm
Associated Alarm Codes	Alarm Code 24 Heating Cycle Fault Alarm Code 84 Restart Null Alarm Code 85 Forced Unit Operation

How Alarm is Set

1. If the unit or zone is exhibiting a cooling temperature differential (ΔT) while operating in heat mode then Alarm Code 22 is set as a prevent alarm.

How Alarm is Cleared

This alarm is cleared automatically or manually.

Considerations

1. This is a Prevent alarm. A second occurrence of this alarm will be set as Alarm Code 24 Heating Cycle Fault shutdown alarm if the zone is operating in the Fresh setpoint range.

2. The alarm is set as a check level alarm if the unit is operating in the frozen setpoint range. Heat operation is locked out if an Alarm Code 24 is set in a unit that is operating in the frozen setpoint range.

3. If restarts are disabled, Alarm Code 24 will be set as a shutdown alarm on the first occurrence of the alarm.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check temperature differential by displaying the temperature differential, or by checking the difference between the return and discharge air temperature sensors.

2. Check refrigerant level.

3. Attach gauges and evaluate unit refrigeration system performance.

4. Verify that sensor grades are set correctly.

5. Check for proper air flow. Short cycling, caused by a blocked air flow path, may generate this code.

6. Check the three-way valve. A defective valve that does not return to the heating position may cause this alarm.

7. Check the pilot solenoid valve. A defective valve will prevent the three-way valve from shifting to the heating position.

23 COOLING CYCLE FAULT

Alarm Type Shutdown Alarm

Associated Alarm Codes Alarm Code 21 Cooling Cycle Check

How Alarm is Set

1. If the unit or zone was operating with a heating temperature differential (ΔT) while operating in cool mode and Alarm Code 21 Cooling Cycle Check has previously been set then Alarm Code 23 is set as a shutdown alarm. If the unit is in a Pretrip Test or Restarts are set DISABLED then Alarm Code 23 can be set without Alarm Code 21 Cooling Cycle Check having occurred.

How Alarm is Cleared

This alarm is cleared manually. If the Limited Alarm Resets feature is active then Alarm Code 23 will be promoted to Guarded Access clear.

If restarts are disabled Alarm Code 24 will be set as a shutdown alarm on the first occurrence of the alarm.

Considerations

1. This is a Shutdown alarm. It is typically preceded by Alarm Code 21 Cooling Cycle Check alarm.

2. If restarts are disabled, Alarm Code 23 will be set as a shutdown alarm on the first occurrence of the alarm.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check temperature differential by displaying the temperature differential, or by checking the difference between the return and discharge air temperature sensors.

2. Check refrigerant level.

3. Attach gauges and evaluate unit refrigeration system performance.

4. Verify that sensor grades are set correctly.

5. Check for proper air flow. Short cycling, caused by a blocked air flow path, may generate this code.

6. Check the three-way valve. A defective valve that does not return to the cooling position may cause this alarm.

7. Check the pilot solenoid valve. A defective valve that is stuck open will prevent the three-way valve from shifting to the cooling position.

24 HEATING CYCLE FAULT

Alarm Type Shutdown Alarm

Associated Alarm Codes Alarm Code 22 Heating Cycle Check

How Alarm is Set

1. If the unit or zone was operating with a cooling temperature differential (ΔT) while operating in heat mode and Alarm Code 22 Heating Cycle Check has previously been set then Alarm Code 24 is set as a shutdown alarm. If the unit is in a Pretrip Test or Restarts are set DISABLED then Alarm Code 24 can be set without Alarm Code 22 Heating Cycle Check having occurred.

How Alarm is Cleared

This alarm is cleared manually. If the Limited Alarm Resets feature is active Alarm Code 24 will be promoted to Guarded Access clear.

If restarts are disabled Alarm Code 24 will be set as a shutdown alarm on the first occurrence of the alarm.

Considerations

1. This is a Shutdown alarm. It is typically preceded by Alarm Code 22 Heating Cycle Check alarm.
2. If restarts are disabled Alarm Code 24 will be set as a shutdown alarm on the first occurrence of the alarm.
3. This alarm cannot be set in a unit operating in the frozen setpoint range. See the Alarm Code 22 description.

24 HEATING CYCLE FAULT

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check temperature differential by displaying the temperature differential, or by checking the difference between the zone return and discharge air temperature sensors.
2. Check refrigerant level.
3. Attach gauges and evaluate unit refrigeration system performance.
4. Verify that sensor grades are set correctly.
5. Check for proper air flow. Short cycling, caused by a blocked air flow path, may generate this code.
6. Check the three-way valve. A defective valve that does not return to the heating position may cause this alarm.
7. Check the pilot solenoid valve. A defective valve that is stuck open will prevent the three-way valve from shifting to the cooling position.

25 ALTERNATOR CHECK

Alarm Type Log, Check or Shutdown Alarm

Associated Alarm Codes None

How Alarm is Set

1. If the engine is running, oil pressure is good, charge amps are less than -1.0 amps, and battery volts are less than 13.2 volts for 3 minutes, the alarm is set as a Check alarm in normal operation and during a Pretrip Test and as a Shutdown alarm in Sleep mode.

2. If the engine is running, oil pressure is good and battery volts are greater than 16.0 volts for 3 minutes, the alarm is set as a Shutdown alarm.

3. If the unit is running in electric, the alternator frequency is >100HZ, charge amps are less than -1.0 amps, and battery volts are less than 13.2 volts for 3 minutes, the alarm is set as a Check alarm in normal operation and during a Pretrip Test, and as a Shutdown alarm in Sleep mode.

How Alarm is Cleared

This alarm is cleared manually.

Considerations

The alternator excite voltage is controlled by the Alternator Excite Output. The Alternator Excite Output will supply alternator excite voltage as soon as the engine starts.

25 ALTERNATOR CHECK

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check and adjust the alternator drive belt.

2. Start the engine or electric motor and check the battery voltage and amperage, using the Gauge Display in the Maintenance Menu. The voltage should be greater than 13.2 volts but less than 16 volts. Current flow should be greater than –1.0 amps. Test and repair charging system as required.

3. Check the alternator connections.

4. Check the excitation voltage at the alternator. Excitation voltage should be equal to the battery voltage.

5. Check the operation of the Alternator Excite Output using Interface Board Test Mode. Be sure the Alternator Excite LED 18 lights. The Alternator Excite Output will supply alternator excite voltage as soon as the engine starts.

6. Check the sense voltage at the alternator. Sense voltage should be equal to the battery voltage

7. Check Fuse F20 on the Base Controller/Interface Board.

8. If the unit is equipped with a Prestolite alternator, verify that fuse F4 is in place on the Base Controller/Interface Board and is not open. Units equipped with a Bosch or a Thermo King alternator should not have fuse F4 installed on the Base Controller/Interface Board.

26 CHECK REFRIGERATION CAPACITY

Alarm Type Check Alarm

Associated Alarm Codes Alarm Code 85 Forced Unit Operation

How Alarm is Set

1. If the unit or zone heating or cooling capacity is reduced far enough below normal levels to indicate a refrigeration problem then Alarm Code 26 is set as a check alarm. The capacity loss is not significant enough to force the unit into shutdown mode.

How Alarm is Cleared

This alarm is cleared manually or automatically.

Considerations

If the unit is running in reduced capacity mode because of a Prevent alarm and Alarm Code 26 is set, Alarm Code 85 Forced Unit Operation alarm is also set. Alarm Code 85 indicates the unit was forced into a reduced capacity mode.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check temperature differential by displaying the temperature differential, or by checking the difference between the control return and control discharge sensors.
2. Check refrigerant level.
3. Attach gauges and evaluate unit refrigeration system performance.
4. Verify that sensor grades are set correctly.
5. Check for proper air flow. Short cycling, caused by a blocked air flow path, may generate this code.
6. Check evaporator superheat.

28 PRETRIP ABORT

Alarm Type Shutdown Alarm

Associated Alarm Codes The associated Pretrip alarm

How Alarm is Set

1. If a shutdown alarm occurs during a Pretrip test then Alarm Code 28 is set and the unit is shut down. The alarm condition that caused the shutdown is also set. Alarm Code 28 is also set if the unit is turned off while a Pretrip Test is in progress, or if the Pretrip Test is terminated by a communications command.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. This is a normal alarm any time the Pretrip Test is terminated before the completion of all tests.
2. Proceed with the corrective actions for any alarm codes that occurred.
3. After repairs, repeat the Pretrip Test. See Section 4 for details.
4. If only Alarm Code 28 is set, the unit may have been turned off during a Pretrip Test, or the test may have been interrupted by a communications request. Clear the alarm and repeat the Pretrip Test.

29 CHECK DEFROST DAMPER CIRCUIT

Alarm Type Check or Shutdown Alarm

Associated Alarm Codes Alarm Code 137 Check Damper Motor Heater Output

Component Description and Location

The defrost damper is located in the discharge air stream at the top of the unit. It is closed during defrost to prevent warm air from being circulated over the load. The damper solenoid is mounted just outside the discharge plenum and is connected to the damper door by means of mechanical linkage.

Circuit Description

The Damper Solenoid circuit is a two wire circuit. The Damper Solenoid is energized by Relay K4 and Fuse F6 on the Base Controller/Interface Board. The 29 wire applies 12 VDC to one side of the Damper Solenoid to energize the solenoid. The CHD wire connects the other side of the solenoid to chassis ground at the ground plate near the unit battery. The solenoid is not polarity sensitive, but the suppression diode must be installed with the bar end of the diode toward the 29 wire. The wires are routed in the Main Harness.

How Alarm is Set

1. If during a Pretrip Test the zone is configured with a damper solenoid and current is not between 2 to 10 amps when the solenoid is energized then Alarm Code 29 is set as a check alarm.

2. If during a Pretrip Test the zone is configured with a damper solenoid and current does not return to less than or equal to 0.5 amps when de-energized then Alarm Code 29 is set as a shutdown alarm.

3. If during a Pretrip Test the unit is equipped with a damper gear motor and the motor travel timer exceeds its limit and the motor stall current has not been exceeded then Alarm Code 29 is set as a check alarm.

How Alarm is Cleared

This alarm is cleared manually.

Considerations

1. Power for this circuit requires the run relay to be energized.

29 CHECK DEFROST DAMPER CIRCUIT

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the operation of the damper door circuit using Interface Board Test Mode. Be sure the damper relay LED 4 lights (for Zone 1). Fan output 1 is used for the Zone 2 damper on DE units. (Damper Solenoid Only)

2. Use the HMI Control Panel amps gauge to check the current drawn by the damper solenoid while operating the damper door with Interface Board Test Mode. The current draw should be approximately 6 amps. (Damper Solenoid Only)

3. Energize the damper solenoid using Interface Board Test Mode and check for battery voltage on the 29 circuit. If voltage is present and no current was measured in the step above replace the damper solenoid. (Damper Solenoid Only)

4. If the unit is not configured correctly Alarm Code 137 Check Damper Motor Heater Output may occur instead of Alarm Code 29.

30 DEFROST DAMPER STUCK

Alarm Type Check Alarm

Associated Alarm Codes Alarm Code 137 Check Damper Motor Heater Output

Component Description and Location

The defrost damper door is located in the discharge air stream at the top of the unit. It is closed during defrost to prevent warm air from being circulated over the load. The Damper Gear Motor is mounted just outside the discharge plenum and is connected to the damper door by means of mechanical linkage.

Circuit Description

The damper motor circuit is a two wire circuit. The GM- (black) wire is connected to one side of the damper gear motor and the GM+ (red) wire is connected to the other side of the gear motor. The motor wires are routed in the Main Harness. The Damper Heater wires 8F-01 and CH-19 are also routed in the Main Harness.

How Alarm is Set

1. This alarm is set as a Check alarm if the damper gear motor draws excessive current for a specified time. This indicates that the damper is frozen or stalled.

How Alarm is Cleared

This alarm is cleared manually.

NOTE: When the alarm is cleared the damper motor will be indexed to verify correct operation. The damper door will first be positioned fully open and then fully closed. If the operating mode requires the damper door be closed, it will remain closed. If the operating mode requires the damper door be open, it will be repositioned open.

Considerations

1. The damper gear motor requires an Base Controller/Interface Board equipped with damper motor provisions.

2. Power for the damper heater requires the run relay to be energized.

Diagnostic Procedure

1. Check the operation of the damper door gear motor circuit, using Interface Board Test Mode. Be sure LED31 Damper Door Open and LED32 Damper Door Close light as appropriate.

2. The initial (breakaway) current draw occurs over a very short period of time and cannot be accurately measured. Once the motor is running the current draw should not exceed 0.8 amps.

3. Check for ice buildup between the damper blade and damper housing. Breaking the ice may cause excessive current draw.

4. Check the door and linkage for binding, ice or other restrictions to proper door operation.

31 CHECK OIL PRESSURE SWITCH

Alarm Type	Log or Shutdown Alarm in Diesel Mode Log Alarm in Electric Mode
Associated Alarm Codes	Alarm Code 19 Low Engine Oil Pressure Alarm Code 66 Low Engine Oil Level

Component Description and Location

The oil pressure switch is located at the side of the oil filter housing.

Circuit Description

The low oil pressure switch circuit is a single wire circuit. The 20B wire connects the Base Controller/Interface Board 36 pin connector J7 pin 28 to the low oil pressure switch. The switch is not polarity sensitive and is closed on low oil pressure. This applies chassis ground to the Base Controller/Interface Board. The switch wire is routed in the Main Harness.

How Alarm is Set

1. If unit is in diesel mode but not running, the oil level is good, and the oil pressure switch is not indicating low oil pressure, Alarm Code 31 Check Oil Pressure Switch is set as a Log alarm.

2. If unit is in diesel mode but not running, the oil level is not good, and the oil pressure switch is not indicating low oil pressure, Alarm Code 31 Check Oil Pressure Switch is set as a Shutdown alarm.

3. If unit is running in electric mode and the oil pressure switch is not indicating low oil pressure, Alarm Code 31 Check Oil Pressure Switch is set as a Log alarm.

How Alarm is Cleared

This alarm is cleared manually**.**

Considerations

If this alarm is set as a Shutdown alarm in diesel mode operation, it becomes a log alarm if unit is switched to electric mode operation.

If the alarm exists in electric mode and the unit is switched to diesel, either condition #1 or #2 in the “How Alarm is Set” section above apply.

Diagnostic Procedure

1. Display the oil pressure when the unit is not running, using the Gauge menu. The oil pressure should show [LOW]. If not, the switch may be stuck open or the switch circuit may be open.

2. Check the 20B-01 wires in the Interface Harness with an ohmmeter for continuity, per Service Procedure H04A

32 REFRIGERATION CAPACITY LOW

Alarm Type Shutdown Alarm

Associated Alarm Codes Alarm Code 26 Check Refrigeration Capacity

How Alarm is Set

1. If the unit heating or cooling capacity has degraded to the point where it has insufficient capacity to operate then Alarm Code 32 is set as a shutdown alarm. The unit's cooling or heating performance is considerably impaired. Corrective actions such as defrost have failed to improve performance.

How Alarm is Cleared

This alarm is cleared manually.

Considerations

Alarm Code 32 Refrigeration Capacity Low requires that Alarm Code 26 Check Refrigeration Capacity has been set first.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check temperature differential by displaying the temperature differential, or by checking the difference between the return and discharge air temperature sensors.
2. Check refrigerant level.
3. Attach gauges and evaluate unit refrigeration system performance.
4. Verify that sensor grades are set correctly.
5. Check for proper air flow. Short cycling caused by a blocked air flow path may generate this code.
6. Check the compressor and refrigeration system.

33 CHECK ENGINE RPM

Alarm Type Check Alarm (Pretrip Only)

Associated Alarm Codes Alarm 07 Check Engine RPM Sensor

How Alarm is Set

1. If during a Pretrip Test the engine high speed RPM is not within the correct range for the unit configuration then Alarm Code 33 is set as a check alarm.

2. If during a Pretrip Test the engine low speed RPM is not within the correct range for the unit configuration then Alarm Code 33 is set as a check alarm.

NOTE: For engine RPM speeds see the Maintenance Manual for the unit.

How Alarm is Cleared

This alarm is cleared manually.

Considerations

Only checked during a Pretrip Test.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check and adjust high speed, as shown in the Maintenance Manual for the unit.

2. Check and adjust low speed, as shown in the Maintenance Manual for the unit.

3. Check for a binding solenoid or disconnected linkage.

4. Verify the selected High and Low speeds match the programmed unit configuration.

5. Check the High Capacity settings in the Guarded Access – Unit Configuration menu. Improper high capacity settings can cause this alarm.

NOTE: Use Service Test Mode to run the unit in high speed cool and low speed cool. See Section 4 for details.

35 CHECK RUN RELAY CIRCUIT

Alarm Type Shutdown Alarm

Associated Alarm Codes

Circuit Description

The K1 Run Relay, LED 6, and associated fuse are located on the Base Controller/Interface Board. The 7K circuit is internal within the SR-3 Base Controller/Interface Board.

Power to the Run Relay circuit is supplied by fuse F25. Consult the schematic diagram for the unit for complete circuit details.

When the Run Relay is energized, 8 circuit power is supplied to the 7K circuit. This alarm code indicates that 7K circuit digital input is not present when the Run Relay output is energized or that 7K power is present when the Run Relay is de-energized.

How Alarm is Set

1. If the Run Relay is energized and the 7K input is low at the Base Controller/Interface Board then Alarm Code 35 is set as a Shutdown Alarm.

2. If the Run Relay is not energized and the 7K input is high at the Base Controller/Interface Board for 4 seconds then Alarm Code 35 is set as a Shutdown Alarm.

3. If current draw is not between 0.4 to 5 amps when the Run Relay is energized during a Pretrip Test Amps Check then Alarm Code 35 is set as a shutdown alarm.

4. If current draw is not less than 0.5 amps when the Run Relay is de-energized during a Pretrip Test Amps Check then Alarm Code 35 is set as a shutdown alarm.

How Alarm is Cleared

This alarm is cleared manually.

35 CHECK RUN RELAY CIRCUIT

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the Run Relay circuit fuse on the Base Controller/Interface Board. Power to the Run Relay circuit is supplied by the 7.5 amp fuse F25. Consult the schematic diagram for the unit for complete circuit details.

2. Check to be sure the K1 Run Relay LED 6 is energized.

3. Check the operation of the K1 Run Relay circuit using Interface Board Test Mode.

4. Check to be sure the High Pressure Cutout Switch is closed (HPCO and PHPCO circuits).

5. Check the voltage of the HPCO wire at the HPCO switch. Battery volts should be present when the unit is turned on.

6. Review the ServiceWatch download in technician level view. The associated alarm data will show the status of the 7K circuit when the alarm was set.

36 ELECTRIC MOTOR FAILED TO RUN

Alarm Type	Log, Check, Prevent, or Shutdown Alarm in Electric Mode Log Alarm in Diesel Mode
Associated Alarm Codes	Alarm Code 84 Restart Null Alarm Code 122 Check Diesel/Electric Circuit

How Alarm is Set

1. If the alternator frequency is less than 100 Hz for 10 seconds when the electric motor should be running then Alarm Code 36 is set as a prevent alarm.

How Alarm is Cleared

This alarm is cleared manually.

Considerations

This alarm becomes a log alarm if the unit is switched to diesel.

Diagnostic Procedure

CAUTION: Electric Standby Units utilize 460, 400 or 230 volt, 3 phase AC power. Extreme care must be used when working on the unit, as these voltages are capable of causing serious injury or death.

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the motor, motor contactor, overload relay and other associated electric standby motor circuitry. The internal pull coil/hold coil circuits in the contactor may be defective, requiring replacement of contactor.

2. Check the voltages at the phase detect module. Battery voltage should be present on the ER wire and the 8 wire.

3. Check the standby power voltage at the phase detect module. Standby power should be available at L1, L2 and L3.

4. Check the voltage at the motor contactor coils. Battery voltage should be present on either the 7EC or 7EB wire when the motor should be running.

5. Check for reason that the motor fails to turn the alternator, such as slipping belts, clutch, etc.

6. Check the alternator as shown under Alarm Code 25.

7. Download and inspect the ServiceWatch data logger to determine the operating conditions present when the alarm code was set. Use the running Service Test Mode Feature to duplicate the operating conditions. The alternator frequency and engine RPM are logged in ServiceWatch and this information is viewable in technician mode. This information can be used to confirm the RPM sensor reading and alternator frequency when the alarm was set.

37 CHECK ENGINE COOLANT LEVEL

Alarm Type	Log, Check or Shutdown Alarm in Diesel Mode Log or Check Alarm in Electric Mode
Associated Alarm Codes	Alarm Code 06 Check Coolant Temp Sensor

Circuit Description

Optical Sensor The 3-wire optical sensor is supplied with + 5 VDC and common from the Base Controller/Interface Board. The sensor is located in the coolant tank. The coolant level must be at or above the sensor location. If the sensor is not submerged in coolant, this alarm will be generated after the condition exists for 3 minutes. This alarm will self-clear automatically if the coolant level rises above the sensor location. The wiring is located in the Main Harness via the CLS-01, CLN-01, CLP-01 circuits.

Magnetic Switch The two wire magnetic switch is actuated by a float inside the coolant expansion tank. The switch is closed if the coolant level is adequate. The two wire switch supplies + 5 VDC from the CLP wire to the CLS wire when the coolant level is adequate. The circuit is opened if coolant level falls below an adequate level. This alarm will self-clear automatically if the coolant level rises above the sensor location. The wiring is located in the Main Harness via the CLS and CLP circuits.

How Alarm is Set

1. If the engine coolant level input indicates low coolant level for 3 minutes and the unit is in electric mode then Alarm Code 37 will be set as a log alarm. If the engine coolant level input indicates low coolant level for 3 minutes and the unit is in diesel mode then Alarm Code 37 will be set as a check alarm. If the unit is switched to electric mode this alarm remains a check alarm.

2. If Alarm Code 06 Check Coolant Temp Sensor is set and the engine coolant level input indicates low coolant level for 3 minutes and the unit is in electric mode then Alarm Code 37 will be set as a check alarm. If Alarm Code 06 Check Coolant Temp Sensor is set and the engine coolant level input indicates low coolant level for 3 minutes and the unit is in diesel mode then Alarm Code 37 will be set as a shutdown alarm.

How Alarm is Cleared

The alarm self-clears if coolant level input indicates good coolant level for 30 seconds. It can also be manually cleared.

Considerations

The Discharge Pressure Transducer, Suction Pressure Transducer and Coolant Level switch each have a separate 5 Vdc power supply. A short circuit condition in one transducer or switch circuit should not affect the other circuits.

37 CHECK ENGINE COOLANT LEVEL

Diagnostic Procedure

CAUTION: Exercise extreme care when checking hot coolant.

1. Check the engine coolant level and mixture. Be sure coolant is above sensor when the coolant is cold.
2. Check the sensor connector for a pushed pin or missing orange pin lock, loose pin crimp or broken wire.
3. Check that +5 VDC is present between the (CLP-01) wire from the Base Controller/Interface Board and chassis ground.
4. If an optical sensor, check continuity to ground of the (CLN-01) wire.
5. Check the voltage between the (CLS-01) wire and chassis ground. Voltage should be +5 Vdc when the sensor or switch is submerged in coolant and less than +0.5 Vdc when the sensor or switch is not submerged.

See Thermo King Service Bulletin T&T 379 for additional information on testing the coolant level switch.

38 ELECTRIC PHASE REVERSED

Alarm Type	Shutdown Alarm in Electric Mode Log Alarm in Diesel Mode
Associated Alarm Codes	Alarm Code 90 Electric Overload

How Alarm is Set

Two phases are reversed on 3 phase standby power between the motor contactor and the motor or the motor is incorrectly wired. This will cause the compressor and condenser fan to rotate in the wrong direction. This is checked by monitoring the evaporator temperature differential.

1. If the unit is running in electric mode and the temperature differential between return air temperature and discharge air temperature is greater than 50°F (10°C) and is still greater than 45°F (7°C) after 5 minutes then Alarm Code 38 is set as a shutdown alarm. The large temperature differential indicates the motor is rotating in the wrong direction.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

CAUTION: Electric Standby Units utilize 460, 400 or 230 volt, 3 phase AC power. Extreme care must be used when working on the unit, as these voltages are capable of causing serious injury or death.

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check motor wiring to be sure phase rotation is correct.
2. Confirm that the 7EC-01 wire is connected to the MCB motor contactor and the 7EB-01 wire is connected to the MCA motor contactor.
3. Check the voltages at the phase detect module. Battery voltage should be present on the 7EA wire and the 8 wire.
4. Check the standby power voltage at the phase detect module. Standby power should be available at L1, L2 and L3.
5. Confirm that the phase wiring between contactor MCA and MCB is correct.

39 CHECK WATER VALVE CIRCUIT

Alarm Type	Check Alarm (Pre-trip only)
Associated Alarm Codes	Alarm Code 28 Pretrip Abort Alarm Code 111 Unit Not Configured Correctly

How Alarm is Set

The water valve is not currently used. However, the associated output is checked during the Non-running Pretrip Test to be certain nothing has been mistakenly connected to it. The output is energized and then de-energized to insure that no device is connected to the circuit and that the Base Controller/Interface Board is operating properly.

1. If current flow is detected during the output energized phase of the Non-running Pretrip Test then Alarm Code 39 will be set as a check alarm and Alarm Code 111 Unit Not Configured Correctly will be set as a log alarm. The Non-running Pretrip Test will be allowed to complete.

2. If current flow is detected during the output de-energized phase of the Non-running Pretrip Test then Alarm Code 39 will be set as a check alarm, Alarm Code 111 Unit Not Configured Correctly will be set as a log alarm and Alarm Code 28 Pretrip Abort will be set as a shutdown alarm. The Pretrip Test will be aborted.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check unit configuration to confirm proper setting.

2. Check the Base Controller/Interface Board wiring to insure that there is no connection to connector J7, pin 9.

3. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

40 CHECK HIGH SPEED CIRCUIT

Alarm Type Check or Shutdown Alarm (Pretrip Only)

Associated Alarm Codes None

Component Description and Location

The high speed solenoid is located at the rear of the injector pump.

Circuit Description

The High Speed Solenoid circuit is a two wire circuit. The High Speed Solenoid is energized by Relay K3 and Fuse F6 on the Base Controller/Interface Board. The 7D wire applies 12 VDC to one side of the High Speed Solenoid to energize the solenoid. The CHHS wire connects the other side of the solenoid to chassis ground at the ground plate near the unit battery. The solenoid is not polarity sensitive, but the suppression diode must be installed with the bar end of the diode toward the 7D wire. The wires are routed in the Main Harness.

How Alarm is Set

1. If during a Pretrip Test the current is not between 2 to 8 amps when the solenoid is energized then Alarm Code 40 is set as a check alarm.

2. If during a Pretrip Test the current does not return to less than 0.5 amps when de-energized then Alarm Code 40 is set as a shutdown alarm. If current flow is detected during the output de-energized phase of the Non-running Pretrip Test then Alarm Code 40 is set as a check alarm and Alarm Code 28 Pretrip Abort will be set as a shutdown alarm. The Pretrip Test will be aborted.

How Alarm is Cleared

This alarm is cleared manually.

40 CHECK HIGH SPEED CIRCUIT

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the operation of the high speed circuit, using Interface Board Test Mode. Be sure the High Speed Relay LED 5 lights. If LED 5 does not light the Base Controller/Interface Board may be defective. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

2. Use the HMI control panel amps gauge to check the current drawn by the high speed solenoid, while operating the high speed solenoid with Interface Board Test Mode. The current draw should be approximately 4.6 amps. If the current is greater than 8 amps check the circuit for a shorted conductor or speed solenoid. If the current draw is zero check Base Controller/Interface Board fuse F6. See the unit wiring diagrams for wire numbers, locations and additional details.

3. Energize the high speed solenoid using Interface Board Test Mode, and check for battery voltage on the 7D-01 circuit. If voltage is present at the solenoid terminals and no current was measured in the step above replace the high speed solenoid. If voltage is not present at the solenoid terminals check the high speed circuit conductors for continuity. See the unit wiring diagrams for wire numbers, locations and additional details.

41 CHECK ENGINE COOLANT TEMPERATURE

Alarm Type	Check Alarm
Associated Alarm Codes	Alarm Code 42 Unit Forced to Low Speed Alarm Code 43 Unit Forced to Low Speed Modulation.

How Alarm is Set

Alarm Code 41 indicates the engine coolant temperature is above expected operating limits, but is not high enough to force a shutdown condition.

1. If the engine coolant temperature rises above 210°F and remains above 205°F for 60 seconds then Alarm Code 41 is set as a check alarm.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the engine coolant temperature by pressing the Gauge key
2. Check the engine coolant level.
3. Check the water pump drive belt.
4. Check the radiator for airflow or coolant flow blockage.
5. Download and inspect the ServiceWatch data logger information to determine the operating conditions that were present when the alarm code was set. Use running Service Test Mode to duplicate the operating conditions.

42 UNIT FORCED TO LOW SPEED

Alarm Type	Log Alarm
Associated Alarm Codes	Alarm Code 10 High Discharge Pressure or Temperature Alarm Code 18 High Engine Coolant Temperature Alarm Code 41 Check Engine Coolant Temperature Alarm Code 43 Unit Forced to Low Speed Modulation.

How Alarm is Set

1. If the unit has been forced to low speed operation as a result of high engine coolant temperature or high discharge pressure then Alarm Code 42 will be set as a log alarm. Alarm Code 10, Alarm Code 18 or Alarm Code 41 will also be set.

How Alarm is Cleared

Alarm will self-clear if unit returns to normal operation.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Troubleshoot as shown for the associated alarm code.

2. Download and inspect the ServiceWatch data logger information to determine the operating conditions that were present when the alarm code was set. Use running Service Test Mode to duplicate the operating conditions.

43 UNIT FORCED TO LOW SPEED MODULATION

Alarm Type	Log Alarm
Associated Alarm Codes	Alarm Code 10 High Discharge Pressure or Temperature Alarm Code 18 High Engine Coolant Temperature Alarm Code 41 Check Engine Coolant Temperature Alarm Code 42 Unit Forced to Low Speed

How Alarm is Set

1. Unit has been forced to low speed, but the engine coolant temperature is still above acceptable limits. The ETV will be closed to reduce the engine load.

How Alarm is Cleared

Alarm will self-clear if unit returns to normal operation.

Considerations

Applies to ETV units only.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

3. Troubleshoot as shown for the associated alarm code.

4. Download and inspect the ServiceWatch data logger information to determine the operating conditions that were present when the alarm code was set. Use running Service Test Mode to duplicate the operating conditions.

44 CHECK FUEL SYSTEM

Alarm Type	Shutdown Alarm
Associated Alarm Codes	Alarm Code 96 Low Fuel Level Alarm Code 98 Check Fuel Level Sensor

Component Description and Location

Either float style or solid state style fuel level sensor must be installed and selected from Guarded Access > Unit Configuration > Fuel Sensor Type.

Low Fuel Shutdown must be enabled from Guarded Access > Unit Configuration > Low Fuel Shutdown.

How Alarm is Set

1. If a fuel level sensor is enabled and fuel level falls to less than 7% of tank capacity for 5 minutes then Alarm Code 44 Check Fuel System is set as a Shutdown alarm.

How Alarm is Cleared

If this alarm is set as a Shutdown Alarm, manually clearing the alarm will demote it to a Check Alarm.

This alarm is cleared automatically when the fuel level is increased to more than 15% of tank capacity.

This alarm is cleared automatically if Alarm Code 98 Check Fuel Level Sensor is set.

This alarm is cleared automatically if the unit is switched to Electric Mode operation.

Considerations

Alarm Code 44 Check Fuel System is not available if Guarded Access > Programmable Features > Rail Option is set ENABLED.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Add fuel as necessary.

45 CHECK HOT GAS OR HOT GAS BYPASS CIRCUIT

Alarm Type Check or Shutdown Alarm

Associated Alarm Codes None

Component Description and Location

The hot gas/hot gas bypass solenoid is located in the condenser section next to the receiver tank. It is a normally closed valve. This valve is only used on ETV units.

Circuit Description

The hot gas/hot gas bypass solenoid circuit is a two wire circuit. The HG-01 wire connects the Base Controller/Interface Board Connector J7 Pin 5 to one side of the hot gas/hot gas bypass solenoid. The CHHG wire connects the other side of the solenoid to chassis ground at the ground plate near the unit battery. The solenoid is not polarity sensitive. The switch wires are routed in the Main Harness. A Smart FET on the Base Controller/Interface Board supplies power to the HG-01 circuit.

Considerations

1. During a non-running Pretrip the current draw is determined by the Base Controller shunt reading.

2. During normal operation the current draw is determined by the Smart FET feedback to the Base Controller.

3. If an alarm code is set during normal operation then the ServiceWatch Data Logger will list the Alarm Code, FLTCT (Fault Current), Battery Volts, and the Shunt Current. The FLTCT will be the high or low current draw as determined by the Smart FET feedback that caused the Alarm Code to set.

How Alarm is Set

1. If during normal operation the current is greater than 3 amps or less than 0.5 amps at specified intervals after the solenoid is energized then Alarm Code 45 Check Hot Gas Circuit is set as a check alarm and the output is turned off. If the output circuit is shorted it will be turned off immediately to protect the circuit and the alarm code will be set. Hot gas valve operation is not allowed until Alarm Code 45 Check Hot Gas Circuit is cleared. The unit will continue to run but with reduced performance until the condition is corrected and the alarm is cleared. If this condition occurs when the unit is in Evacuation Mode then Alarm Code 45 Check Hot Gas Circuit will be set as a shutdown alarm.

2. If during normal operation the current does not return to less than 0.5 amps at a specified interval after the solenoid is de-energized then Alarm Code 45 Check Hot Gas Circuit is set as a check alarm. Hot gas valve operation is not allowed until Alarm Code 45 Check Hot Gas Circuit is cleared. The unit will continue to run but with reduced performance until the condition is corrected and the alarm is cleared.

3. If during a Pretrip Test the current is not between 0.5 to 3 amps when the solenoid is energized then Alarm Code 45 Check Hot Gas Circuit is set as a check alarm.

4. If during a Pretrip Test the current does not return to less than 0.5 amps when de-energized then Alarm Code 45 Check Hot Gas Circuit is set as a shutdown alarm.

45 CHECK HOT GAS OR HOT GAS BYPASS CIRCUIT

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch Data Logger using WinTrac. Review the data using Technician User Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. If FLTCT is greater than 3.0 amps the circuit has excessive current flow. Check for a shorted circuit or solenoid coil.

2. If FLTCT is less than 0.5 amps the circuit has low current flow. Check for high resistance or an open in the circuit or solenoid coil.

Indicator LED Diagnosis

1. Clear the alarm to reset the Smart FET. Check the operation of the Hot Gas Solenoid circuit using Interface Board Test Mode. Be sure the Interface Board Hot Gas Solenoid circuit LED lights. For Interface Board LED identification see the LED decal on the control box door. If the Interface Board Hot Gas Solenoid circuit LED lights go to Step 2. If the Interface Board Hot Gas Solenoid circuit LED does not light go to Step 3.

2. If the Interface Board Hot Gas Solenoid circuit LED lights and Alarm Code 45 Check Hot Gas Circuit is set, the circuit has high resistance or is open. Use the HMI Control Panel amps gauge to check the current drawn by the Hot Gas Solenoid, while operating the solenoid with Interface Board Test Mode. The current draw should be approximately 1.1 amps. If the current is not within limits then check for high resistance or open in the circuit or solenoid coil as shown in Step 3. Verify that all circuit connectors are secure.

3. If the Interface Board Hot Gas Solenoid circuit LED does not light and Alarm Code 45 Check Hot Gas Circuit is set, check for a shorted circuit or solenoid coil. Disconnect the 36 pin Connector J7 and check the Hot Gas Solenoid circuit at Pin 5 with an accurate ohmmeter for a short circuit, open circuit or loose connection. The solenoid coil resistance should be approximately 8.3 ohms.

4. If no problems are found in Steps 1-3 and the output LED does not turn on then check the Base Controller/Interface Board Assembly as shown in Service Procedure A01A.

46 CHECK AIR FLOW

Alarm Type Check Alarm

Associated Alarm Codes

Component Description and Location

The Blocked Air Chute Detect uses the Spare 1 sensor mounted in the discharge air chute.

How Alarm is Set

1. Alarm is set if the difference between the control discharge air temperature and a chute mounted sensor (Spare 1) exceeds the programmed limits. See Blocked Air Chute Detect feature in Section 3 for details.

How Alarm is Cleared

This alarm is cleared manually.

Programmable Features

See Blocked Air Chute Detect in Section 3 for details and setup.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the discharge air chute for restricted air flow.
2. Check the spare sensor to be sure that it is positioned in the chute air flow at the rear of the trailer and is not obstructed.
3. Check operation of the spare sensor.

48 CHECK BELTS OR CLUTCH

Alarm Type Shutdown Alarm

Associated Alarm Codes

How Alarm is Set

1. The ratio between the engine RPM and alternator frequency is monitored. If these values are not in the proper ratio it is an indication that drive belt slippage is occurring. If this occurs then Alarm Code 48 is set as a shutdown alarm.

How Alarm is Cleared

This alarm is cleared manually.

Considerations

Applies to units equipped with electric standby only.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check clutch and belts for condition, operation and slippage.
2. Check for a stuck compressor.
3. Check alternator operation.
4. Check "W" circuit including resistor for continuity. Monitor with Wintrac or a frequency meter.
5. Check unit configuration if this alarm occurs on a Model 30 (diesel only) unit.
6. Verify the unit model is correctly configured. This alarm is dependant on the alternator drive pulley sizes used in the unit. The pulley sizes can vary between unit models.
7. Verify that the correct pulley is installed on the alternator. This code can occur if the alternator is replaced with an alternator with the wrong size pulley installed.
8. Download and inspect the ServiceWatch data logger to determine the operating conditions present when the alarm code was set. Use the running Service Test Mode Feature to duplicate the operating conditions. The alternator frequency and engine RPM are logged in ServiceWatch and this information is viewable in technician mode. This information can be used to confirm the RPM sensor reading and alternator frequency when the alarm was set.

50 RESET CLOCK

Alarm Type Log Alarm

How Alarm is Set

1. This alarm indicates that power to the HMI control panel has been interrupted for an extended period and the hold capacitor for the clock/calendar has discharged. As a result, the clock/calendar is no longer accurate. Turning the unit on will recharge the hold capacitor in the HMI control panel.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

1. Turn the unit on to recharge the hold capacitor in the HMI control panel.

2. Reset the clock to the customer's time zone.

52 CHECK HEAT CIRCUIT

Alarm Type Check or Shutdown Alarm

Associated Alarm Codes None

Component Description and Location

The pilot solenoid is located in the condenser section adjacent to the receiver tank.

Circuit Description

The pilot solenoid circuit is a two wire circuit. The 26-01 wire connects the Base Controller/Interface Board connector J7 pin 3 to one side of the pilot solenoid. The CHPS wire connects the other side of the solenoid to chassis ground at the ground plate near the unit battery. The solenoid is not polarity sensitive. The switch wires are routed in the Main Harness. A Smart FET on the Base Controller/Interface Board supplies power to the 26-01 circuit.

Considerations

1. During a non-running Pretrip the current draw is determined by the Base Controller shunt reading.

2. During normal operation the current draw is determined by the Smart FET feedback to the Base Controller.

3. If an alarm code is set during normal operation then the ServiceWatch Data Logger will list the Alarm Code, FLTCT (Fault Current), Battery Volts, and the Shunt Current. The FLTCT will be the high or low current draw as determined by the Smart FET feedback that caused the Alarm Code to set.

How Alarm is Set

1. If during normal operation the current is greater than 3 amps or less than 0.5 amps at specified intervals after the solenoid is energized then Alarm Code 52 Check Heat Circuit is set as a check alarm and the output is turned off. If the output circuit is shorted it will be turned off immediately to protect the circuit and the alarm code will be set. Hot gas valve operation is not allowed until Alarm Code 52 Check Heat Circuit is cleared. The unit will continue to run but with reduced performance until the condition is corrected and the alarm is cleared. If this condition occurs when the unit is in Evacuation Mode then Alarm Code 52 Check Heat Circuit will be set as a shutdown alarm.

2. If during normal operation the current does not return to less than 0.5 amps at a specified interval after the solenoid is de-energized then Alarm Code 52 Check Heat Circuit is set as a check alarm. Hot gas valve operation is not allowed until Alarm Code 52 Check Heat Circuit is cleared. The unit will continue to run but with reduced performance until the condition is corrected and the alarm is cleared.

3. If during a Pretrip Test the current is not between 0.5 to 3 amps when the solenoid is energized then Alarm Code 52 Check Heat Circuit is set as a check alarm.

4. If during a Pretrip Test the current does not return to less than 0.5 amps when de-energized then Alarm Code 52 Check Heat Circuit is set as a shutdown alarm.

52 CHECK HEAT CIRCUIT

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch Data Logger using WinTrac. Review the data using Technician User Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. If FLTCT is greater than 3.0 amps the circuit has excessive current flow. Check for a shorted circuit or solenoid coil.

2. If FLTCT is less than 0.5 amps the circuit has low current flow. Check for high resistance or an open in the circuit or solenoid coil.

Indicator LED Diagnosis

1. Clear the alarm to reset the Smart FET. Check the operation of the Pilot Solenoid circuit using Interface Board Test Mode. Be sure the Interface Board Pilot Solenoid circuit LED lights. For Interface Board LED identification see the LED decal on the control box door. If the Interface Board Pilot Solenoid circuit LED lights go to Step 2. If the Interface Board Pilot Solenoid circuit LED does not light go to Step 3.

2. If the Interface Board Pilot Solenoid circuit LED lights and Alarm Code 52 Check Heat Circuit is set, the circuit has high resistance or is open. Use the HMI Control Panel amps gauge to check the current drawn by the Pilot Solenoid, while operating the solenoid with Interface Board Test Mode. The current draw should be approximately 1.1 amps. If the current is not within limits then check for high resistance or open in the circuit or solenoid coil as shown in Step 3. Verify that all circuit connectors are secure.

3. If the Interface Board Pilot Solenoid circuit LED does not light and Alarm Code 52 Check Heat Circuit is set, check for a shorted circuit or solenoid coil. Disconnect the 36 pin Connector J7 and check the Pilot Solenoid circuit at Pin 3 with an accurate ohmmeter for a short circuit, open circuit or loose connection. The solenoid coil resistance should be approximately 9.6 ohms.

4. If no problems are found in Steps 1-3 and the output LED does not turn on then check the Base Controller/Interface Board Assembly as shown in Service Procedure A01A.

54 TEST MODE TIMEOUT

Alarm Type Shutdown Alarm

Associated Alarm Codes None

Considerations

The HMI will display the remaining test time. The timer can be reset by pressing the HMI test "Select" key while the respective Service Test Mode or Interface Board Test Mode test is active.

How Alarm is Set

1. If the unit has been in the same Service Test Mode function for 15 minutes then Alarm Code 54 is set as a shutdown alarm.

2. If the unit has been in the same Interface Board Test Mode function for 15 minutes then Alarm Code 54 is set as a shutdown alarm.

How Alarm is Cleared

This alarm is manually cleared.

Diagnostic Procedure

1. If the unit is in Service Test Mode or Interface Board Test Mode and the function is not changed for 15 minutes then Alarm Code 54 is set as a shutdown alarm. Clear the alarm and re-enter the test mode as necessary to complete the diagnosis or repair.

61 LOW BATTERY VOLTAGE

Alarm Type Log Alarm or Shutdown Alarm

Associated Alarm Codes

How Alarm is Set

1. If the unit is not preheating or starting, and battery voltage is less than 11.2 volts for 3 minutes, Alarm Code 61 is set as a Shutdown alarm.

2. If during the preheat cycle prior to an engine start the battery voltage is below 10 volts during an engine start, Alarm Code 61 is set as a Log alarm. **NOTE:** The preheat output will have been de-energized prior to the alarm being set.

3. If during a Pretrip Test the preheat amps check is not within limits, and battery voltage is less than 11.3 volts, Alarm Code 61 is set as a Shutdown alarm.

4. If during a Pretrip Test all outputs are de-energized, and battery voltage is not within limits, Alarm Code 61 is set as a Shutdown alarm.

5. If the unit is in Evacuation mode, and battery voltage is greater than 16.0 volts for 3 minutes, Alarm Code 61 is set as a Shutdown alarm

6. If three power-up and start attempts are made without a successful start, Alarm Code 61 is set as a Shutdown Alarm. This indicates that the battery voltage dropped low enough during the start sequence that the Base Controller/Interface Board powered down. This can also occur if the unit is turned on and off 3 times without allowing the unit to start.

How Alarm is Cleared

This alarm is cleared manually.

Considerations

No other alarm codes are set after this alarm code is set as a shutdown alarm and is not cleared.

This alarm code can be set by either low voltage or excessive voltage conditions.

61 LOW BATTERY VOLTAGE

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check for discharged battery and charge as required.
2. Check the battery terminals for tightness and corrosion.
3. Check the unit ground plate connections for tightness and corrosion.
4. With the engine running, check the battery voltage and charge rate using the Gauge Menu.
5. Check the operation of the alternator. Be sure the belt is properly adjusted.
6. Load test the battery, replace if necessary.
7. Inspect the ServiceWatch downloads to check for 3 start attempts and the reason for the start attempts.
8. Download and inspect the ServiceWatch data logger to determine the operating conditions present when the alarm code was set. The battery voltage, charge current, and alternator frequency are logged in ServiceWatch and this information is viewable in technician mode. This information can be used to determine which condition caused the alarm to be set.

62 AMMETER OUT OF CALIBRATION

Alarm Type Shutdown Alarm (Pretrip Only)

Associated Alarm Codes

Considerations

The current shunt on SR-3 Base Controller/Interface Boards is a surface mount device and is conformal coated for protection. Field resistance measurement of this circuit cannot be made.

How Alarm is Set

1. Shunt calibration check in Pretrip Test shows shunt circuit is out of calibration with all outputs de-energized.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the ServiceWatch download for abnormal ammeter readings or all dashes [- - - -].
2. Check the Base Controller/Interface Board assembly, using Service Procedure A01A.
3. Check the current draw with the unit off and compare it to the reading of a clamp-on ammeter.

63 ENGINE STOPPED

Alarm Type	Prevent or Shutdown Alarm in Diesel Mode Log Alarm in Electric Mode
Associated Alarm Codes	Alarm Code 84 Restart Null

Considerations

Becomes a log alarm if unit is switched to electric mode.

If the Restart Unit After Shutdown feature is set for Continuous, then the shutdown alarm condition is disabled and the interval between restart attempts is increased from 15 minutes to 1 hour. Note: This feature is recommended only for rail application where the equipment is operated unattended for long periods of time. See the Restart Unit After Shutdown feature in Section 3 for additional information.

How Alarm is Set

1. If the unit was running and still should be but has stopped then Alarm Code 63 is set as a prevent alarm. This is determined based on multiple factors, and can be caused by an intermittent condition. Three restart attempts will be made to allow continued operation at temporarily reduced performance. The time interval between restart attempts is 15 minutes. If at the end of the three attempts full performance is not possible, the alarm is set as a Shutdown alarm. If the Restart Unit After Shutdown feature is set for Continuous, then the shutdown alarm condition is disabled. If the Restart Unit After Shutdown feature is set for Disabled, then the alarm will be set as a shutdown alarm on the first occurrence.

2. If Alarm Code 17 Engine Failed to Crank, or Alarm code 20 Engine Failed to Start alarm occurs after Alarm Code 63 is cleared then Alarm Code 63 will be set as a Shutdown alarm.

How Alarm is Cleared

This alarm is cleared manually or automatically.

63 ENGINE STOPPED

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Download the ServiceWatch data logger and check the conditions when the alarm code was set.
2. Check for other alarm codes and proceed as indicated for each code.
3. Perform a Pretrip Test to determine cause for shutdown.
4. Verify the fuel level and check the fuel pump for proper operation.
5. Check the air cleaner and intake hose for obstructions.
6. Check the unit fuses.
7. Check the RPM sensor for proper operation.
8. Check Run Relay and fuel solenoid components and circuits.
9. Check for low battery voltage.
10. Be sure all ground connections on the master ground plate are secure.
11. Check for a seized compressor or engine.
12. Download and inspect the ServiceWatch data logger information to determine the operating conditions that were present when the alarm code was set. Use the running service test mode feature to duplicate the operating conditions as required. Unit operating data is logged in ServiceWatch and the data is viewable in technician mode.

64 PRETRIP REMINDER

Alarm Type Log Alarm

Associated Alarm Codes

Considerations

The alarm is cleared when Pretrip Test is entered. If the Pretrip Test is not successful, the alarm will not be reset. If the Pretrip Test is not successful then diagnose and correct the fault.

How Alarm is Set

1. If a programmable hour meter is set as a Pretrip Reminder and the hourmeter time expires then Alarm Code 64 is set as a log alarm.

How Alarm is Cleared

The alarm self-clears when a Pretrip Test is entered.

Programmable Features

This feature must be programmed. See Section 3 Hourmeters for details.

Diagnostic Procedure

1. Perform a Pretrip Test to confirm unit operation.

2. Reset the Pretrip Reminder hourmeter after a Pretrip Test is entered.

65 ABNORMAL TEMPERATURE DIFFERENTIAL

Alarm Type Check Alarm

Associated Alarm Codes Alarm Code 13 Sensor Check

Considerations

This alarm only applies to Multi-Temperature Trailer Units and Single Temperature Truck Units.

How Alarm is Set

Alarm Code 65 Abnormal Temperature Differential is set if there is an abnormally large cooling or heating temperature differential and the offending sensor cannot be determined. Alarm Code 13 Sensor Check will also be set.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

Determine which sensor Alarm Codes (02, 03, 203, 04, 204 or 05) are present along with Alarm Code 13. Proceed as shown for that Alarm Code.

Sensor alarms are classified as either “Soft Failures” or “Hard Failures”.

A “**Soft Failure**” is defined as erratic operation or sensor drift that exceeds acceptable tolerances. If this occurs, the alarm code for the suspect sensor will be set along with Alarm Code 13. This indicates a potential problem that may not be immediately apparent, and also shows that a hard failure as defined below did not occur. Alarm Code 13 is always set if a soft failure occurs.

> **Note:** Alarm Code 13 can be cleared by the driver, while sensor Alarm Codes 03, 04, 203 and 204 can only be cleared from the Guarded Access Menu. If the unit has only Alarm Code 03, 04, 203 or 204 set when inspected, that alarm code may have been originally set with Alarm Code 13. Checking the ServiceWatch data logger download will indicate the conditions that existed when the failure occurred.

A “**Hard Failure**” is defined by an out of range sensor reading, typically caused by an open or shorted sensor, connector, or harness conductor. The sensor display will show dashes if a hard failure occurs. If this occurs, only the alarm code for that sensor will be set (such as Alarm Code 03 if the control return air sensor failed). Alarm Code 13 will not be set if a hard failure occurs.

> **Note:** The controller may not be currently showing dashes for the sensor reading, but the alarm will be present when the unit is inspected. If a sensor alarm code is set, a failure did occur at some point. Checking the ServiceWatch data logger download will indicate when the hard failure occurred.

66 LOW ENGINE OIL LEVEL

Alarm Type Shutdown Alarm in Diesel Mode
Log Alarm in Electric Mode

Associated Alarm Codes

Considerations

A shutdown level Alarm Code 66 becomes a log alarm if the unit is switched from diesel mode to electric mode. A log level Alarm Code 66 becomes a shutdown alarm if the unit is switched from electric to diesel mode.

Component Description and Location

The switch is located on the top of the engine oil pan. The switch is open with full oil level and closed with low oil level.

Circuit Description

The wiring is located in the Main Harness via the OLS and CHOL circuits.

How Alarm is Set

1. If the engine oil level switch indicates low engine oil for 3 minutes then Alarm Code 66 is set as a Shutdown alarm.

2. If Alarm Code 66 is manually cleared and the engine oil level is still low then Alarm Code 66 is reset as a Shutdown Alarm.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

1. Check and adjust the engine oil level.

2. Check the switch with an ohmmeter. It should be open when the oil level is satisfactory.

3. Check the harness wires OLS-01 and CHOL with an ohmmeter for continuity, per Service Procedure H04A.

67 CHECK LIQUID LINE SOLENOID CIRCUIT

Alarm Type	Check Alarm (Pre-trip only)
Associated Alarm Codes	Alarm Code 28 Pretrip Abort Alarm Code 111 Unit Not Configured Correctly

How Alarm is Set

The liquid line solenoid is not used on single temperature applications. However, the associated output is checked during the Non-running Pretrip Test to be certain nothing has been mistakenly connected to it. The output is energized and then de-energized to insure that no device is connected to the circuit and that the Base Controller/Interface Board is operating properly.

1. If current flow is detected during the output energized phase of the Non-running Pretrip Test then Alarm Code 67 will be set as a check alarm and Alarm Code 111 Unit Not Configured Correctly will be set as a log alarm. The Non-running Pretrip Test will be allowed to complete.

2. If current flow is detected during the output de-energized phase of the Non-running Pretrip Test then Alarm Code 67 will be set as a check alarm, Alarm Code 111 Unit Not Configured Correctly will be set as a log alarm and Alarm Code 28 Pretrip Abort will be set as a shutdown alarm. The Pretrip Test will be aborted.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check unit configuration to confirm proper setting.

2. Check the Base Controller/Interface Board wiring to insure that there is no connection to connector J7, pin 4.

3. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

68 INTERNAL CONTROLLER FAULT CODE

Alarm Type Log, Check or Shutdown Alarm

How Alarm is Set

1. If a shutdown level internal fault occurs in the Base Controller/Interface Board then Alarm Code 68 is set as a shutdown alarm.
2. If a check level internal fault occurs in the Base Controller/Interface Board then Alarm Code 68 is set as a check alarm.
3. If a log level internal fault occurs in the Base Controller/Interface Board the Alarm Code 68 is set as a log alarm.

Diagnostic Procedure

1. Replace the Base Controller/Interface Board.
2. Return failed Base Controller/Interface Board for failure analysis

70 HOURMETER FAILURE

Alarm Type Log Alarm

Associated Alarm Codes

How Alarm is Set

1. If one or more hourmeters exceeds 499,999 hours the Alarm Code 70 is set as a log alarm.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

1. If the hourmeter readings are normal, perform a Cold Start per Service Procedure A07A.
2. If the code can now be cleared, proceed with Base Controller/Interface Board setup, using Service Procedure A04A.

IMPORTANT: Any time a Cold Start is performed the Base Controller/Interface Board must be set up using Service Procedure A04A. Failure to do so may result in the unit not operating to customer specifications.

74 CONTROLLER RESET TO DEFAULTS

Alarm Type Check Alarm

How Alarm is Set

1. If all the Base Controller/Interface Board programmable features have been reset to factory defaults the Alarm Code 74 is set as a check alarm. Alarm Code 74 is typically set by a cold start.

How Alarm is Cleared

This alarm can only be cleared from the Guarded Access menu.

Diagnostic Procedure

1. Be sure the Base Controller/Interface Board cold start jumper J101 is in the correct (up) position. It should match the white mark on the Base Controller/Interface Board, at the side of the jumper. If the jumper is in the wrong position a cold start will occur every time the unit is turned on.

2. Complete the Base Controller/Interface Board setup, using Service Procedure A04A.

3. Alarm code 74 will be cleared during the Base Controller/Interface Board setup.

IMPORTANT: Any time Alarm Code 74 occurs the Base Controller/Interface Board must be set up using Service Procedure A04A. Failure to do so may result in the unit not operating to customer specifications.

77 CONTROLLER EPROM CHECKSUM FAILURE

Alarm Type Shutdown Alarm

How Alarm is Set

1. If a shutdown level internal memory fault has occurred in the Base Controller/Interface Board or data logger then Alarm Code 77 is set as a shutdown alarm.

Diagnostic Procedure

1. Replace the Base Controller/Interface Board.

2. Return failed Base Controller/Interface Board for failure analysis

79 INTERNAL DATA LOGGER OVERFLOW

Alarm Type Log Alarm

How Alarm is Set
If too many data logger events occurred at once or if too many data logger events occurred during a download then Alarm Code 79 is set as a log alarm.

How Alarm is Cleared
This alarm is cleared manually.

Diagnostic Procedure
No corrective action is possible. This serves only as an indication that an event occurred that was not recorded by the data logger.

80 CHECK COMPRESSOR TEMP SENSOR

Alarm Type Check Alarm

Considerations
Not implemented - future use.

81 HIGH COMPRESSOR TEMP

Alarm Type Log Alarm

Considerations
Not implemented - future use.

82 HIGH COMPRESSOR TEMP SHUTDOWN

Alarm Type Prevent Alarm

Considerations
Not implemented - future use.

83 LOW ENGINE COOLANT TEMPERATURE

Alarm Type Log Alarm

Considerations
Not implemented - future use.

84 RESTART NULL

Alarm Type	Prevent Alarm
Associated Alarm Codes	Alarm Codes 10, 17, 18. 20, 21, 22, 36, 42, 63, 90, 91 and 93

Considerations

- This alarm is a secondary alarm that is set along with the associated primary alarm.
- The alarm indicates that the unit is in a temporary (“prevent” or “restart null”) shutdown. The alarm clears automatically if the condition does not re-occur.
- Many of these actions include a “waiting period” (to allow the engine to cool down, a high pressure condition to subside or the like). The alarm code that caused the condition and Alarm Code 84 might be present to indicate that the Base Controller/Interface Board is taking a corrective action and that a restart will be attempted when conditions permit.
- If the corrective action is successful, the original alarm code and Alarm Code 84 are cleared automatically. If the original alarm condition continues to occur, and the corrective actions taken by the Base Controller/Interface Board are not successful, the original alarm code remains. Alarm Code 84 is automatically cleared and the unit shuts down.
- This alarm occurs if unit operation is not allowed as a result of the associated prevent alarm. For example, if a high discharge pressure condition shuts the unit down, a waiting period occurs to allow system pressures to equalize. A restart occurs when conditions permit.
- If restarts are disabled Alarm Code 84 is also disabled.
- Most prevent alarms become shutdown alarm if three occurrences of the alarm occur within a set time period.
- Alarm Codes 10, 18 and 63 are not promoted to shutdown level if the Continuous Restarts feature is enabled.
- Alarm Codes 32 and 63 are promoted to guarded access clearable shutdown alarms if the Limited Restarts Feature is enabled and the shutdown alarm occurs 3 times with a 12 hour time period.
- Some prevent alarms will result in modified unit operation after the alarm is self cleared. For example, Alarm Code 10 High Discharge Pressure will result in Alarm Code 42 Unit Forced to Low Speed being set and the unit being forced to low speed for a 1 hour period.
- If the unit is turned off while Alarm Code 84 is present the primary alarm becomes a shutdown alarm when the unit is turned back on.

84 RESTART NULL

How Alarm is Set

1. This alarm is set with the associated alarm that caused the condition.

How Alarm is Cleared

This alarm clears automatically if the condition is resolved.

Diagnostic Procedure

Check for associated alarms and repair as required.

85 FORCED UNIT OPERATION

Alarm Type Check Alarm

Associated Alarm Codes Alarm Code 26 Check Refrigeration Capacity

How Alarm is Set

1. This alarm is set only if an alert low refrigeration capacity alarm occurs while the unit is operating in the reduced capacity state.

How Alarm is Cleared

This alarm clears automatically if the condition is resolved.

Considerations

1. This alarm is a secondary alarm that is set along with the associated primary alarm.

2. This alarm indicates that the unit was forced to a different operating mode than would normally be implemented under the existing conditions. This can occur as result of low coolant temperature or high compressor temperature. It indicates that normal unit operation has been over-ridden, (i.e., the discharge pressure setpoint has been reduced). The alarm is only set if a low cooling capacity condition occurs while the unit is in reduced capacity mode.

Diagnostic Procedure

Check for associated alarms and repair as required.

86 CHECK DISCHARGE PRESSURE SENSOR

Alarm Type Check Alarm

Associated Alarm Codes

Circuit Description

The 3-wire discharge pressure sensor is supplied with +5 VDC and ground from the Base Controller/Interface Board. The wiring is located in the Sensor Harness via the DPP, DPN and DPI circuits.

Considerations

The Discharge Pressure Transducer, Suction Pressure Transducer and Coolant Level switch each have a separate 5 Vdc power supply. A short circuit condition in one transducer or switch circuit should not affect the other circuits.

The maximum discharge pressure that can be displayed is 500 psig. If the sensed pressure is greater than 500 psig, the HMI Control Panel will display [- - - -] instead of the discharge pressure.

The minimum discharge pressure that can be sensed is –10 psig. The control system cannot determine if the minimum sensed pressure is the result of an electrical short or very low system pressure.

The Discharge Pressure Transducer will have a “500” on the body of the part. The Suction Pressure Transducer will have a “200” on the body of the part. They are not interchangeable.

How Alarm is Set

1. If the unit is not running and the discharge pressure transducer reading is greater than 500 psig for 10 seconds then Alarm Code 86 is set as a check alarm. If the unit is in a Pretrip Test this alarm is set as a shutdown alarm.

2. If the unit is running, the ambient temperature is greater than 10°F (-12°C) and the discharge pressure transducer reading is less than +15 psig for 10 seconds then Alarm Code 86 is set as a check alarm. If the unit is in a Pretrip Test this alarm is set as a shutdown alarm.

3. If Alarm Code 10 is cleared and the discharge pressure transducer reading is greater than or equal to 425 psig but less than 500 psig then Alarm Code 86 is set as a check alarm.

How Alarm is Cleared

This alarm is cleared manually. Clearing the code will cause the unit to shut down and restart to check the transducer for proper operation by performing a ETV check.

86 CHECK DISCHARGE PRESSURE SENSOR

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the discharge pressure display using the Gauge Menu.

2. If the discharge pressure is not displayed by the Base Controller/Interface Board, unplug the transducer and check for +5 VDC between DPP and DPN. If +5 VDC is not present check the Base Controller/Interface Board using Service Procedure A01A.

3. Check the harness wires DPP, DPN and DPI for continuity using an ohmmeter.

4. Connect refrigeration gauges to verify that the sensor is displaying the correct pressure. Replace the sensor if required.

87 CHECK SUCTION PRESSURE SENSOR

Alarm Type Check Alarm

Associated Alarm Codes

Circuit Description

The 3-wire suction pressure sensor is supplied with +5 VDC and ground from the Base Controller/Interface Board. The sensor is located in the suction line and downstream of the ETV if present. The wiring is located in the Sensor Harness via the SPP, SPN and SPI circuits.

Considerations

The Discharge Pressure Transducer, Suction Pressure Transducer and Coolant Level switch each have a separate 5 Vdc power supply. A short circuit condition in one transducer or switch circuit should not affect the other circuits.

The maximum suction pressure that can be displayed is 200 psig. If the sensed pressure is greater than 200 psig, the HMI Control Panel will display [- - - -] instead of the suction pressure. When the unit is off and the refrigerant pressures have equalized, the system pressure can exceed 200 psig when ambient temperatures are above 90°F (35°C). If this occurs the HMI Control Panel will display [- - - -]. This is normal operation and no cause for concern.

The minimum suction pressure that be sensed is -12 psig.

If the sensor opens the display will read -10 PSIG. An alarm may not be generated immediately but the unit will be forced to low speed due to low suction pressure.

The Suction Pressure Transducer will have a “200” on the body of the part. The Discharge Pressure Transducer will have a “500” on the body of the part. They are not interchangeable.

How Alarm is Set

1. If the unit is running and the suction pressure sensor reading is greater than 200 PSIG for 10 seconds then Alarm Code 87 is set as a check alarm. If the unit is in a Pretrip Test this alarm is set as a shutdown alarm. If the suction pressure is greater than 200 PSIG the sensor display will be dashes [- - - -].

2. If the unit is running and the suction pressure sensor reading is less than -9 PSIG for 10 seconds then Alarm Code 87 is set as a check alarm. If the unit is in a Pretrip Test this alarm is set as a shutdown alarm.

3. If suction pressure does not change ±3 PSIG during the ETV test then Alarm Code 87 is set as a check alarm. If the unit is in a Pretrip Test this alarm is set as a shutdown alarm.

87 CHECK SUCTION PRESSURE SENSOR

How Alarm is Cleared

This alarm is cleared manually. Clearing the code will cause the unit to shut down and restart to check the transducer for proper operation by performing an ETV check.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the suction pressure display using the Gauge Menu. If the suction pressure is -10 psig then turn the unit off and allow the system refrigerant pressures to equalize. If the displayed suction pressure remains at –10 psig then the suction pressure transducer is defective and must be replaced.

2. Check the suction pressure display using the Gauge Menu. If the sensor reads [- - - -] psig then turn the unit off and allow the system pressures to equalize.

    - If the actual suction pressure is less than 180 psig, but the displayed suction pressure remains at [- - - -] then the transducer is defective and must be replaced.

    - If the suction pressure is greater than 180 psig, the suction pressure transducer may be operating normally. Place the unit in full cool and allow the return air temperature to drop below 50°F (10°C). If the suction pressure display remains at [- - - -] then the transducer, controller power supply, or conductors are faulty.

3. If the suction pressure is not displayed by the Base Controller/Interface Board, unplug the transducer and check for +5 Vdc between SPP-01 and SPN-01. If 5 volts is not present check the Base Controller/Interface Board, using Service Procedure A01A.

4. Connect refrigeration gauges to verify that the sensor is not displaying the correct pressure. Replace the sensor.

5. Check the harness wires SPP-01, SPN-01 and SP-01 for continuity using an ohmmeter.

89 CHECK ELECTRONIC THROTTLING VALVE CIRCUIT

Alarm Type Check or Shutdown Alarm

Component Description and Location

The Electronic Throttling Valve (ETV) is located in the suction line and is accessible from the rear of the unit.

IMPORTANT: There are two different valves currently in use. They are connected in a similar manner, but the valve wire color codes are different for each valve. Consult the unit schematic diagram for connection details.

Circuit Description

The ETV circuit consists of 4 wires from the ETV driver located on the Base Controller/Interface Board to the ETV. The harness wires to the valve are labeled EVA-01, EVB-01, EVC-01 and EVD-01. These wires are located in the Main Harness.

IMPORTANT: There are two different valves currently in use. They are connected in a similar manner, but the valve wire color codes are different for each valve. Consult the unit schematic diagram for connection details.

How Alarm is Set

The electrical test is performed before every engine or motor start. The running test is only performed when the unit restarts after a shutdown or prevent alarm or if the Base Controller/Interface Board senses a problem with either or both of the refrigerant pressure transducers. The running test is also performed when an engine start occurs during a Pre-trip Test.

When Alarm Code 89 Check ETV Circuit is cleared the unit will shut down (if running) and perform a full ETV test to confirm proper ETV operation.

The alarm can be set during the non-running or running phases of the unit engine start routine.

1. During the non-running phase the ETV driver outputs are checked for error conditions (ETV electrical test).

2. During the first phase of the running test, the ETV is nearly closed. The ETV closing is confirmed by a drop in suction pressure.

3. During the second phase of the running test, the ETV is opened. The ETV opening is confirmed by a rise in suction pressure.

How Alarm is Cleared

This alarm is cleared manually. The unit will shut down (if running) and perform a full ETV test to confirm proper ETV operation.

89 CHECK ELECTRONIC THROTTLING VALVE CIRCUIT

Diagnostic Procedure

1. Check the suction and discharge pressures with unit not running, to determine if refrigerant charge appears adequate.

2. Check the electrical operation of electronic throttling valve circuit, using Service Procedure G03A.

3. If the electronic throttling valve appears to function electrically, check the refrigeration system for low refrigerant, a frozen expansion valve, or a severe restriction in the suction side of the system.

90 ELECTRIC OVERLOAD

Alarm Type	Check or Prevent Alarm in Electric Mode Log Alarm in Diesel Mode
Associated Alarm Codes	Alarm Code 84 Restart Null

How Alarm is Set

Alarm conditions are only active when 3∅ power is connected (ER input is high).

1. This alarm will be set during electric mode operation if the Base Controller/Interface Board determines that the electric motor overload relay (EOL) has tripped.

2. If during a Pretrip Test the unit is not configured electric standby and the EOL input is low then Alarm Code 90 Electric Overload is set as a check alarm and Alarm Code 111 Unit Not Configured Correctly is set as a log alarm.

How Alarm is Cleared

This alarm is cleared manually.

Considerations

This alarm becomes a Log alarm if the unit is switched from electric mode to diesel mode.

Diagnostic Procedure

CAUTION: Electric Standby Units utilize 460, 400 or 230 volt, 3 phase AC power. Extreme care must be used when working on the unit, as these voltages are capable of causing serious injury or death.

1. Check the electric motor for current draw. Refer to the motor nameplate for the Full Load Amperage rating (FLA) of the motor.

2. Check the setting of the motor overload relay. It should be 10% greater than full load rating of the motor.

3. Check the EOL-01 circuit for continuity from J6 pin 2 on the Base Controller/Interface Board to the overload relay.

4. Check for continuity between the overload relay terminals 95 and 96. The contacts should be normally closed.

5. Check the CHHV circuit for continuity to chassis ground.

91 CHECK ELECTRIC READY INPUT

Alarm Type	Prevent Alarm in Electric Mode Log Alarm in Diesel Mode
Associated Alarm Codes	Alarm Code 84 Restart Null

How Alarm is Set

This alarm will only be set if the unit is configured for manual switchover from electric to diesel.

1. If electric mode operation is selected and the Base Controller/Interface Board determines that 3∅ standby power is not connected (ER input is low) then set Alarm code 91 as a prevent alarm.

How Alarm is Cleared

This alarm is cleared automatically when one of the two actions occur:

- The unit is auto switched or manually switched to diesel mode operation.
- 3∅ standby power is restored to the unit.

Considerations

This alarm becomes a Log alarm if the unit is switched from electric mode to diesel mode.

Diagnostic Procedure

CAUTION: Electric Standby Units utilize 460, 400 or 230 volt, 3 phase AC power. Extreme care must be used when working on the unit, as these voltages are capable of causing serious injury or death.

1. Check the ER-01 Circuit from the phase detect module for 12 volts to chassis ground when standby power is connected to the unit.

2. Check the 8 circuit at the phase detect module for 12 volts.

3. Check to be sure standby power of the correct voltage is present at L1, L2 and L3 on the phase detect module.

4. Check the ER-01 Circuit for continuity from J6 pin 5 on the Base Controller/Interface Board to the phase detect module.

5. If steps 1-5 above are correct, check the control system, using Service Procedure A01A.

6. If steps 1, 2, 4 or 5 above do not correct the fault, replace the phase detect module.

92 SENSOR GRADES NOT SET

Alarm Type	Check Alarm
Associated Alarm Codes	Alarm Codes 03, 04, 203, and 204 sensor alarm codes for graded sensors Alarm Code 12 Sensor Shutdown

How Alarm is Set

1. If any graded return or discharge sensor is in valid range and the sensor grade is set to grade 5H (default) when the unit power switch is turned on then Alarm Code 92 is set as a log alarm. The offending sensor alarm code (03, 04, 203 or 204) is also set.

How Alarm is Cleared

Clears automatically when the sensor grade is set to other than 5H. The offending sensor alarm code (03, 04, 203 or 204) must be manually cleared in Guarded Access after the sensor grades have been set.

Considerations

The sensor grade must be set using the Sensor Calibration feature in the Guarded Access Menu. If the sensor grade is not properly set the sensor reading will not be accurate. Grade 5H is set as the default grade on factory Base Controller/Interface Board and is used as an indication that the sensor grade has not been set.

Alarm Code 92 Sensor Grades Not Set is not set for spare sensors. However, if used, spare sensors should be calibrated to achieve maximum accuracy.

Diagnostic Procedure

1. Verify actual sensor grades for all graded sensors.

2. Using this information, calibrate the sensors using the Sensor Calibration feature in the Guarded Access Menu. See Service Procedure A15A in Section 6 of this manual for details.

93 LOW COMPRESSOR SUCTION PRESSURE

Alarm Type Prevent or Shutdown Alarm

Considerations

Not implemented - future use.

94 CHECK LOADER #1 CIRCUIT

Alarm Type	Check Alarm (Pre-trip only)
Associated Alarm Codes	Alarm Code 28 Pretrip Abort Alarm Code 111 Unit Not Configured Correctly

How Alarm is Set

The Loader #1 circuit is not currently used. However, the associated output is checked during the Non-running Pretrip Test to be certain nothing has been mistakenly connected to it. The output is energized and then de-energized to insure that no device is connected to the circuit and that the Base Controller/Interface Board is operating properly.

1. If current flow is detected during the output energized phase of the Non-running Pretrip Test then Alarm Code 94 will be set as a check alarm and Alarm Code 111 Unit Not Configured Correctly will be set as a log alarm. The Non-running Pretrip Test will be allowed to complete.

2. If current flow is detected during the output de-energized phase of the Non-running Pretrip Test then Alarm Code 94 will be set as a check alarm, Alarm Code 111 Unit Not Configured Correctly will be set as a log alarm and Alarm Code 28 Pretrip Abort will be set as a shutdown alarm. The Pretrip Test will be aborted.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check unit configuration to confirm proper setting.

2. Check the Base Controller/Interface Board wiring to insure that there is no connection to connector J7, pin 7.

3. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

95 CHECK LOADER #2 CIRCUIT

Alarm Type	Check Alarm (Pre-trip only)
Associated Alarm Codes	Alarm Code 28 Pretrip Abort Alarm Code 111 Unit Not Configured Correctly

How Alarm is Set

The Loader #2 circuit is not currently used. However, the associated output is checked during the Non-running Pretrip Test to be certain nothing has been mistakenly connected to it. The output is energized and then de-energized to insure that no device is connected to the circuit and that the Base Controller/Interface Board is operating properly.

1. If current flow is detected during the output energized phase of the Non-running Pretrip Test then Alarm Code 95 will be set as a check alarm and Alarm Code 111 Unit Not Configured Correctly will be set as a log alarm. The Non-running Pretrip Test will be allowed to complete.

2. If current flow is detected during the output de-energized phase of the Non-running Pretrip Test then Alarm Code 95 will be set as a check alarm, Alarm Code 111 Unit Not Configured Correctly will be set as a log alarm and Alarm Code 28 Pretrip Abort will be set as a shutdown alarm. The Pretrip Test will be aborted.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check unit configuration to confirm proper setting.

2. Check the Base Controller/Interface Board wiring to insure that there is no connection to connector J7, pin 7.

3. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

96 LOW FUEL LEVEL

Alarm Type Check Alarm

Associated Alarm Codes Alarm Code 98 Check Fuel Level Sensor

Considerations

This alarm is enabled only if the unit is configured with a fuel level sensor.

How Alarm is Set

1. If the fuel level indicated by the fuel level sensor falls to 15% of tank capacity then Alarm Code 96 is set as a check alarm.

How Alarm is Cleared

This alarm is cleared automatically when the fuel level exceeds 25% of tank capacity. The alarm will not clear manually until the fuel level is greater than 20%.

Diagnostic Procedure

1. Check fuel tank level and fill as required.

98 CHECK FUEL LEVEL SENSOR

Alarm Type Check Alarm

Associated Alarm Codes Alarm Code 96 Low Fuel Level

Considerations
This alarm is enabled only if the unit is configured with a fuel level sensor.

How Alarm is Set
1. Alarm is set when the fuel level sensor is determined to be out of range.

How Alarm is Cleared
This alarm is cleared manually.

Diagnostic Procedure
1. Check fuel level sensor harness to be sure it is connected and secure.
2. Check fuel level sensor harness for continuity.
3. Replace fuel level sensor.

99 HIGH COMPRESSOR PRESSURE RATIO

Alarm Type Prevent Alarm

Considerations
Not implemented - future use.

108 DOOR OPEN TIMEOUT

Alarm Type Check Alarm

Associated Alarm Codes

Considerations

Changes in the door switch state are not recognized for 4 seconds. This is to prevent rapid unit operation changes if the door is ajar or the door switch is defective.

The unit will be restarted after the off timer expires.

How Alarm is Set

The following conditions must be met:

- The optional door switch must be installed.
- The unit must programmed to force the unit off on door opening.
- A maximum door open time must be programmed.

1. When door open timer expires, the unit will restart if allowed and resume operation even if the door is still open. Alarm Code 108 is set as a check alarm.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Download the ServiceWatch data logger and inspect the information to determine if the door switch is defective or if the door was left open for an extended period of time during loading or unloading of the trailer.

2. Check the operation of the door switches.

111 UNIT NOT CONFIGURED CORRECTLY

Alarm Type	Log Alarm

Associated Alarm Codes	Alarm Code 02 Check Evaporator Coil Sensor Alarm Code 03 Check (Control) Return Air Sensor Alarm Code 04 Check (Control) Discharge Air Sensor Alarm Code 29 Check Defrost Damper Circuit Alarm Code 30 Defrost Damper Stuck Alarm Code 45 Check Hot Gas or Hot Gas Bypass Circuit Alarm Code 67 Check Liquid Line Solenoid Circuit Alarm Code 90 Electric Overload Alarm Code 94 Check Loader #1 Circuit Alarm Code 95 Check Loader #2 Circuit Alarm Code 110 Check Suction Line Solenoid Circuit Alarm Code 113 Check Electric Heat Circuit Alarm Code 121 Check PWM Liquid Injection Circuit Alarm Code 122 Check Diesel/Electric Circuit Alarm Code 137 Check Damper Gear Motor Heater Alarm Code 143 Check Drain Hose Heater Output

How Alarm is Set

1. If a mismatch exists between the unit hardware configuration and the unit hardware as detected by the Base Controller/Interface Board then Alarm Code 111 is set as a log alarm.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

1. Verify actual unit configuration.

2. Set the unit configuration using the Unit Configuration sub-menu of the Programming Menu, as shown in Service Procedure A04A.

113 CHECK ELECTRIC HEAT CIRCUIT

Alarm Type	Check or Shutdown Alarm (Pretrip test only)
Associated Alarm Codes	Alarm Code 28 Pretrip Abort.

How Alarm is Set

This alarm is set if the measured shunt current is incorrect during a non-running pre-trip test. Current is measured with the output on and off.

1. The alarm is set as a Check alarm if the current is not within specifications when the solenoid is energized.
2. The alarm is set as a Shutdown alarm if the current does not return to 0 when the device is de-energized.
3. The alarm is set as a Shutdown alarm if the unit is not configured as a Model 50 unit and the current flow is within specifications when the solenoid is energized.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check for battery voltage at the 7E wire on the heater contactor.
2. Check the heater contactor coil for continuity.
3. Verify actual unit configuration.

114 MULTIPLE ALARMS – CAN NOT RUN

Alarm Type Shutdown Alarm

Associated Alarm Codes Associated alarm indicating the cause of shutdown.

How Alarm is Set

1. If both pressure transducers are failed and Alarm Code 03/203 Check Return Air Sensor or Alarm Code 04/204 Check Discharge Air Sensor is set then Alarm Code 114 is set as a shutdown alarm.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Proceed as indicated for associated alarm codes.

115 CHECK HIGH PRESSURE CUT OUT SWITCH

Alarm Type Check Alarm

Considerations

Not implemented - future use.

116 CHECK HIGH PRESSURE CUT IN SWITCH

Alarm Type Log Alarm

Considerations

Not implemented - future use.

117 AUTO SWITCH FROM DIESEL TO ELECTRIC

Alarm Type Log or Shutdown Alarm

Associated Alarm Codes Alarm Code 118 Auto Switch from electric to diesel

How Alarm is Set

1. If the unit is switched from diesel operation to electric operation during a Pretrip Test then set Alarm code 117 as a log alarm. The Pretrip Test will be restarted from the beginning in Electric Mode.

2. If the unit is switched from diesel operation to electric operation during a non-running Service Test Mode operation then set Alarm code 117 as a shutdown alarm.

3. If the unit is switched from diesel operation to electric operation during normal operation this alarm is set as a log alarm for information only.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Information only. No action is required.

118 AUTO SWITCH FROM ELECTRIC TO DIESEL

Alarm Type	Log or Shutdown Alarm
Associated Alarm Codes	Alarm Code 117 Auto Switch from diesel to electric

How Alarm is Set

1. If the unit is switched from electric operation to diesel operation during a Pretrip Test then set Alarm code 118 as a log alarm. The Pretrip Test will be restarted from the beginning in Diesel Mode.

2. If the unit is switched from electric operation to diesel operation during a non-running Service Test Mode operation then set Alarm code 118 as a shutdown alarm.

3. If the unit is switched from electric operation to diesel operation during normal operation this alarm is set as a log alarm for information only.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Information only. No action is required.

120 CHECK ALTERNATOR EXCITE CIRCUIT

Alarm Type Check or Shutdown Alarm

Associated Alarm Codes

Considerations

The alternator excite input is energized when the engine starts to supply excitation voltage to the alternator.

Circuit Description

The Alternator Excite circuit is a single wire circuit. The EXC wire connects the Base Controller/Interface Board connector J7 pin 33 to the alternator excite terminal. The wire is routed in the Main Harness. A Smart FET on the Base Controller/Interface Board supplies power to the EXC circuit. LED 18 is turned on when the alternator excite output is energized.

How Alarm is Set

1. If during normal operation the current is not within specifications 3 seconds after the alternator excite output is energized then Alarm Code 120 is set as a check alarm and the output is turned off. Alternator excite operation is not allowed until Alarm Code 120 is cleared. The unit will continue to run but with reduced performance until the condition is corrected and the alarm is cleared.

2. If during normal operation the current does not return to less than 0.5 amps 3 seconds after the alternator excite output is de-energized then Alarm Code 120 is set as a check alarm. Alternator excite operation is not allowed until Alarm Code 120 is cleared. The unit will continue to run but with reduced performance until the condition is corrected and the alarm is cleared.

3. If during a Pretrip Test the current is not within specifications when the alternator excite output is energized then Alarm Code 120 is set as a check alarm.

4. If during a Pretrip Test the current does not return to less than 0.5 amps when de-energized then Alarm Code 120 is set as a shutdown alarm.

How Alarm is Cleared

This alarm is cleared manually.

120 CHECK ALTERNATOR EXCITE CIRCUIT

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the operation of the alternator excite circuit using Interface Board Test Mode. Be sure the alternator excite circuit LED lights. If the alternator excite circuit LED 18 lights then go to Step 2. If the alternator excite circuit LED 18 does not light then go to Step 3.

2. If the alternator excite circuit LED 18 does light then check for 12 Vdc at the alternator excite terminal. If 12 Vdc is not present check for a short circuit, open circuit or loose connection.

3. If the alternator excite circuit LED 18 does not light then check the circuit with an accurate ohmmeter for a short circuit, open circuit or loose connection.

4. Disconnect the EXC wire at the alternator and check for 12 Vdc when the engine is running. If 12 VDC is not present check the EXC circuit for continuity.

5. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

121 CHECK PWM/LIQUID INJECTION CIRCUIT

Alarm Type	Log or Shutdown Alarm (Pretrip only)
Associated Alarm Codes	Alarm Code 111 Unit Not Configured Correctly

How Alarm is Set

The PWM/Liquid Injection Circuit is not currently used. However, the associated output is checked during the Non-running Pretrip Test to be certain nothing has been mistakenly connected to it. The output is energized and then de-energized to insure that no device is connected to the circuit and that the Base Controller/Interface Board is operating properly.

1. If the unit is not configured as a screw compressor or scroll compressor and current flow is detected when the output is energized then Alarm Code 121 is set as a log alarm and Alarm Code 111 Unit Not Configured Correctly is also set as a log alarm.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

1. Check unit configuration to confirm proper setting.
2. Check the Base Controller/Interface Board wiring to insure that there is no connection to connector J7, pin 10.
3. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

122 CHECK DIESEL/ELECTRIC CIRCUIT

Alarm Type Check or Shutdown Alarm (Pretrip test only)

Associated Alarm Codes

Circuit Description

The Diesel/Electric circuit is energized by the Diesel/Electric Relay K5 on the Base Controller/Interface Board. The 7E wire supplies 12 VDC the Phase Select Module to energize the appropriate Standby Motor contactor.

How Alarm is Set

1. If during a Pretrip Test the unit is configured with Diesel/Electric Relay and current is not greater than 0.5 amps when the circuit is energized then Alarm Code 122 is set as a check alarm.

2. If during a Pretrip Test the zone is configured with Diesel/Electric Relay and current does not return to less than 0.5 amps of run relay reference when de-energized then Alarm Code 122 is set as a shutdown alarm.

IMPORTANT ADDITIONAL CONSIDERATIONS: The following is true on all units, even if Electric Standby is not present.

When the Diesel/Electric Relay is energized during a Pretrip Test, the Fuel Solenoid is de-energized. When this occurs, the current flow measured by the shunt should decrease to indicate that the Fuel Solenoid is actually de-energized. If the current flow does not decrease, the Fuel Solenoid was not de-energized and Alarm Code 122 Check Diesel/Electric Circuit is set. This is normal operation.

If the current flow decreases by less than 0.75 amps when the Fuel Solenoid is de-energized, then the Fuel Solenoid is presumed to be de-energized and the Pretrip Test continues.

However, if the current flow decreases by more than 0.75 Amps when the Fuel Solenoid is de-energized, Alarm Code 122 Check Diesel/Electric Circuit is also set. This indicates that the Fuel Solenoid is drawing excessive current. Alarm Code 35 Check Run Relay Circuit is not set under these conditions.

How Alarm is Cleared

This alarm is cleared manually.

122 CHECK DIESEL/ELECTRIC CIRCUIT

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the operation of the Diesel/Electric relay using Interface Board Test Mode in the Maintenance Menu. Be sure the Diesel/Electric LED 7 lights.

2. Use the HMI control panel amps gauge to check the current drawn by the Diesel/Electric relay while operating the Diesel/Electric relay with Interface Board Test Mode. The current draw should be between 0.1 to 2 amps.

3. If Alarm Code 122 Check Diesel/Electric Circuit is set, check the current draw of the Fuel Solenoid using Interface Board Test Mode. If the current draw for the Fuel Solenoid decreases by more than 0.75 amps during the Diesel/Electric Relay Test, the Fuel Solenoid should be replaced.

Note: A replacement fuel solenoid can be plugged in but not physically installed and a Pretrip Test run to confirm the original fuel solenoid is the source of the problem.

IMPORTANT: Do not replace the Base Controller or Interface Board without first confirming that Alarm Code 122 Check Diesel/Electric Circuit was not set by the Fuel Solenoid drawing current in excess of 0.75 amps.

127 SETPOINT NOT ENTERED

Alarm Type Check Alarm

Associated Alarm Codes

How Alarm is Set

1. If the setpoint was changed but the change was not confirmed by pressing the YES key then Alarm Code 127 Setpoint Not Entered is set as a check alarm. The setpoint has not been changed and has returned to the original setting.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Information only. Be sure setpoint is adjusted properly.

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130 ELECTRIC RUN TIME MAINTENANCE REMINDER #1	**Page 1 of 1**
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134 CONTROLLER POWER ON HOURS	**Page 1 of 1**

Alarm Type Log Alarm

Associated Alarm Codes

Considerations

The programmable hourmeter alarms can be cleared from the Guarded Access Menu only.

How Alarm is Set

1. If one of the hourmeters above has exceeded the programmed time limit then the appropriate alarm code is set as a log alarm.

How Alarm is Cleared

This alarm is cleared from the Guarded Access Menu only.

Diagnostic Procedure

1. Perform required maintenance, as dictated by owner requirements.
2. Reset the hourmeter limit after completion using the Hourmeter menu. See Section 4 for details.

135 CHECK SPARE DIGITAL INPUTS

Alarm Type Check Alarm (Pretrip Only)

Associated Alarm Codes

How Alarm is Set
The Pretrip test indicates that a connection has been made to a spare digital input and should not have been.

How Alarm is Cleared
This alarm is cleared manually.

Diagnostic Procedure
Correct the wiring error.

136 CHECK SPARE DIGITAL OUTPUTS

Alarm Type Check Alarm (Pretrip Only)

Associated Alarm Codes

How Alarm is Set
The Pretrip test indicates that a connection has been made to a spare digital output and should not have been.

How Alarm is Cleared
This alarm is cleared manually.

Diagnostic Procedure
Correct the wiring error.

137 CHECK DAMPER MOTOR HEATER OUTPUT

Alarm Type Check Alarm

Associated Alarm Codes Alarm Code 30 Defrost Damper Stuck

Component Description and Location

Circuit Description

On units equipped with a damper gear motor, the damper solenoid output is used to control the motor heater.

How Alarm is Set

1. Alarm is set if the measured shunt current is incorrect during non running pre-trip. Current is measured with the output on and off.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. If the unit is mis-configured Alarm Code 137 may occur instead of Alarm Code 29 Check Defrost Damper Circuit.

141 AUTO-SWITCH DIESEL TO ELECTRIC DISABLED

Alarm Type Check Alarm

Considerations

When this alarm is set the unit will remain in Diesel Mode operation even when connected to a fully functional electric standby power system.

How Alarm is Set

1. If the Autoswitch Diesel to Electric feature is set yes and the unit switches to Electric Mode operation and an Electric Mode shutdown alarm is already set, then Alarm Code 141 Auto-switch Diesel to Electric is set as a check alarm.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

1. Check for associated alarms and repair as required.

145 LOSS OF CONTROLLER "ON" FEEDBACK SIGNAL

Alarm Type Log Alarm

Circuit Description

The Base Controller/Interface Board "On" feedback signal is supplied by 8X power flowing through fuse F7 (2A) to pin 6 on the CAN connectors J12, J13 and J14. The power on pin 6 of CAN connector J14 flows to the HMI Control Panel pin 6. The presence of power at pin 6 of the HMI Control Panel indicates that power is present on the 8X circuits.

Active CAN communications indicate the K9 On/Off Relay is energized and the Base Controller/Interface Board is running. If CAN communications are active but power is not present at pin 6 of the HMI Control Panel then there is a problem with the 8XP or 8X circuit(s).

How Alarm is Set

1. If communications have been established between the Base Controller/Interface Board and a CAN connected device such as the HMI Control Panel or an iBox and the device feedback input is low for 3 seconds then set Alarm Code 145 Loss of Controller "ON" Feedback Signal as a log alarm.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

1. Verify that fuse F7 is not blown. If fuse F7 is blown, check the 8XP circuit for shorts. This circuit supplies power to pin 6 of all of the CAN communication ports (J12, J13 and J14) on the Base Controller/Interface Board. If necessary, check for shorts at any devices connected to any of the CAN ports.

2. Check for power at pin 6 of the HMI Control Panel. If power is not present, check for an open in the 8XP circuit from fuse F7 to pin 6 of the CAN communication ports.

146 SOFTWARE VERSION MISMATCH

Alarm Type Shutdown Alarm

Associated Alarm Codes Alarm Code 111 Unit Not Configured Correctly

How Alarm is Set

If single temperature software is detected in a unit with a Multi-Temperature Expansion Module connected then set Alarm Code 146 Software Version Mismatch as a shutdown alarm. Alarm Code 111 Unit Not Configured Correctly will also be set as a log alarm.

How Alarm is Cleared

This alarm is cleared manually. The alarm will also clear automatically if the correct version of Base Controller/Interface Board software is flash loaded.

Diagnostic Procedure

Flash load the correct software for the application.

148 AUTO-SWITCH ELECTRIC TO DIESEL DISABLED

Alarm Type Check Alarm

Considerations

When this alarm is set the unit will remain in Electric Mode operation.

How Alarm is Set

1. If the Autoswitch Electric to Diesel feature is set yes and the unit switches to Diesel Mode operation and an Diesel Mode shutdown alarm is already set, then set Alarm Code 141 Auto-switch Electric to Diesel as a check alarm.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

1. Check for associated alarms and repair as required.

149 ALARM NOT IDENTIFIED

Alarm Type Check

Considerations

IMPORTANT: This alarm, if present does not affect unit operation. It is an information only alarm.

If set, this alarm code may not appear in either the CargoWatch or ServiceWatch Data Loggers.

How Alarm is Set

If an alarm in the alarm queue cannot be identified then Alarm Code 149 Alarm Not Identified is set as a Check alarm.

How Alarm is Cleared

This alarm is cleared manually. This alarm may not be able to be cleared from the Main or Guarded Access Menu. If Alarm Code 149 cannot be cleared a Cold Start may be required to allow the alarm to be cleared.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check and correct other existing alarms.

2. If Alarm Code 149 Alarm Not Identified is set, perform a Base Controller Cold Start as shown by Service Procedure A07A. Be sure to record programmable settings before performing the Cold Start and re-program all settings after the Cold Start is completed. Clear all alarm codes.

3. If Alarm Code 149 Alarm Not Identified is still set, it may not be possible to clear it. Should this be the case, consult the Minneapolis Service Department for instructions on how to proceed.

150 OUT OF RANGE LOW

Alarm Type Log Alarm

Considerations

The CargoWatch temperatures and times that will cause an alarm to be set are user programmable. These CargoWatch Data Logger features are configured as required for the particular customer applications. See the Sensor Configuration Menu – CargoWatch Data Logger in Section 3 of this manual for details.

This alarm is only logged in the CargoWatch Data Logger.

Be sure the CargoWatch Data Logger is downloaded before installing HMI Control Panel software, as the HMI Control Panel Cold Start will erase any existing data in the CargoWatch Logger.

How Alarm is Set

1. If the temperature falls below the user programmed temperature for the user programmed time interval then Alarm Code 150 Out of Range Low is set as a log alarm.

2. If a CargoWatch sensor is open or shorted then Alarm Code 150 Out of Range Low is set as a log alarm.

3. If Out of Range Checking is turned On and no CargoWatch sensors are connected then Alarm Code 150 Out of Range Low is set as a log alarm.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the CargoWatch data logger using Wintrac. Review the data to determine the conditions at the time the alarm was set. Additional data may be accessed by reviewing the ServiceWatch data logger download. This data can be very helpful in determining the cause of the alarm.

1. Determine the cause of low CargoWatch sensor temperature and correct as necessary.

2. If no CargoWatch sensors are connected and the Out of Range feature is turned On, perform an HMI Control Panel Cold Start using Wintrac. The Cold Start will set the Out of Range Checking to Off. Be sure the CargoWatch Data Logger is downloaded before installing HMI Control Panel software, as the HMI Control Panel Cold Start will erase any existing data in the CargoWatch Data Logger.

IMPORTANT: Do not attempt a cold start using the Base Controller/Interface Board jumpers or with the download cable connected to the ServiceWatch port as this will restart the SR-3 Base Controller/Interface Board, not the HMI Control Panel.

151 OUT OF RANGE HIGH

Alarm Type Log Alarm

Considerations

The CargoWatch temperatures and times that will cause an alarm to be set are user programmable. These CargoWatch Data Logger features are configured as required for the particular customer applications. See the Sensor Configuration Menu – CargoWatch Data Logger in Section 3 of this manual for details.

This alarm is only logged in the CargoWatch Data Logger.

Be sure the CargoWatch Data Logger is downloaded before installing HMI Control Panel software, as the HMI Control Panel Cold Start will erase any existing data in the CargoWatch Logger.

How Alarm is Set

1. If the temperature falls above the user programmed temperature for the user programmed time interval then Alarm Code 150 Out of Range High is set as a log alarm.

2. If a CargoWatch sensor is open or shorted then Alarm Code 150 Out of Range High is set as a log alarm.

3. If Out of Range Checking is turned On and no CargoWatch sensors are connected then Alarm Code 150 Out of Range High is set as a log alarm.

How Alarm is Cleared

This alarm is cleared manually.

Diagnostic Procedure

Download the CargoWatch data logger using Wintrac. Review the data to determine the conditions at the time the alarm was set. Additional data may be accessed by reviewing the ServiceWatch data logger download. This data can be very helpful in determining the cause of the alarm.

1. Determine the cause of low CargoWatch sensor temperature and correct as necessary.

2. If no CargoWatch sensors are connected and the Out of Range feature is turned On, perform an HMI Control Panel Cold Start using Wintrac. The Cold Start will set the Out of Range Checking to Off. Be sure the CargoWatch Data Logger is downloaded before installing HMI Control Panel software, as the HMI Control Panel Cold Start will erase any existing data in the CargoWatch Data Logger.

IMPORTANT: Do not attempt a cold start using the Base Controller/Interface Board jumpers or with the download cable connected to the ServiceWatch port as this will restart the SR-3 Base Controller/Interface Board, not the HMI Control Panel.

157 OPTISET FILE MISMATCH

Alarm Type Check Alarm

Associated Alarm Codes

Considerations

How Alarm is Set

Alarm Code 157 OptiSet Plus Profile Mismatch indicates that a problem exists with the OptiSet Plus Temperature Profiles.

Alarm Code 157 will be set as a check alarm on power-up if the OptiSet configuration in the Base Controller does not match the configuration held in the HMI Control Panel. This alarm condition usually occurs if the Base Controller is Cold Started or replaced.

If OptiSet Plus with Named Products is in use and the Base Controller is Cold Started or replaced with a new Base Controller, the Named Temperature Profiles are deleted by the Cold Start or do not exist in the replacement Base Controller but still exist in the HMI Control Panel. The following conditions will be present:

1. Alarm Code 157 OptiSet Plus Profile Mismatch will be set.
2. Alarm Code 157 may be able to be cleared manually but will re-occur when the unit is powered off and back on.
3. The OptiSet Plus Reset selection in Guarded Access Menu may not be available. An OptiSet Plus Reset can still be performed using Wintrac.

If the number of profiles held in the SR-3 Base Controller/Interface Board memory does not match the number of profiles expected by WinTrac, then Alarm Code 157 OptiSet File Mismatch is set as a Check Alarm.

If the OptiSet Configuration held in the SR-3 Base Controller/Interface Board does not match the OptiSet Configuration held in the HMI Control Panel when the unit is powered up, then Alarm Code 157 OptiSet File Mismatch is set as a Check Alarm.

How Alarm is Cleared

This alarm is cleared manually.

157 OPTISET FILE MISMATCH

Diagnostic Procedure

1. **OptiSet Plus File is Available:** If the correct OptiSet Plus File is available, sending the OptiSet Plus File to the ServiceWatch Data Logger will transfer the correct Temperature Profiles to both the Base Controller and the HMI Control Panel.

   The OptiSet Plus Temperature Profiles in the Base Controller and HMI Control Panel now match. Alarm Code 157 can be cleared manually.

2. **OptiSet Plus File is Not Available:** Sending an OptiSet Plus Reset using Wintrac will reset both the Base Controller and the HMI Control Panel to OptiSet defaults. All OptiSet Plus Temperature Profiles will be cleared from both the Base Controller and HMI Control Panel – OptiSet Plus will be set to factory defaults with Numeric Settings only.

   Important: The OptiSet Plus Reset selection in Guarded Access Menu may not be available. An OptiSet Plus Reset can still be performed using Wintrac.

   Important: The Wintrac OptiSet Plus Reset will occur deceivingly fast and is not reported as successful by Wintrac. However, the OptiSet Plus Reset will be performed.

   There are no OptiSet Plus Temperature Profiles in either the Base Controller or HMI Control Panel. Alarm Code 157 can be cleared manually.

3. **Alternative Action if OptiSet Plus File is Not Available:** Perform an HMI Control Panel Cold Start as shown by Service Procedure A07B. The HMI Control Panel will be reset to defaults and all OptiSet Plus Temperature Profiles will be cleared from the HMI. OptiSet Plus will be set to factory defaults with Numeric Settings only.

   Important: The CargoWatch Data Logger will also be cleared. Be sure to download the CargoWatch Data Logger before performing a Cold Start.

   There are no OptiSet Plus Temperature Profiles in the Base Controller or HMI Control Panel. Alarm Code 157 can be cleared manually.

4. **Allow Alarm Code 157 to remain set:** Alarm Code 157 OptiSet Plus Profile Mismatch can be left set temporarily, but then only Numeric Setpoints will be available.

157 - A NUMBERS IN LIEU OF NAMED PRODUCTS

Alarm Type NONE - No alarm code is set

Condition

A Long String of Numbers is Present In Lieu of Named Products but Alarm Code 157 Is Not Present.

What Causes Condition

If OptiSet Plus with Named Products is in use and the HMI Control Panel is Cold Started or replaced with a new HMI Control Panel, the Named Temperature Profiles are deleted by the Cold Start or do not exist in the replacement HMI Control Panel but still exist in the Base Controller. The following conditions will exist:

1. A long string of numbers will be shown in place of Named Product names.

2. The OptiSet Plus Reset can be performed using either the Guarded Access Menu or Wintrac.

Corrective Action

1. **OptiSet Plus File is Available:** If the correct OptiSet Plus File is available, sending the OptiSet Plus File to the ServiceWatch Data Logger will transfer the correct Temperature Profiles to both the Base Controller and the HMI Control Panel.

   The OptiSet Plus Temperature Profiles in the Base Controller and HMI Control Panel now match. The Named Profiles will now be present in lieu of the long strings of numbers.

2. **OptiSet Plus File is Not Available:** Sending an OptiSet Plus Reset using the Guarded Access Menu or Wintrac will reset both the Base Controller and the HMI Control Panel to OptiSet defaults. All OptiSet Plus Temperature Profiles will be cleared from both the Base Controller and HMI Control Panel – OptiSet Plus will be set to factory defaults with Numeric Settings only.

   Important: The Wintrac OptiSet Plus Reset will occur deceivingly fast and is not reported as successful by Wintrac. However, the OptiSet Plus Reset will be performed.

   There are no OptiSet Plus Temperature Profiles in either the Base Controller or HMI Control Panel.

3. **Alternative Action if OptiSet Plus File is Not Available:** Perform a Base Controller Cold Start as shown by Service Procedure A07A. The Base Controller will be reset to defaults. Be sure to record programmable settings before performing the Cold Start and re-program all settings after the Cold Start is completed. Clear all alarm codes. All OptiSet Plus Temperature Profiles will be cleared – OptiSet Plus will be set to factory defaults with Numeric Settings only.

   Important: All Guarded Access Programmable Feature settings will be cleared and set to factory defaults. Be sure to record all Guarded Access settings before performing the Cold Start. All Guarded Access Settings must be set to the recorded values or customer specifications before releasing the unit for service.

   There are no OptiSet Plus Temperature Profiles in either the Base Controller or HMI Control Panel.

158 SOFTWARE FAILED TO LOAD

Alarm Type Check Alarm

Associated Alarm Codes

Considerations

Base Controller Software flash loads via WinTrac, USB Flash Drive or other methods are all performed and checked in the same manner.

How Alarm is Set

When new software is being flash loaded to a Base Controller, the current revision software is held intact until the new revision software is installed and verified. If the flash load is unsuccessful, the Base Controller will continue to operate with the current revision software and Alarm Code 158 Software Failed to Load will be set as a check alarm.

How Alarm is Cleared

This alarm is cleared automatically when the new software is successfully flash loaded. The alarm can be cleared manually, but will return when the unit power is switched off and back on.

Diagnostic Procedure

Retry the flash load procedure.

203 CHECK DISPLAY RETURN AIR SENSOR

Alarm Type	Check Alarm (Shutdown Alarm during a Pretrip Test).
Associated Alarm Codes	Alarm Code 11 Unit Controlling on Alternate Sensor Alarm Code 13 Sensor Check Alarm Code 92 Sensor Grades Not Set Alarm Code 03 Check (Control) Return Air Sensor

Component Description and Location

This sensor is one of a pair of return air sensors. Both return air sensors must agree within specified limits. The sensor associated with Alarm Code 203 Check Display Return Air Sensor is used to display the temperature. The sensor is located next to the control return air sensor in the return air stream. The harness wires to this sensor are marked with two yellow cables tie near the sensor connection. It is a graded sensor.

A brass clamp should be installed between the two return air sensors. This clamp increases the thermal coupling between the sensors to provide more accurate temperature readings when the temperature is changing rapidly. Rapid temperature changes may occur during pulldown or when the door has been opened. This clamp is not required on the discharge air sensors.

Circuit Description

The display return air temperature sensor circuit is a two wire circuit. The RTRP-01 (+) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 pin 21 to the blue sensor wire. The RTRN-01 (-) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 pin 32 to the brown sensor wire. The sensor wires are routed in the Sensor Harness. The harness wires to this sensor are marked with two yellow cables tie near the sensor connection. The sensor is hard wired to the sensor harness.

Considerations

1. If the unit is controlling on return air temperature and a problem occurs with either return air sensor, the unit will switch to Discharge Air Control and Alarm Code 11 Unit Controlling on Alternate Sensor will be set. The appropriate sensor alarm codes will also be set.

2. Sensor codes must be cleared from the Guarded Access Menu before Alarm Code 11 Unit Controlling on Alternate Sensor can be cleared.

3. Sensor grades must be correctly set to the actual grade of the sensor installed. Failure to do so may result in nuisance sensor alarm codes.

4. Sensors should be positioned to minimize the potential for moisture entry where the wires enter the sensor shell. Mount sensors with the barrel up and the wires down wherever possible.

5. See Alarm Code 13 for an explanation of “Soft Failures” and “Hard Failures”.

203 CHECK DISPLAY RETURN AIR SENSOR

How Alarm is Set

1. If the sensor reading is over 200°F (93°C) for 10 seconds then Alarm Code 203 is set as a check alarm. The sensor reading will display dashes [- - -] and may return to normal. This condition is termed a "hard" sensor failure.

2. If the sensor reading is under -50°F (-46°C) for 10 seconds then Alarm Code 203 is set as a check alarm. The sensor reading will display dashes [- - -] may return to normal. This condition is termed a "hard" sensor failure.

3. If the differential between the return air temperature and other temperature sensors is too large when Alarm Code 03 is cleared then Alarm Code 203 and Alarm Code 13 Sensor Calibration Check are set as check alarms. This condition is termed a "soft" sensor failure.

4. If the sensor reading is erratic over time but does not go above 200°F (93°C) or below -50°F (-46°C) then Alarm Code 203 and Alarm Code 13 Sensor Calibration Check are set as check alarms. This condition is termed a "soft" sensor failure.

5. If the sensor grade for this sensor is set to 5H then Alarm Code 203 and Alarm Code 92 Sensor Grades Not Set are set as check alarms.

6. The temperatures of the control return air sensor and display return air sensor twins are not within a specified range. If the faulty sensor can be determined, only the alarm code for that sensor and Alarm Code 13 Sensor Check will be set. Alarm Codes 03 Check (Control) Return Air Sensor, 203 Check Display Return Air Sensor, and 13 Sensor Check are set if the faulty sensor cannot be determined.

How Alarm is Cleared

This alarm can only be cleared manually from the Guarded Access menu.

When the alarm is cleared the return air sensors, discharge air sensors and evaporator coil sensor must all read within 30°F (17°C) of each other. If they do not, it is assumed that the sensor reading is not accurate. The alarm code is not cleared and Alarm Code 13 Sensor Calibration Check will also be set. Also, if the sensor is over or under range when the alarm clear is attempted, the alarm will not be cleared.

If the alarm is set by Condition #5 above, Alarm Code 92 will clear automatically if the sensor grade is changed from 5H. If the sensor grade remains 5H, Alarm Code 92 can not be cleared.

Programmable Features

This is a graded sensor. The sensor grade must be correctly set in the Guarded Access Menu.

203 CHECK DISPLAY RETURN AIR SENSOR

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

Alarm Code 203 (Sensor was out of range)

1. Display the sensor reading using the Sensor Menu. If the display shows [----], the sensor is defective and should be replaced. If the condition still exists, check the sensor circuit for an open wire or short to ground. See Service Procedure D01A. Check the Base Controller/Interface Board using Service Procedure A01A.

2. If the display is normal proceed as shown below.

Alarm Code 203 and Alarm Code 13 (Sensor drifted or was reading erratically)

1. Review the ServiceWatch data logger and check the senor reading at the time the alarm was set. Also, review the history to see if previous alarm codes exist that would indicate an intermittent problem. If the sensor appears to have read incorrectly, it should be replaced.

2. Be sure the sensor grades are set to the actual sensor grade.

3. Check for an airflow obstruction and correct sensor mounting.

4. If the problem reoccurs, check the sensor connector as shown in Service Procedure D01A.

5. Check the sensor circuit, as shown by Service Procedure D01A.

Alarm Code 203 and Alarm Code 92 (Sensor grade set to 5H)

1. Verify and set the sensor grade.

Alarm Code 03 and/or Alarm Code 203 are set with Alarm Code 13 (Dual sensors don't agree)

1. Review the ServiceWatch data logger and check the sensor readings at the time the alarm was set. Also, review the history to see if previous alarm codes exist that would indicate the problem sensor. If a sensor appears to have read incorrectly, it should be replaced.

2. Check for an airflow obstruction and correct sensor mounting. Be sure the brass clamp is installed on the two return air sensors.

3. Be sure the sensor grades are set to the actual sensor grade, and are not transposed.

4. If the offending sensor cannot be determined, either ice bath both return air sensors simultaneously to determine which sensor is inaccurate or replace both sensors.

If all or many of the Sensor Alarm Codes (02, 03, 04, 05, 06, 11, 12, 203 and 204) are set

1. Be sure the 35 pin Base Controller/Interface Board sensor connector J3 is connected securely.

2. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

204 CHECK DISPLAY DISCHARGE AIR SENSOR

Alarm Type	Check Alarm (Shutdown Alarm during a Pretrip Test).
Associated Alarm Codes	Alarm Code 11 Unit Controlling on Alternate Sensor Alarm Code 13 Sensor Check Alarm Code 92 Sensor Grades Not Set Alarm Code 04 Check (Control) Return Air Sensor

Component Description and Location

This sensor is one of a pair of dual discharge air sensors. Both discharge air sensors must agree within specified limits. The sensor associated with Alarm Code 204 Check Display Discharge Air Sensor is used to display the temperature. The sensor is located next to the display discharge air sensor in the discharge air stream. The harness wires to this sensor are marked with two red cable ties near the sensor connection. It is a graded sensor.

Circuit Description

The discharge air temperature sensor circuit is a two wire circuit. The DTRP-01 (+) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 pin 21 to the blue sensor wire. The DTRN-01 (-) wire connects the Base Controller/Interface Board 35 pin sensor connector J3 pin 33 to the brown sensor wire. The sensor wires are routed in the Sensor Harness. The harness wires to this sensor are marked with two red cables tie near the sensor connection. The sensor is hard wired to the sensor harness.

Considerations

1. If the unit is controlling on discharge air temperature, and a problem occurs with either discharge air sensor, the unit will switch to Return Air Control and Alarm Code 11 Unit Controlling on Alternate Sensor will be set. The appropriate sensor alarm codes will also be set.

2. Sensor codes must be cleared from the Guarded Access Menu before Alarm Code 11 Unit Controlling on Alternate Sensor can be cleared.

3. Sensor grades must be correctly set to the actual grade of the sensor installed. Failure to do so may result in nuisance sensor alarm codes.

4. Sensors should be positioned to minimize the potential for moisture entry where the wires enter the sensor shell. Mount sensors with the barrel up and the wires down wherever possible.

5. See Alarm Code 13 for an explanation of “Soft Failures” and “Hard Failures”.

204 CHECK DISPLAY DISCHARGE AIR SENSOR

How Alarm is Set

1. If the sensor reading is over 200°F (93°C) for 10 seconds then Alarm Code 204 is set as a check alarm. The sensor reading will display dashes [- - -] and may return to normal. This condition is termed a "hard" sensor failure.

2. If the sensor reading is under -50°F (-46°C) for 10 seconds then Alarm Code 204 is set as a check alarm. The sensor reading will display dashes [- - -] may return to normal. This condition is termed a "hard" sensor failure.

3. If the differential between the discharge and other sensors is too large when Alarm Code 04 is cleared then Alarm Code 204 and Alarm Code 13 Sensor Calibration Check are set as check alarms. This condition is termed a "soft" sensor failure.

4. If the sensor reading is erratic over time but does not go above 200°F (93°C) or below -50°F (-46°C) then Alarm Code 204 and Alarm Code 13 Sensor Calibration Check are set as check alarms. This condition is termed a "soft" sensor failure.

5. If the sensor grade for this sensor is set to 5H then both Alarm Code 204 and Alarm Code 92 Sensor Grades Not Set are set as check alarms.

6. The temperatures of the control discharge air sensor and display discharge air sensor twins are not within a specified range. If the faulty sensor can be determined, only the alarm code for that sensor and Alarm Code 13 Sensor Check will be set. Alarm Codes 04 Check (Control) Discharge Air Sensor, 204 Check Display Discharge Air Sensor, and 13 Sensor Check are set if the faulty sensor cannot be determined.

How Alarm is Cleared

This alarm can only be cleared manually from the Guarded Access menu.

When the alarm is cleared the return air sensors, discharge air sensors and evaporator coil sensor must all read within 30°F (17°C) of each other. If they do not, it is assumed that the sensor reading is not accurate. The alarm code is not cleared and Alarm Code 13 Sensor Calibration Check will also be set. Also, if the sensor is over or under range when the alarm clear is attempted, the alarm will not be cleared.

If the alarm is set by Condition #5 above, Alarm Code 92 will clear automatically if the sensor grade is changed from 5H. If the sensor grade remains 5H, Alarm Code 92 can not be cleared.

Programmable Settings

This is a graded sensor. The sensor grade must be correctly set in the Guarded Access Menu.

204 CHECK DISPLAY DISCHARGE AIR SENSOR

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

Alarm Code 204 (Sensor was out of range)

1. Display the sensor reading using the Sensor Menu. If the display shows [----], the sensor is defective and should be replaced. If the condition still exists, check the sensor circuit for an open wire or short to ground. See Service Procedure D01A. Check the Base Controller/Interface Board using Service Procedure A01A.

2. If the display is normal proceed as shown below.

Alarm Code 204 and Alarm Code 13 (Sensor drifted or was reading erratically)

1. Review the ServiceWatch data logger and check the sensor reading at the time the alarm was set. Also, review the history to see if previous alarm codes exist that would indicate an intermittent problem. If the sensor appears to have read incorrectly, it should be replaced.

2. Be sure the sensor grades are set to the actual sensor grade.

3. Check for an airflow obstruction and correct sensor mounting.

4. If the problem reoccurs, check the sensor connector as shown in Service Procedure D01A.

5. Check the sensor circuit, as shown by Service Procedure D01A.

Alarm Code 204 and Alarm Code 92 (Sensor grade set to 5H)

1. Verify and set the sensor grade.

Alarm Code 04 and/or Alarm Code 204 are set with Alarm Code 13 (Dual sensors don't agree)

1. Review the ServiceWatch data logger and check the sensor readings at the time the alarm was set. Also, review the history to see if previous alarm codes exist that would indicate the problem sensor. If a sensor appears to have read incorrectly, it should be replaced.

2. Check for an airflow obstruction and correct sensor mounting.

3. Be sure the sensor grades are set to the actual sensor grade, and are not transposed.

4. If the offending sensor cannot be determined, either ice bath both return air sensors simultaneously to determine which sensor is inaccurate or replace both sensors.

If all or many of the Sensor Alarm Codes (02, 03, 04, 05, 06, 11, 12, 203 and 204) are set

1. Be sure the 35 pin Base Controller/Interface Board sensor connector J3 is connected securely.

2. Check the Base Controller/Interface Board as shown by Service Procedure A01A.

252 CHECK FRESH AIR EXCHANGE CIRCUIT

Alarm Type Check or Shutdown Alarm

Associated Alarm Codes

Component Description and Location

Fresh Air Exchange allows fresh outside air to be drawn into the trailer and the interior air to be exhausted. This feature is beneficial when hauling loads that release gas as they ripen, such as potatoes. The Fresh Air Exchange feature should be used exactly as specified by the customer.

IMPORTANT: The Fresh Air Exchange feature is only available with setpoints above 32°F (0°C). The feature is disabled with setpoints of 32°F (0°C) and below.

A Damper Solenoid and mechanical linkage is used to open and close the Fresh Air Exchange door.

Circuit Description

NOTE: In normal operation the Auto Fresh Air Solenoid is only energized when the unit engine is running.

The Fresh Air Exchange circuit is a two wire circuit. The Fresh Air Exchange Solenoid is energized by Relay K8 and Fuse F11 on the Base Controller/Interface Board. The AFA wire applies 12 VDC to one side of the Fresh Air Exchange Solenoid to energize the solenoid. The CHAFA wire connects the other side of the solenoid to chassis ground at the ground plate near the unit battery. The solenoid is not polarity sensitive, but the suppression diode must be installed with the bar end of the diode toward the AFA wire. The wires are routed in the Main Harness.

The Fresh Air Reed Switch is closed when the fresh air door is closed and open when the fresh air door is open. Wire numbers AFASW and CHSW supply door position information to the microprocessor digital input at J7 Pin 19.

How Alarm is Set

1. When the Fresh Air Exchange Solenoid is energized, the fresh air door will open and the Auto Fresh Air Reed Switch will also be open. If a mismatch exists between the Fresh Air Exchange and the Auto Fresh Air Reed Switch, up to three additional attempts to open the door will be made by de-energizing and energizing the Fresh Air Exchange Solenoid at 1 second intervals. If the door still fails to open as indicated by the Auto Fresh Air Reed Switch, Alarm Code 252 is set as a Check Alarm. The Fresh Air Exchange Solenoid will remain energized to open the door if conditions change – for example, should some ice melt that was restricting door movement.

2. If during a Pretrip Test the unit is configured with Fresh Air Exchange and current is not between 2 to 10 amps when the Fresh Air Exchange Solenoid is energized then Alarm Code 252 is set as a check alarm.

3. If during a Pretrip Test the unit is configured with Fresh Air Exchange and current does not return to less than or equal to 0.5 amps when de-energized then Alarm Code 252 is set as a shutdown alarm.

How Alarm is Cleared

This alarm is cleared manually.

252 CHECK FRESH AIR EXCHANGE CIRCUIT

Considerations

In normal operation the Auto Fresh Air Solenoid is only energized when the unit engine is running.

Diagnostic Procedure

Download the ServiceWatch data logger using Wintrac. Review the data using Technician Level to determine the conditions at the time the alarm was set. Conditions relevant to the alarm are recorded when the alarm is set and cleared. This data can be very helpful in determining the cause of the alarm.

1. Check the operation of the Fresh Air Exchange circuit using Interface Board Test Mode. Be sure the Fresh Air Exchange LED 22 lights.

2. Use the HMI Control Panel amps gauge to check the current drawn by the Fresh Air Exchange Solenoid while operating the Fresh Air Exchange Door with Interface Board Test Mode. The current draw should be approximately 6 amps.

3. Energize the Fresh Air Exchange Solenoid using Interface Board Test Mode and check for battery voltage on the AFA circuit. If voltage is present and no current was measured in the step above replace the Fresh Air Exchange Solenoid.

4. Verify that the Auto Fresh Air Reed Switch is closed when the fresh air door is closed and open when the fresh air door is open. Battery voltage should be present at J7 Pin 19 when the switch is open (door is open). 0 volts should be present at J7 Pin 19 when the switch is closed (door is closed).

5. Inspect the Fresh Air Exchange mechanical components for binding or ice buildup.

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Section 6 Table of Contents - continued

SR-3 Base Controller/Interface Board Functional Test

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To confirm proper operation of the Base Controller/Interface Board

Materials Required

NEW DIAGNOSTIC TOOL An SR-2/SR-3 Diagnostic Tool with Diagnostic Tool Software 4.1 or greater is required to test the SR-3 Base Controller/Interface Board. The SR-3 Base Controller/Interface Board is currently used on SR-3 Single Temperature Trailer applications. This Diagnostic Tool will also work on all previous SR-2 Truck and Trailer Base Controller/Interface Boards and Trailer HMI Control Panels. It also tests the Truck Premium HMI Control Panel.

The new Diagnostic Tool is available as a complete tool and also as an update kit for the SR-2 Blue Diagnostic Tool. See Section 7 for parts numbers.

Features:

The SR-2/SR-3 Diagnostic Tool includes the following new features.

- ✓ Tests the SR-3 Base Controller/Interface Board
- ✓ Tests the SR-3 USB Communications Port
- ✓ Tests the SR-2 and SR-3 Base Controller and HMI Control Panel CAN Ports using a USB to CAN Adaptor

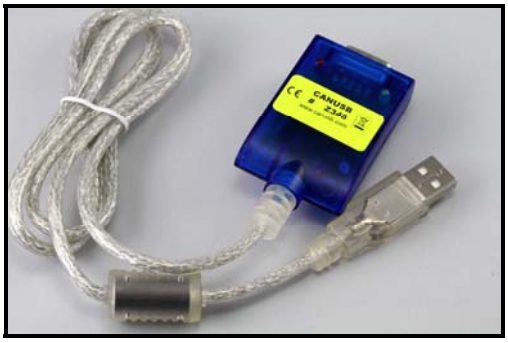
Important Notes

- The Diagnostic Tool Software provides detailed and illustrated on screen instructions for connecting the Diagnostic Tool and performing the tests. Follow these instructions carefully. The instructions in this Service Procedure are intended to support the instructions provided by the software, not replace them.

- When using the Diagnostic Tool, supply power from known good battery, a suitable power supply or by connecting a battery charger to the unit battery. Low voltage caused by a low unit battery will affect the test results. The threshold for battery power influencing test results is about 11.5 Vdc.

- When testing a Base Controller/Interface Board, supply power to the Interface Board power connections as shown in the instructions. Do not supply power to the Diagnostic Tool. Supplying power to the Diagnostic Tool may result in a communication failure.

- If communications problems have been experienced with the components under test, the CAN Test should be performed. The CAN Test cannot be run without a USB to CAN Adaptor and a CAN Test Cable as shown below. These items are included as part of both the complete SR-2/SR-3 Diagnostic Tool and the SR-2/SR-3 Diagnostic Tool Update Kit.



USB to CAN Adaptor

The USB Connector on the adaptor cable is attached to the test PC computer. The 9 Pin Connector on the blue adaptor body is attached to the CAN Test Cable.

CAN Test Cable

The 9 Pin Connector on the cable is attached to the 9 pin connector on the USB to CAN Adaptor body. The Red J1 Connector is attached to the J1 Connector on the Blue Diagnostic Tool.

- Be certain to make secure connections both when attaching the tester and when reconnecting the unit wiring harnesses.

- If a component fails the test, be sure all wiring is connected correctly.

- Be sure to complete the SR-3 Control System Warranty Report (TK 54903-9-FO) if the repair is covered under warranty. This Warranty Report, as well as a printed copy of the Diagnostic Tool Test Report is necessary to process a warranty claim. In addition, appropriate ServiceWatch and Cargo Watch data logger downloads that relate to the issue can be extremely helpful for failure analysis studies.

- The Status Light conditions may be helpful when testing SR-3 Base Controller/Interface Boards. The Status LED conditions are also required to complete the SR-3 Control System Warranty Report.

Status LED 21 condition	**Meaning**
Flashing once per second	Indicates normal Base Controller/Interface Board operation.
Flashing several times per second	Indicates the Base Controller/Interface Board is in flash load mode. Flash loading the controller usually resolves this situation. If this condition cannot be resolved the Base Controller/Interface Board may need to be replaced. Consult the Minneapolis Service Department if condition can not be corrected.
Always off	Indicates the Base Controller/Interface Board is not operating. This may occur for reasons other than a defective Base Controller/Interface Board. Verify power is available, all connections are secure and harnesses are in good condition. Be sure the unit battery is not dead. Check the unit fuses.
Always on	Indicates the Base Controller/Interface Board is rebooting or is under test by the SR-3 Diagnostic Tool. If this condition cannot be resolved the Base Controller/Interface Board must be replaced.

Important PC Notes

The following notes apply to the pc computer used in conjunction with the Thermo King SR-3 Diagnostic Tool.

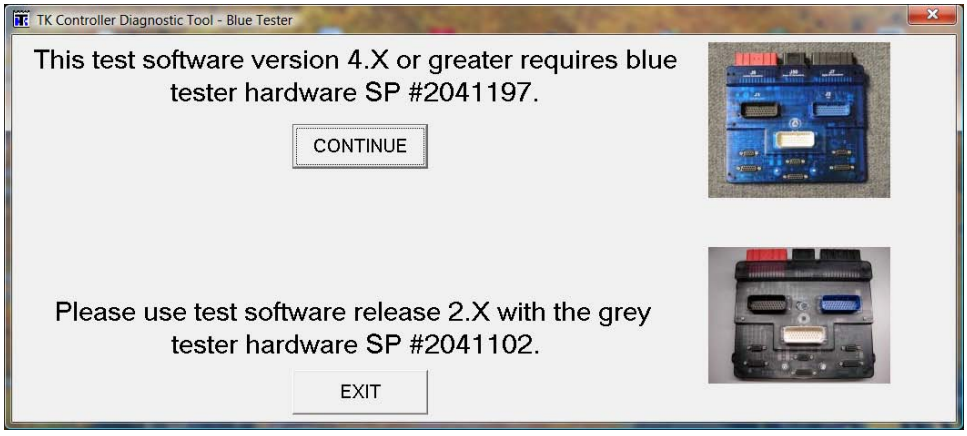
- The SR-3 Diagnostic Tool may not function properly on pc computers running Windows ME.

- The pc computer must be set for English. Select Control Panel – Regional and Language Options. Then use the Regional Dropdown menu to select English.

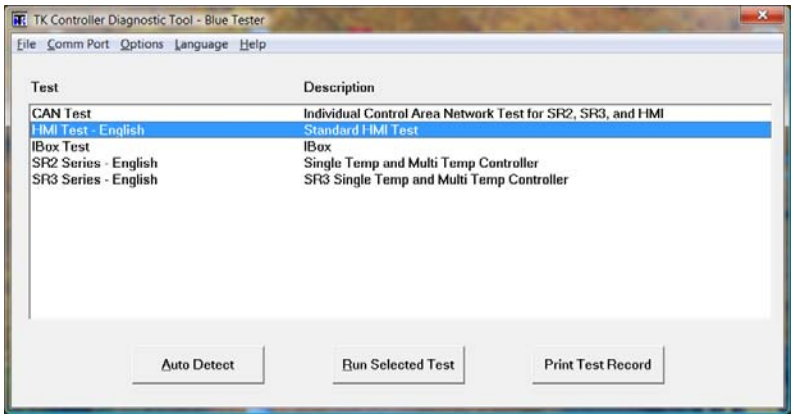
- The pc computer must be set to use the decimal point (.) for the decimal symbol, not the comma (,). If a comma is used it will be ignored – 12,3 will be read as 123. Select Control Panel – Regional and Language Options – Customize – Decimal Symbol – select (.) instead of (,).

Diagnostic Procedure

Step	Action	Result	Comments
	Base Controller/Interface Board Assembly Test		
1	Turn the Microprocessor On/Off switch off.		Failure to do so may damage the unit components.
2	Start the TK Diagnostic Tool software on the computer.		The TK Diagnostic Tool Software provides illustrated step by step connection and test instructions.
3	Diagnostic Tool software version 4.1 will prompt the technician to use the correct Diagnostic Tool as shown below.		If the prompt below does not appear you are using software prior to Revision 4.1. This software will not test SR-3 Base Controller/Interface Board assemblies.



Step	Action	Result	Comments
4	From the Diagnostic Tool software menu select “SR-3 Series - English”.		



5	Left click RUN SELECTED TEST.		
6	Confirm the test selection by left clicking RUN TEST WITH SERVICE REPORT.		
7	Follow the prompts to connect the Diagnostic Tool to the unit Base Controller/Interface Board assembly and perform the test.		
8	When the test is complete the results will be reported on the pc.		

Step	Action	Result	Comments
9	If the assembly failed the test, check the test results for possible causes and correct as directed.	The test results will indicate if a problem exists with the Base Controller/Interface Board.	
10	Retest the assembly if necessary to confirm the test results.		If component fails the test, be sure the wiring is connected correctly.
11	Record the data as requested by the test report.		Be sure to complete the SR-3 Control System Warranty Report (TK 54903-9-FO) if the repair is covered under warranty. The form is included with the replacement component.
12	Print the test report for future use.		A copy of the Diagnostic Tool Test Report is also necessary to process a warranty claim.
13	Disconnect the Diagnostic Tool and reconnect the unit harnesses and wires.		Be sure all connectors are secure and harnesses are properly routed and held in place with tie bands.
14	After repairs are completed perform a Full Pretrip Test to confirm unit operation.		

SR-3 HMI Control Panel Functional Test

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To confirm proper operation of the SR-3 Trailer HMI Control Panel

Materials Required

NEW DIAGNOSTIC TOOL An SR-2/SR-3 Diagnostic Tool with Diagnostic Tool Software 4.1 or greater is required to test the SR-3 Base Controller/Interface Board. The SR-3 Base Controller/Interface Board is currently used on SR-3 Single Temperature Trailer applications. This Diagnostic Tool will also work on all previous SR-2 Truck and Trailer Base Controller/Interface Boards and Trailer HMI Control Panels. It also tests the Truck Premium HMI Control Panel.

The new Diagnostic Tool is available as a complete tool and also as an update kit for the SR-2 Blue Diagnostic Tool. See Section 7 for parts numbers.

Features:

The SR-2/SR-3 Diagnostic Tool includes the following new features.

- ✓ Tests the SR-3 Base Controller/Interface Board
- ✓ Tests the SR-3 USB Communications Port
- ✓ Tests the SR-2 and SR-3 Base Controller and HMI Control Panel CAN Ports using a USB to CAN Adaptor

Important Notes

- The Diagnostic Tool Software provides detailed and illustrated on screen instructions for connecting the Diagnostic Tool and performing the tests. Follow these instructions carefully. The instructions in this Service Procedure are intended to support the instructions provided by the software, not replace them.

- When using the Diagnostic Tool, supply power from known good battery, a suitable power supply or by connecting a battery charger to the unit battery. Low voltage caused by a low unit battery will affect the test results. The threshold for battery power influencing test results is about 11.5 Vdc.

- When testing an HMI Control Panel, supply power to the Diagnostic Tool. When testing a HMI Control Panel, supply power to the Diagnostic Tool power connections as shown in the instructions.

- If communications problems have been experienced with the components under test, the CAN Test should be performed. The CAN Test cannot be run without a USB to CAN Adaptor and a CAN Test Cable as shown below. These items are included as part of both the complete SR-2/SR-3 Diagnostic Tool and the SR-2/SR-3 Diagnostic Tool Update Kit.

USB to CAN Adaptor

The USB Connector on the adaptor cable is attached to the test PC computer. The 9 Pin Connector on the blue adaptor body is attached to the CAN Test Cable.

CAN Test Cable

The 9 Pin Connector on the cable is attached to the 9 pin connector on the USB to CAN Adaptor body. The Red J1 Connector is attached to the J1 Connector on the Blue Diagnostic Tool.

- Be certain to make secure connections both when attaching the tester and when reconnecting the unit wiring harness.

- If a component fails the test, be sure all wiring is connected correctly.

- Be sure to complete the SR-3 Control System Warranty Report (TK 53079-9-FO) if the repair is covered under warranty. This Warranty Report, as well as a printed copy of the Diagnostic Tool Test Report is necessary to process a warranty claim. In addition, appropriate ServiceWatch and Cargo Watch data logger downloads that relate to the issue can be extremely helpful for failure analysis studies.

Important PC Notes

The following notes apply to the pc computer used in conjunction with the Thermo King SR-3 Diagnostic Tool.

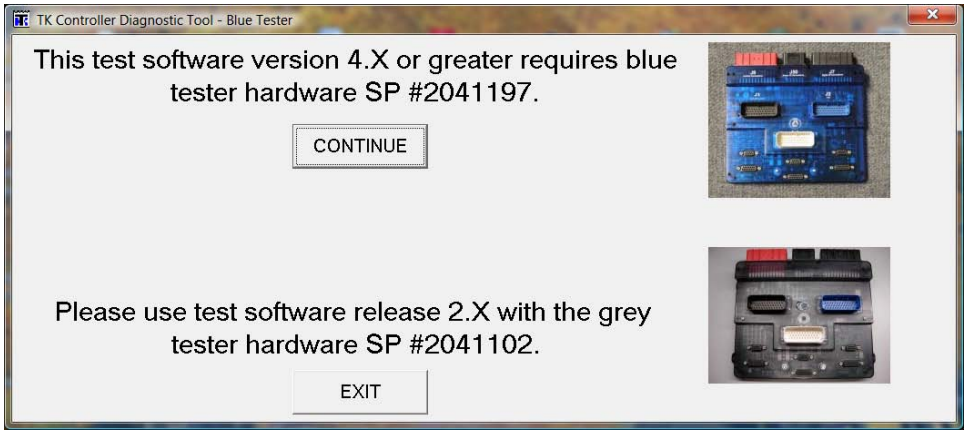
- The SR-3 Diagnostic Tool may not function properly on pc computers running Windows ME.

- The pc computer must be set for English. Select Control Panel – Regional and Language Options. Then use the Regional Dropdown menu to select English.

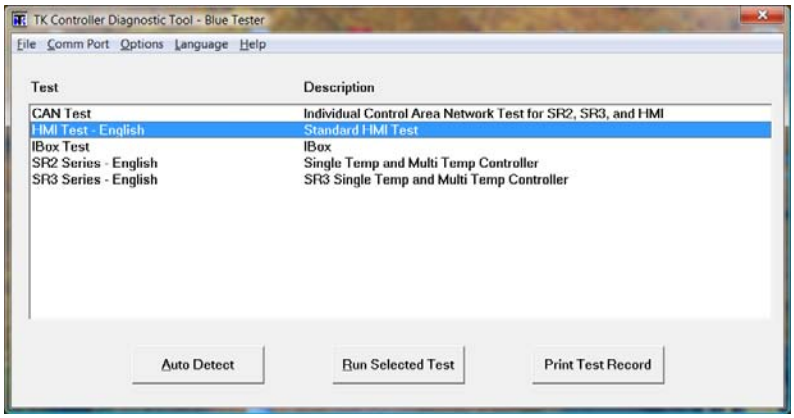
- The pc computer must be set to use the decimal point (.) for the decimal symbol, not the comma (,). If a comma is used it will be ignored – 12,3 will be read as 123. Select Control Panel – Regional and Language Options – Customize – Decimal Symbol – select (.) instead of (,).

Diagnostic Procedure

Step	Action	Result	Comments
	HMI Control Panel Test		
1	Turn the Microprocessor On/Off switch off.		Failure to do so may damage the unit components.
2	Start the TK Diagnostic Tool Software on the computer.		The TK Diagnostic Tool Software provides illustrated step by step connection and test instructions.
3	Diagnostic Tool Software Revision 4.1 will prompt the technician to use the correct Diagnostic Tool as shown below.		If the prompt below does not appear you are using software prior to Revision 4.1. This software will not test SR-3 Base Controller/Interface Board assemblies.



Step	Action	Result	Comments
4	From the Diagnostic Tool software menu select “HMI Test - English”.		



5	Left click RUN SELECTED TEST.		
6	Confirm the test selection by left clicking RUN TEST WITH SERVICE REPORT.		
7	Follow the prompts to connect the Diagnostic Tool to the HMI Control Panel and perform the test.		
8	When the test is complete the results will be reported on the pc.		

Step	Action	Result	Comments
9	If the HMI Control Panel failed the test, check the test results for possible causes and correct as directed.	The test results will indicate if a problem exists with the HMI Control Panel.	
10	Retest the HMI Control Panel if necessary to confirm the test results.		If component fails the test, be sure the wiring is connected correctly.
11	Record the data as requested by the test report.		Be sure to complete the SR-3 Control System Warranty Report (TK 54903-9-FO) if the repair is covered under warranty. The form is included with the replacement component.
12	Print the test report for future use.		A copy of the Diagnostic Tool Test Report is also necessary to process a warranty claim.
13	Disconnect the Diagnostic Tool and reconnect the unit harnesses and wires.		Be sure all connectors are secure and harnesses are properly routed and held in place with tie bands.
14	After repairs are completed perform a Full Pretrip Test to confirm unit operation.		

SR-3 HMI Control Panel Self Test

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To confirm proper operation of the SR-3 Trailer HMI Control Panel using the built in Display Self Test

Materials Required

- None

Operation

The following procedure allows the technician to determine if the SR-3 Trailer HMI Control Panel is operating properly using the built in HMI Self Tests.

Important Notes

- Replace only one component at a time to be certain the problem component is correctly identified.

Diagnostic Procedure

Step	Action	Result	Comments
	HMI Control Panel Self Test		
1	To access the Maintenance Menu press the MENU key.		
2	The Maintenance Menu is accessed from the first Main Menu screen that appears; either the Language Display or the Alarms Display. Press and hold both the unlabelled soft key and the Exit Key for 5 seconds.		
3	The first Maintenance Menu feature will appear. Press the NEXT and BACK Keys to scroll thru the Maintenance Menu choices. When DISPLAY SELF TEST is shown on the display, press the SELECT Key to access it.		
5	The DISPLAY SELF TEST menu appears. The available tests are shown in the table on page 4.		
6	Press the NEXT and BACK Keys to scroll thru the Display Self Test Menu choices.		

Step	Action	Result	Comments
7	When DISPLAY SELF TEST is shown on the display, press the SELECT Key to access it.		
8	When the individual test is complete another test can be selected.		
9	When testing is finished press EXIT to return to the Maintenance Menu.		

SR-3 HMI Control Panel Self Tests

- **LCD Test** – This test allows the technician to select a normal or inverted display. If inverted is chosen the display is reversed – segments that were turned on are now turned off and segments that were turned off are now turned on. The technician visually verifies that all display segments are functioning properly.

- **Keypad Test** – This test prompts the technician to press the four soft keys, the Defrost Key and the Cycle Sentry Key. Each time the requested key is pressed the next prompt is displayed, allowing the technician to verify proper operation of these keys.

- **Backlight Test** – This test allows the technician to turn the backlight on and off to confirm operation.

- **Brightness Test** – This test allows the technician to select Low, Medium or High backlight intensity.

- **Buzzer Test** – This test allows the technician to turn the HMI buzzer on and off to verify operation.

- **Heater Output** – This test allows the technician to turn the HMI display heater on and off.

- **Unit On/Off Output Test** – This test allows the technician to turn the Unit On/Off output off. This turns the unit off to confirm that the output can be turned off. To restart the unit, press the On key.

- **SPR Digital Output Test** – This test allows the technician to turn digital output 2 on and off. This allows the operation of a device attached to this output to be checked.

- **Serial E2** – This test allows the technician to perform an internal HMI memory test. The test takes less than 1 second and the results are reported as PASS or FAIL.

- **Datalog Flash** – This test allows the technician to perform an internal HMI CargoWatch data logger memory test. The test takes less than 1 second and the results are reported as PASS or FAIL.

- **RTC Update** – This test allows the technician to perform an internal HMI real time clock test. The test takes less than 3 seconds and the results are reported as PASS or FAIL.

Recording Existing Programmable Feature Settings

Where Used

All SR-3 Single Temperature and SR-3 SPECTRUM Multi-Temperature units

Purpose

To retrieve and record the sensor grades and programmable feature settings of an SR-3 Base Controller/Interface Board

Materials Required

- A copy of the Setup Sheet at the back of this Service Procedure.

Operation

- The settings of the graded sensors and all programmable features must be retrieved before replacing a Base Controller/Interface Board or performing a Base Controller/Interface Board Cold Start. These settings will then be duplicated in the replacement Base Controller/Interface Board or after the Cold Start.

- See Section 3 of this manual for flowcharts and a complete description of programmable features.

- The default settings are shown on the Setup Sheet at the back of this Service Procedure.

- If a sensor grade is not shown on the setup sheet physically check the sensor to determine the grade. It is very important that sensor grades be set properly.

Procedure

Step	Action	Result	Comments
1	Turn the unit on.		
2	Press the MENU key.	The Operator Menu appears.	Do not let the unit start. The Guarded Access Menu can not be entered in the unit is running.
3	Press and hold both the EXIT and unlabelled key for 5 seconds.	The Maintenance Menu appears.	
4	Press the NEXT key as required to display the Software Revision Menu. Then press the SELECT key to enter the Software Revision menu.		
5	Use the NEXT and/or BACK keys to scroll through the HMI Control Panel and Base Controller/Interface Board software revisions.	Record the software revisions on the Setup Sheet.	
6	When the software revisions have been recorded press the EXIT key to return to the Maintenance Menu.		

Step	Action	Result	Comments
7	Press the NEXT key as required to display the Set Time and Date Menu. Then press the SELECT key to enter the Set Time and Date Menu.		The real time clock is located in the HMI Control Panel. The time is supplied to the Base Controller/Interface Board each time the unit is turned on. If the Base Controller/Interface Board is changed the clock setting will be supplied to the Base Controller/Interface Board when the unit is turned on. If the HMI Control Panel is changed the time and date must be checked and set if necessary.
8	Check the Time to determine the time zone used by the customer.	Record the time zone on the Setup Sheet.	Compare local time to unit time to determine time zone.
9	When the time zone has been recorded press the EXIT key to return to the Maintenance Menu.		
10	Be sure the unit is not running. The unit will not enter the Guarded Access Menu if it is running.		If the unit is running, scroll back and enter Interface Board Test Mode. This will cause the unit to shut down. Press the Exit key to return to the Maintenance Menu. Scroll back to the Set Time and Date Menu and proceed with the next step.

Step	Action	Result	Comments
11	Press and hold both the EXIT and unlabelled key for 5 seconds.	The Guarded Access Menu appears.	If a Security Code is requested then enter the Security Code or [4444] to enter the Guarded Access Menu.
12	The Programmable Features Menu will appear. Press the SELECT key to enter the Programmable Features Menu.		
13	Use the NEXT and/or BACK keys to scroll through all settings in the Programmable Features Menu.	Record all Programmable Features settings on the Setup Sheet.	
14	When all Programmable Features settings have been recorded press the EXIT key to return to the Guarded Access Menu.		
15	Use the NEXT and/or BACK keys to scroll to the next Guarded Access Menu.		Use the Setup Sheet as a guide.
16	Use the SELECT key to enter the next Guarded Access Menu.		Use the Setup Sheet as a guide.

Step	Action	Result	Comments
17	Use the NEXT and/or BACK keys to scroll through all settings in the Menu.	Record all Programmable Features settings on the Setup Sheet.	
18	Use the EXIT key to return to the Guarded Access Menu.		
19	Continue to use Steps 15 – 18 as required to complete the Setup Sheet.		The OptiSet Plus features will be retrieved at the end of this procedure using a separate OptiSet Plus Procedure. See Service Procedure P41SA47B Setting Up OptiSet Plus Features using WinTrac.
20	When all settings have been recorded press the EXIT key to return to the Guarded Access Menu.		
21	Press the EXIT key again to return to the Standard Display.		
22	Download the ServiceWatch and CargoWatch data loggers.		This information may be needed for diagnostics.
23	Download the OptiSet Plus settings using Service Procedure P41SA47B Setting Up OptiSet Plus Features using WinTrac.		

Single Temperature Setup Sheet - D0xx Software

SOFTWARE REVISION

Function	Default Setting	Recorded Setting
HMI Control Panel Software Revision	65xx, 66xx, 67xx, 68xx	
Base Controller/Interface Board Software Revision	D0xx	

SET DATE AND TIME

Compare local time to unit time to determine time zone. The real time clock is located in the HMI Control Panel. The time is supplied to the Base Controller/Interface Board each time the unit is turned on. If the Base Controller/Interface Board is changed the clock setting will be supplied to the Base Controller/Interface Board when the unit is turned on. If the HMI Control Panel is changed the time and date must be checked and set if necessary.

Function	Default Setting	Recorded Setting
Time Zone	As specified by customer	

SECURITY CODE

Function	Default Setting	Recorded Setting
Security Code as specified by customer	None	

If an unknown security code is set then use Security Code 4444 to gain access.

IMPORTANT: Not all features shown on the Setup Sheet may appear. This is dependant on hardware type, software revision and unit settings.

PROGRAMMABLE FEATURES

Function	Default Setting	Recorded Setting
Temperature Units	FAHRENHEIT	
Pressure Units	PSI	
Restart Unit After Shutdown	ENABLED	
Setpoint High Limit	80°F	
Setpoint Low Limit	-20°F	
Fuel Saver II	ENABLED	
High Speed Pull Down	ENABLED	
Fresh Frozen Range	24°F	
Door Open Forces	LOG ONLY	
Door Open Timeout (HRS:MIN)	OFF	
Sleep Mode After Pretrip	DISABLED	
Rail Option	DISABLED	
Rail Alternate (If Rail Option = ENABLED)	DISABLED	
Blocked Air Chute Detect	DISABLED	
Temperature Differential (If Blocked Air Chute = ENABLED)	9.9	
Time to Alarm (If Blocked Air Chute = ENABLED)	0:30	
Door Open Override (If Blocked Air Chute = ENABLED)	DISABLED	
Discharge Pressure Setpoint	415 PSIG	
Water Temperature Setpoint	210°F	
Limited Alarm Restarts	DISABLED	
Remote Device	DISABLED	
COM 1 Default Baud Rate	1200	
COM 2 Default Baud Rate	9600	
COM 3 Default Baud Rate	9600	
High Temperature Defrost	Disabled	
Local Authorization of OS+ Upload (Not Currently Used)		
Local Authorization of Flash Load (Not Currently Used)		

MAIN MENU CONFIGURATION

Function	Default Setting	Recorded Setting
Add Keypad Lockout to Mode Menu	DISABLED	
Add Sleep to Mode Menu	DISABLED	
Add Temperature Units to Mode Menu	DISABLED	

HOURMETER SETUP– PROGRAM HOURMETER

Function	Default Setting	Recorded Setting
Total Run Time Reminder # 1 Hours	OFF	
Total Run Time Reminder # 2 Hours	OFF	
Controller Power On Hours	OFF	
Pretrip Reminder Hours	OFF	
Engine Run Time Reminder # 1	OFF	
Engine Run Time Reminder # 2	OFF	
Electric Run Time Reminder # 1	OFF	
Electric Run Time Reminder # 2	100 HOURS	

HOURMETER SETUP– VIEWABLE HOURMETER SETUP

Function	Default Setting	Recorded Setting
Total Hours	DISABLED	
Total Run Time Hours	ENABLED	
Engine Hours	ENABLED	
Electric Hours	ENABLED	
Total Run Time Reminder # 1 Hours	DISABLED	
Total Run Time Reminder # 2 Hours	DISABLED	
Controller Power On Hours	DISABLED	
Pretrip Reminder Hours	DISABLED	
Engine Run Time Reminder # 1 Hours	DISABLED	
Engine Run Time Reminder # 2 Hours	DISABLED	
Electric Run Time Reminder # 1 Hours	DISABLED	
Electric Run Time Reminder # 2 Hours	DISABLED	

HOURMETER SETUP– PROGRAM SERVICE DUE DATE

Function	Default Setting	Recorded Setting
Engine Run Time Service Due Date	DISABLED	

SENSOR CALIBRATION

Function	Default Setting	Recorded Setting
Control Return Air Sensor Grade	5H	
Control Discharge Air Sensor Grade	5H	
Display Return Air Sensor Grade	5H	
Display Discharge Air Sensor Grade	5H	
Spare 1 Sensor Grade	5H	

CYCLE SENTRY SETUP

Function	Default Setting	Recorded Setting
Cycle Sentry Amperes Level	5 AMPS	
Battery Sentry Voltage Level	12.2 VOLTS	

DEFROST SETUP

Function	Default Setting	Recorded Setting
Defrost Interval In Range with Fresh Setpoint	6 HOURS	
Defrost Interval Not In Range with Fresh Setpoint	4 HOURS	
Defrost Interval In Range with Frozen Setpoint	6 HOURS	
Defrost Interval Not In Range with Frozen Setpoint	4 HOURS	
Maximum Defrost Duration	45 MINUTES	

LANGUAGE SETUP (First language = 65xx, second language 66xx)

Function				Default Setting	Recorded Setting
Version	65xx	66xx	67xx		
Default Language				ENGLISH	
Enable Language	English	English	English	DISABLED	
Enable Language	Spanish	Danish	Japanese	DISABLED	
Enable Language	French	Russian		DISABLED	
Enable Language	German	Norwegian		DISABLED	
Enable Language	Italian	Swedish		DISABLED	
Enable Language	Dutch	Finnish		DISABLED	
Enable Language	Portuguese	Polish		DISABLED	
Enable Language	Greek	Hungarian		DISABLED	
Enable Language	Turkish	Romanian		DISABLED	
Enable Language	Hebrew	Bulgarian		DISABLED	
Enable Language	Arabic	Czech		DISABLED	

ACCESS CODE SETUP

Function	Default Setting	Recorded Setting
Enter Access Code	NO CODE	

OPTISET PLUS

OptiSet Plus features are retrieved using OptiSet Plus 4.1 or later.

SENSOR CONFIGURATION (CargoWatch)

Log Interval is set for all sensors.

Function	Default Setting	Recorded Setting
Logging Interval	15 minutes	

Up to 6 sensors may be configured

Function	Default	1	2	3	4	5	6
Sensor Logging	1-2 On, 3-6 Off						
Sensor Name	Log Sensor X						
Out of Range Checking	OFF						
Low Limit	-10.8°						
High Limit	10.8°						
Italian Logging	OFF						
Sensor Averaging	OFF						

Up to 4 digital inputs may be configured.

Function	Default	1	2	3	4
Door Open Logging	1On, 2-4 Off				
Digital Input #X Name	Digital Input #X				

These features allow extended data logging when the unit is turned off.

Function	Default Setting	Recorded Setting
Countdown	OFF	
Conservative	OFF	

If set Enabled, this feature sends a Start of Trip marker to the CargoWatch and ServiceWatch Data Loggers any time the setpoint is changed.

Function	Default Setting	Recorded Setting
SOT on Setpoint	DISABLED	

UNIT CONFIGURATION

Function	Default Setting	Recorded Setting
Unit Type	Trailer	
Engine Type	YANMAR 2.1	
Compressor Type	RECIP	
ETV Configured	YES	
Electric Standby Equipped (Model 50)	YES	
Electric Heat Option (Model 50)	YES	
Electric Motor Type (14 HP Type, 24 HP Type) (Model 50)	NO	
Diesel to Electric Auto Switch Enabled (Model 50)	NO	
Electric to Diesel Auto Switch Enabled (Model 50)	NO	
Unit Model	As built	
High Capacity Unit	NO	
High Capacity Fresh (If High Capacity = YES)	NO	
Defrost Motor Equipped	NO	
Fuel Sensor Type	NONE	
Rear Remote Control	NONE	
Rear Remote Control Action (If Rear Remote installed)	Stand By	
Pretrip/Sleep Switch Options	DISABLED	
3rd Party Device Control	NONE	
Low Fuel Shutdown	DISABLED	
Fresh Air Exchange	DISABLED	

Replacement of the SR-3 Base Controller/Interface Board

Where Used

All SR-3 Single Temperature and SR-2 Spectrum Multi-Temperature units

Purpose

To replace the Base Controller/Interface Board

Materials Required

- Cable ties

Operation

The Base Controller/Interface Board is removed from the control box as an assembly.

Important Notes

- It is very important that the correct Base Controller/Interface Board be used for replacement. There are currently two hardware versions of the Base Controller/Interface Board. Consult the material in Section 7 of this manual to determine the required Base Controller/Interface Board for the application.

- It is very important that the correct Base Controller software be used. Base Controllers are supplied from Service Parts with the most recent software at the time of manufacture. The anti-static shipping bags are also marked with pertinent information. Consult the material in Section 7 of this manual to determine the required Base Controller software for the application. Check the available software on SharePoint InfoCentral for the current released software version.

- Some Interface Board applications require the 60 amp fuse be removed from the old Base Controller/Interface Board and installed in the replacement Base Controller/Interface Board.

- Be sure the harnesses are reconnected properly and do not place excessive strain on the connectors. Secure the harnesses with cable ties as required.

Diagnostic Procedure

Step	Action	Result	Comments
1	Log the existing Base Controller/Interface Board settings using Service Procedure A02A.		This information will be used to set up the replacement Base Controller.
2	Turn the unit off.		
3	Disconnect standby power, if connected.		
4	Disconnect the unit battery.		Some circuits are directly connected to the unit battery.
5	Disconnect all harness connectors from the Base Controller/Interface Board assembly.		
6	Remove the screws securing the Base Controller/Interface Board to the control box and remove the Base Controller/Interface Board assembly from the control box.		
7	Install the new Base Controller/Interface Board assembly in the control box.		

Step	Action	Result	Comments
8	Reconnect all harness connectors to the Base Controller and Interface Board.		Apply Super Lube as needed. Be sure all connectors are securely mated and secure the harnesses with cable ties as required.
9	Reconnect the unit battery.		
10	Reconnect the standby power if needed.		
11	Turn the unit on.		The real time clock settings will be loaded from the HMI Control Panel when the unit is turned on.
12	Clear any alarm codes as shown in Section 4.		
13	Set up all programmable features using Service Procedure A04A.		
14	Run a Pretrip Test as shown in Section 4 to verify proper unit operation.		

Replacement of the Trailer HMI Control Panel

Where Used

All SR-3 Trailer Single Temperature and SR-3 Trailer Spectrum Multi-Temperature units

Purpose

To replace the Trailer HMI Control Panel

Materials Required

- Cable ties

Operation

The Trailer HMI Control Panel is removed from the control box door as an assembly.

Important Notes

- It is very important that the correct HMI Control Panel software be used. HMI Control Panels are supplied from Service Parts with the most recent software at the time of manufacture. The anti-static shipping bags are also marked with pertinent information. Consult the material in Section 7 of this manual to determine the required HMI Control Panel software for the application. Check the available software on SharePoint InfoCentral for the current released software version.

- Be sure the harnesses are reconnected properly and do not place excessive strain on the connectors. Secure the harnesses with cable ties as required.

Diagnostic Procedure

Step	Action	Result	Comments
1	Turn the unit off.		
2	Disconnect standby power, if connected.		
3	Disconnect the unit battery.		
4	Disconnect the harness connector from the HMI Control Panel.		
5	Remove the four screws securing the HMI Control Panel to the control box and remove the HMI Control Panel from the control box.		
6	Install the new HMI Control Panel in the control box.		
7	Re-connect the harness connector to the HMI Control Panel. Apply Super Lube as required		Be sure all connectors are securely mated and secure the harnesses with cable ties as required.

Step	Action	Result	Comments
8	Reconnect the unit battery.		
9	Reconnect the standby power if needed.		
10	Turn the unit on.		The programmable feature settings will be loaded from the Base Controller when the unit is turned on.
11	Clear any alarm codes as shown in Section 4.		
12	Check the setting of the real time clock as shown in Section 4 and correct if necessary.		The clock may be set from the Maintenance Menu or with Wintrac when connected to the CargoWatch Data Logger port.
13	Run a Full Pretrip Test as shown in Section 4 to verify proper unit operation.		

Programmable Feature Setup

Where Used

All SR-3 and SR-3 SPECTRUM Multi-Temp units

Purpose

To set the sensor grades and programmable features of an SR-3 Base Controller/Interface Board/Interface Board to customer specifications

Materials Required

- A completed copy of the Setup Sheet at the back of Service Procedure A02A Recording Existing Programmable Feature Settings.

Operation

- The settings of the graded sensors and all programmable features must be programmed after replacing a Base Controller/Interface Board or performing a Base Controller/Interface Board Cold Start.

- See Section 3 of this manual for flowcharts and a complete description of programmable features.

- The default settings are shown on the appropriate Setup Sheet at the back of Service Procedure A02A Recording Existing Base Controller/ Interface Board Settings.

- <u>If a sensor grade is not shown on the setup sheet visually check the sensor to determine the grade. It is very important that sensor grades be set properly</u>.

Procedure

Step	Action	Result	Comments
1	Turn the unit on.		
2	Press the MENU key.	The Operator Menu appears.	
3	Press and hold both the EXIT and unlabelled key for 5 seconds.	The Maintenance Menu appears.	
4	Press the NEXT key as required to display the Software Revision Menu.		
5	Use the NEXT and/or BACK keys to scroll through the HMI Control Panel and Base Controller/Interface Board software revisions.	Verify the Software revisions are as desired.	
6	When the software revisions have been verified press the EXIT key to return to the Maintenance Menu.		

Step	Action	Result	Comments
8	Press the NEXT key as required to display the Set Time and Date Menu. Then press the SELECT key to enter the Set Time and Date Menu.		The real time clock is located in the HMI Control Panel. The time is supplied to the Base Controller/Interface Board each time the unit is turned on. If the Base Controller/Interface Board is changed the clock setting will be supplied to the Base Controller/Interface Board when the unit is turned on. If the HMI Control Panel is changed the time and date must be checked and set if necessary.
9	Verify that the Time is set to the time zone used by the customer as shown on the setup sheet.		
10	When the time zone has been verified press the EXIT key to return to the Maintenance Menu.		
11	Be sure the unit is not running. The unit will not enter the Guarded Access Menu if it is running.		If the unit is running, scroll back and enter Interface Board Test Mode. This will cause the unit to shut down. Press the Exit key to return to the Maintenance Menu. Scroll back to the Set Time and Date Menu and proceed with the next step.

Step	Action	Result	Comments
12	Press and hold both the EXIT and unlabelled key for 5 seconds.	The Guarded Access Menu appears.	If a Security Code is requested then enter the Security Code or [4444] to enter the Guarded Access Menu.
13	The Programmable Features Menu will appear. Press the SELECT key to enter the Programmable Features Menu.		
14	Use the NEXT and/or BACK keys to scroll through all the features in the Programmable Features Menu.	Set all Programmable Features settings to those shown on the Setup Sheet.	
15	When all Programmable Features have been set press the EXIT key to return to the Guarded Access Menu.		
16	Use the NEXT and/or BACK keys to scroll to the next Guarded Access Menu.		Use the Setup Sheet as a guide.
17	Use the SELECT key to enter the next Guarded Access Menu.		Use the Setup Sheet as a guide.
18	Use the NEXT and/or BACK keys to scroll through all settings in the Menu.	Set all menu settings to those shown on the Setup Sheet.	

Step	Action	Result	Comments
19	Use the EXIT key to return to the Guarded Access Menu.		
20	Continue to use Steps 16 – 19 as required to complete the Setup Sheet.		The OptiSet features are set up using OptiSet Plus 4.1 or later. See Service Procedure P41SA47B Setting Up OptiSet Features using Wintrac.
21	When all settings have been recorded press the EXIT key to return to the Guarded Access Menu.		
22	Press the EXIT key again to return to the Standard Display.		
23	Set up the OptiSet features using Service Procedure P41SA47B Setting Up OptiSet Features using Wintrac.		
24	Run a Pretrip Test as shown in Section 4 to verify proper unit operation.		

Performing a Base Controller/Interface Board Cold Restart

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To perform a Cold Restart on the Base Controller/Interface Board

Materials Required

- WinTrac 5.1 loaded on a PC Computer

Operation

This procedure will perform a Cold Restart on the Base Controller/Interface Board.

- The Unit Serial Number and Truck/trailer ID Number will both be reset to 0000000000.
- All programmable features except the hourmeters are reset to factory default settings.
- All sensor grades are reset to factory default settings (5H).
- The ServiceWatch Data Logger will be cleared.

IMPORTANT: The Unit Serial Number, Truck/trailer ID Number and all programmable features such as sensor calibration, defrost settings and other feature settings will be reset to the standard (default) settings. They must be set up using Service Procedure A04A after performing a Cold Restart or the unit may not operate to the customer's requirements.

IMPORTANT: The ServiceWatch Data Logger data will be cleared when a Cold Restart is performed. Be sure to download and save the ServiceWatch Data Logger before performing a Cold Restart.

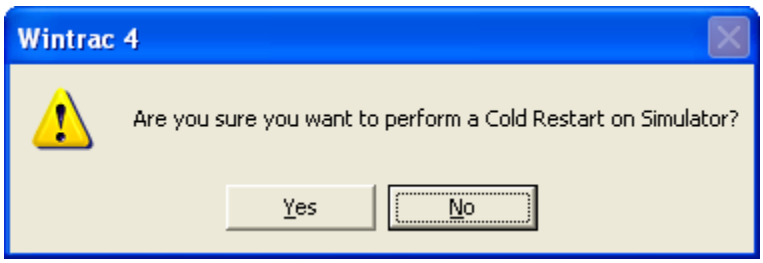
IMPORTANT: Be sure to connect the download cable to the <u>ServiceWatch</u> port. If the cable is connected to the CargoWatch port the HMI Control Panel will be restarted.

Diagnostic Procedure – Cold Restart Using WinTrac 5.1 or Later

Step	Action	Result	Comments
1	Log existing Base Controller/Interface Board settings using Service Procedure A02A.	This information will be used to set up the Base Controller/Interface Board after performing the Cold Restart.	If the information cannot be retrieved the customer specified settings must be used.
2	Connect the download cable to the ServiceWatch port on the unit.		**Be sure to connect the download cable to the <u>ServiceWatch</u> port. If the cable is connected to the CargoWatch port the HMI Control Panel will be restarted.**
3	Turn the unit on.		
4	Start WinTrac.	The WinTrac Display will appear.	
5	Click “Seek Device” to display the ServiceWatch settings.		
6	Record the Unit Serial Number and Truck/trailer ID Number.	This information will be used to set up the Base Controller/Interface Board after performing the Cold Restart.	The Cold Restart will reset the Unit Serial Number and Truck/trailer ID Number to 0000000000.
7	Download and save the contents of the ServiceWatch Data Logger.		The ServiceWatch Data Logger will be cleared when the Cold Start is performed.

Step	Action	Result	Comments
8	From the WinTrac display press CTRL-SHIFT-T to enable the WinTrac Tool Menu	The Tool Menu appears in the WinTrac menu bar.	
9	Select Tools – Restart Device – Cold Restart. A display similar to the one shown below will appear.		

10	Select Yes to continue. The display will briefly indicate that the ServiceWatch settings are being downloaded. Then a Cold Restart confirmation similar to the one shown below will appear.		



Step	Action	Result	Comments
11	Select Yes to continue. A display similar to the one shown below will appear.		

Step	Action	Result	Comments
12	When the Cold Restart has completed a display similar to the one below will appear.		

Step	Action	Result	Comments
13	When the Cold Restart is complete the following Alarm Codes will be present: Alarm Code 03 Alarm Code 04 Alarm Code 13 Alarm Code 74 Alarm Code 92 Alarm Code 203 Alarm Code 204	Alarm Code 74 indicates the Cold Restart was successful. The other alarm codes exist because the sensor grades have been set to 5H. Alarm Code 92 will clear automatically when the sensor grades are properly set.	The sensor codes will not clear until the sensor grades have been properly set. The sensor codes and code 74 may be cleared in the Alarms Menu.
14	Click “Seek Device” to display the ServiceWatch settings.		
15	Enter the Unit Serial Number and Truck/trailer ID Number that was recorded in Step 6.		
16	Click “Update Unit” to load the Unit Serial Number and Truck/trailer ID Number.		
17	Set up all programmable features using Service Procedure A04A.		

Step	Action	Result	Comments
18	Disconnect the download cable.		
19	Clear any alarm codes.		
20	Run a Pretrip Test as shown in Section 4 to verify proper unit operation.		

Performing an HMI Control Panel Cold Restart

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To perform a Cold Restart on the HMI Control Panel

Materials Required

- WinTrac 5.1 loaded on a PC Computer

Operation

This procedure will perform a Cold Restart on the HMI Control Panel.

- The CargoWatch Data Logger will be cleared.

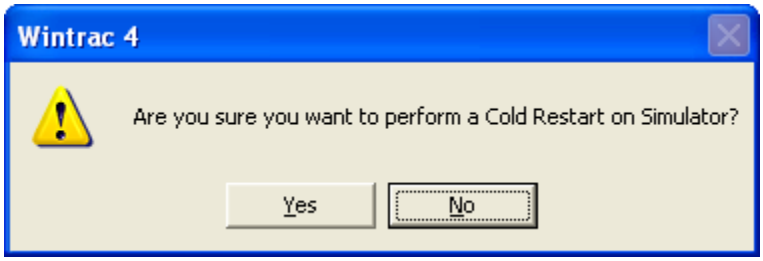
IMPORTANT: The CargoWatch Data Logger data will be cleared when a Cold Restart is performed. Be sure to download and save the CargoWatch Data Logger before performing a Cold Restart.

IMPORTANT: Be sure to connect the download cable to the CargoWatch port. If the cable is connected to the ServiceWatch port the Base Controller/Interface Board will be restarted.

Diagnostic Procedure – Cold Start Using WinTrac 5.1 or Later

Step	Action	Result	Comments
1	Connect the download cable to the ServiceWatch port on the unit.		**Be sure to connect the download cable to the CargoWatch port. If the cable is connected to the ServiceWatch port the Base Controller/Interface Board will be restarted.**
2	Turn the unit on.		
3	Start WinTrac.	The WinTrac Display will appear.	
4	Download and save the contents of the CargoWatch Data Logger.		The CargoWatch Data Logger will be cleared when the Cold Start is performed.
5	From the WinTrac display press CTRL-SHIFT-T to enable the WinTrac Tool Menu.	The Tool Menu appears in the WinTrac menu bar.	
6	Select Tools – Restart Device – Cold Restart. A display similar to the one shown below will appear.		

Step	Action	Result	Comments
7	Select Yes to continue. The display will briefly indicate that the CargoWatch settings are being downloaded. Then a Cold Restart confirmation similar to the one shown below will appear.		



Step	Action	Result	Comments
8	Select Yes to continue. A display similar to the one shown below will appear.		

Step	Action	Result	Comments
9	When the Cold Restart has completed a display similar to the one below will appear.		

10	Disconnect the download cable.		
11	Run a Pretrip Test as shown in Section 4 to verify proper unit operation.		

Unit Temperature Sensor Grade Calibration

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To calibrate the sensor grades of graded sensors

Materials Required

- None

Operation

The following sensors are graded sensors and must be properly calibrated.

- **Single Temperature Units** The control and display return air temperature sensors and the control and display discharge air temperature sensors are graded sensors. The Spare 1 temperature sensor is also a graded sensor.

- **Multi-Temperature Units** The return air temperature sensors and discharge air temperature sensors for all zones are graded sensors. The three spare temperature sensors are also graded sensors.

Any time these sensors are replaced or a Cold Start is performed the sensor grade must be correctly entered to insure optimum performance of the unit. The sensor grade is stamped on the barrel of each sensor. Failure to properly calibrate sensors may result in nuisance alarm codes.

Important Notes

- Always record the marked sensor grades of any replacement return, discharge or spare temperature sensors. The grade is required to complete the sensor calibration procedure.

- If any return air temperature or discharge air temperature sensor grade is set to 5H then Alarm Code 92 Sensor Grades Not Set will be set. Calibrating the sensor grades automatically clears alarm Code 92. Note that Alarm Code 92 does not apply to spare sensors. However, when used, spare sensors should still be calibrated to achieve maximum accuracy.

Diagnostic Procedure

Step	Action	Result	Comments
1	Verify and record the sensor grades of all return air, discharge air and spare sensors (if used) by physically checking the sensor.		Note that Alarm Code 92 does not apply to spare sensors. However, when used, spare sensors should still be calibrated to achieve maximum accuracy.
2	Turn the unit on.		
3	Press the MENU key.	The Main Menu appears.	
4	Press and hold both the EXIT and unlabelled key for 5 seconds.	The Maintenance Menu appears.	
5	Press the NEXT key as required to display the Set Time and Date Menu.	The Set Time and Date Menu appears.	
6	Press and hold both the EXIT and unlabelled key for 5 seconds.	The Guarded Access Menu appears.	
7	Press the NEXT key as required to display the Sensor Calibration Menu.	The Sensor Calibration Menu appears.	

Step	Action	Result	Comments
8	When the Sensor Calibration Menu is shown press the SELECT key to access the Sensor Calibration Menu.	The first graded sensor and the current grade appear.	
9	If necessary, use the NEXT and/or BACK keys to select the sensor to be calibrated.	These keys scroll thru all graded sensors installed on the unit.	Be sure the correct sensor is selected.
10	When the sensor to be calibrated is shown on the display, press the SELECT key.	The Sensor Change menu for the selected sensor will appear.	
11	Use the “+” and “-“ keys to change the sensor grade to match the grade stamped on the sensor.		
12	When the correct grade is shown press the YES key to confirm the choice.		
13	If necessary, repeat steps 9 – 12 to change any other sensor grades that are not correct.		
14	Press Exit to leave the Sensor Calibration Menu.		

Step	Action	Result	Comments
15	If graded sensor alarms exist (Alarm Codes 03 and/or 04), use the BACK key to return to the Alarms Menu in Guarded Access.	The Alarms Menu will appear.	
16	Press the SELECT key to enter the Alarms Menu.		
17	Press the CLEAR key to clear the sensor alarms.		
18	When finished, press the EXIT key several times or turn the unit off to exit the Sensor Calibration Menu.		

Welding on Units Equipped with SR-3 Base Controllers

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To prevent damage to the Base Controller/Interface Board during welding operations

Materials Required

- None

Operation

Electric welding generates high amperage currents that can damage electrical and electronic components. In order to minimize the possibility of damage the following procedures should be followed.

Before Welding

Step	Action	Result	Comments
1.	Turn the unit off.		
2.	Disconnect standby power, if connected.		
3.	Remove the both battery cables.		
4.	Connect the welder ground cable as close as possible to the area where the welding is to be performed. Move the welder ground cable as required.		

After Welding

Step	Action	Result	Comments
1.	Reconnect the battery cable.		
2.	Reconnect the standby power if needed.		
3.	Perform a Pretrip Test as shown in Section 4 to confirm operation.		

Setting Unit Running Time Hourmeters

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

This procedure should be followed to set the fixed running time hourmeters Total Hours, Total Run Time Hours, Engine Hours, Electric Run Time Hours and Zone Run Hours after replacing a Base Controller with a new replacement Base Controller. If all hourmeters have less than 100 hours accumulated, time can be added to them as shown in this procedure. If hourmeter time exceeds 100 hours, the hourmeter time can no longer be changed.

Materials Required

- None

IMPORTANT: Time can only be added if all hourmeters have less than 100 hours accumulated. If hourmeter time exceeds 100 hours, the hourmeter time can no longer be changed.

IMPORTANT: If time in excess of 100 hours has been entered the hourmeters can no longer be changed. Exercise care when changing these hourmeter settings. Be sure the correct number of hours are selected for each hourmeter.

IMPORTANT: Do not allow the 3 minute Guarded Access keypad timeout to occur during this procedure. If the keypad times out before all desired changes are made and a hourmeter exceeds 100 hours, the hourmeters can no longer be changed.

IMPORTANT: Do not exit hourmeter setup until all hourmeters have been set as required. Once the hourmeter setup has been exited this menu is locked out and the hourmeters can no longer be changed.

Procedure

Step	Action	Result	Comments
1	Determine the number of hours to be set on each hourmeter. If the unit is a Model 50 unit, be sure the total of Engine Hours and Electric Run Time Hours is equal to the number of hours to be set as Total Run Time Hours.		
2	Turn the unit on.		
3	Press the MENU key.	The Main Menu appears.	Press the MENU key.
4	Press and hold both the EXIT and unlabelled key for 5 seconds.	The Maintenance Menu appears.	
5	Press the NEXT key as required to display the Set Time and Date Menu.		
6	Press and hold both the EXIT and unlabelled key for 5 seconds. If a Security Code is requested enter the Security Code or [4444] to enter the Guarded Access Menu.	The Guarded Access Menu appears.	

Step	Action	Result	Comments
7	Press the NEXT key to display the Hourmeter Setup Menu.	The Hourmeter Setup Menu appears.	
8	Press the SELECT key to choose the Hourmeter Setup Menu.		
9	Press the SELECT key again to choose the Program Hourmeter Menu.		
10	Press the NEXT key to scroll to the last item in the Program Hourmeter Menu. The NEXT key will disappear.		
11	Press and hold both the EXIT and unlabelled key for 5 seconds.	This will add the non-programmable hourmeters to the menu only if the number of hours in these hourmeters are less than 100 hours.	**IMPORTANT:** Do not exit the hourmeter setup or allow the Guarded Access keypad timeout to occur during this procedure. If the keypad times out and an hourmeter exceeds 100 hours, the hourmeters will be locked and can no longer be changed.

Step	Action	Result	Comments
12	Use the NEXT and/or BACK keys to show the desired hourmeter. When the desired hourmeter is shown press the SELECT key to chose it.		
13	Change the value of the hourmeter by pressing the + or - keys.		
14	When the correct number of hours is shown press the YES key to accept the change.		**IMPORTANT:** If time in excess of 100 hours has been entered the hourmeters can no longer be changed. Exercise care when changing hourmeter settings.
15	Repeat Steps 12-14 as necessary to change the remaining hourmeters.		
16	When all hourmeters are set press the EXIT key to return to the Program Hourmeter menu.		**IMPORTANT:** If time in excess of 100 hours has been entered the hourmeters can no longer be changed. Be sure all settings are correct before leaving this menu.

Flash Loading SR-3 Base Controller/Interface Board Software

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To update software for the Thermo King SR-3 Base Controller/Interface Board using a computer and WinTrac 5.1 or later software

Flash Loading using USB Flash Drive

SR-3 equipped units can also flash load HMI Control Panel and SR-3 Base Controller software using a WinTrac configured USB Flash Drive. See USB Flash Drive in Section 4 of this manual for details.

Materials Required

The following materials are required to perform a flash load.

- Thermo King WinTrac 5.1 or later software loaded on a PC computer.
- Interconnect Cable, Thermo King Service Part Number TK 44-9417 (20 foot, 6 meter) or TK 44-9418 (50 foot, 15 meter).
- Adapter Cable, Thermo King Service Part Number TK 204-918, 15 Pin “D” connector to 5 pin Deutsch.
- The correct Base Controller Flash Load file.

Obtaining Flash Load Files on the Internet

When SR-3 Base Controller and/or HMI Control Panel flash load files are downloaded from the Thermo King iService web site, the flash load files are downloaded as a *.ZIP file. When flash load files for SR-3 applications are unzipped, there will now be three flash load files instead of the usual two.

- ✓ The traditional *.mXX and *.cXX files will be unzipped. These two files are for use when flash loading an SR-3 unit in the traditional manner by using a Data Cable to connect the SR-3 Unit to a PC Computer equipped with WinTrac.

  NOTE: Both the *.mXX and *.cXX files must be present in order to perform a flash load using a Data Cable, even though only one of them is shown by WinTrac.

- ✓ A *.FLA file will also be unzipped. This file is for use when flash loading a unit using a WinTrac 5.1 configured USB Flash Drive.

  The Flashload Directory on the configured USB Flash Drive contains sub-directories for HMI and SR3SINGLE TEMP flash load *.FLA files. The *.FLA file must be placed in the correct directory on the flash drive using either the WinTrac 5.1 Upload > Manage Flashload Files feature or Windows Explorer.

The latest SR-3 Revision D0xx Trailer Base Controller/Interface Board software is available on the Thermo King TSA Info Central web site. Go to:

http://www.thermoking.com/tk/index.asp

Choose TSA Info Central and select Home > Software and Downloads > Microprocessors > Trailer Microprocessor Updates.

- ✓ The file name for the *.ZIP file containing both the traditional .mXX and .cXX files and the *.FLA file is Micro Code D0xx Update for the SR-3 Single Temp Base Controller.zip. Double click this file to install the software.

Connecting the Cables

The same cables used for downloading are required to perform a flash load. Typically two cables are used to connect the computer to the base controller as shown below.

Data Cable The data cable has a 9 pin "D" connector installed on one end to attach to the computer and a 15 pin "D" connector on the other end. The cable is available as either a 20 foot or 50 foot cable.

Adapter Cable An adapter cable is required to complete the connection to the base controller or data logger. This cable has a 15 pin "D" connector on one end and a 5 pin Deutsch connector on the other end. The 15 pin "D" connector is attached to the 15 pin "D" connector on the data cable and the 5 pin Deutsch connector is attached to the Service Watch connector above the HMI Control Panel. Do not attach the cable to the Cargo Watch connector.

Flash Load Details

Flashload status is reported on the PC, not on the HMI Control Panel. The HMI Control Panel will display the message COMMUNICATION FAILURE – LOST CONTROLLER CONNECT. This is normal.

The unit must remain on and connections must not be disturbed during the flash load process.

If communications are lost, Wintrac will not be able to find the device.

If the Status LED is flashing rapidly (several times per second), the base controller is stuck in a flash load.

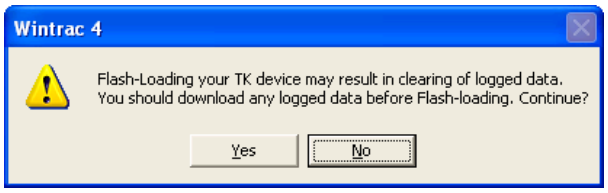
If the Status LED is flashing once per second the base controller is operating normally.

Flash Load Procedure

The following procedure should be followed to flash load software using a connection to the ServiceWatch connector.

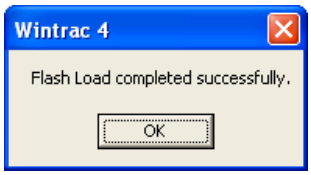
Step	Action	Result	Comments
	NOTE: SR-3 Base Controllers retain all the programmed features when being flash loaded. It is not necessary to reprogram the SR-3 Base Controller/Interface Board after a flash load.		
	NOTE: Download and save the ServiceWatch Data Logger before flash loading the Base Controller/Interface Board.		
1	Obtain and prepare the flash load files as described above.		
2	Connect the data cables from the PC to the Service Watch connector as described above.		**Be sure the cable is connected to the Service Watch connector.**
3	Connect a power source to the PC computer.		**Do not rely on a laptop battery as low power may cause communications to be lost and the flash load to fail.**
4	Start WinTrac 5.1 or later as shown in the Wintrac manual.		

Step	Action	Result	Comments
5	Turn the unit on. The unit can be running. It will shut down automatically during the flash load process.		**The unit must remain on and connections must not be disturbed during the flash load process.**
6	**Allow the unit to fully power up and the Standard Display to appear before starting a flash load.** Failure to do so may result in unreliable results.		
7	If the Wintrac menu bar does not show TOOLS, press and hold the computers "Ctrl" and "Shift" keys and then press the "T" key.	The TOOLS menu will appear in the Wintrac menu bar.	
8	Left click "Tools".	The TOOLS menu will appear.	
9	From the Tools menu left click "Flash Load".	A download data warning menu appears as shown below. Be sure to download the ServiceWatch data logger if necessary.	



Step	Action	Result	Comments
10	Left click “Yes” to continue.	A directory containing the flash load files appears.	
11	Double click the flash load directory and locate the correct flash load file.		
12	Double click the flash load file.	Several status screens are shown briefly and then a confirmation message will appear.	
13	If the information shown is correct left click “Yes” to continue. The flash load will proceed automatically.	If the unit is running it will shut down. The HMI Control Panel will display “Communication Failure – Lost Controller Connect”. This is normal. The flash load will take several minutes.	
14	**The unit must remain on and connections must not be disturbed during the flash load process.**	Several status screens are shown as the flash load proceeds.	

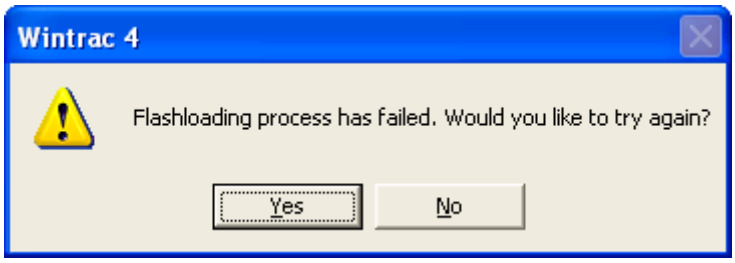
Step	Action	Result	Comments
15	When the flash load is complete a message appears confirming a successful flash load as shown below.		



16	Left click “OK” to complete the flash load. The unit will automatically restart and run.		SR-3 Base Controllers retain all the programmed features when being flash loaded. It is not necessary to reprogram the SR-3 Base Controller/Interface Board after a flash load.
17	Clear any alarm codes.		
18	Run a Full Pretrip Test as shown in Section 4.		This confirms proper unit operation.

Flash Load Failure During a Flash Load

When a flash load is initiated, Wintrac will perform a Full flash load. The full set of Wintrac commands is sent to the Base Controller/Interface Board, such as seek device and read device properties. If the flash load procedure does not complete successfully, the following message will appear.



Left click “Yes” to retry the flash load process.

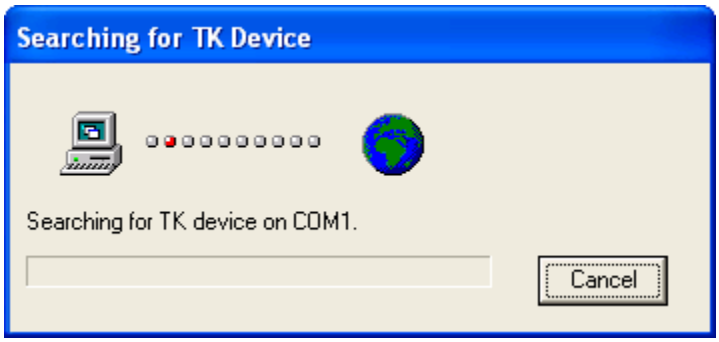
The Retry flash load differs from the Full flash load as follows: Since the Base Controller/Interface Board is already in flash load mode it does not respond to the full set of Datapac commands. Therefore, during a flash load Retry, Wintrac skips most of the initial communications with the device and goes directly to the actual flash load routine.

Wintrac simply sends the flash load write commands. If these fail then Wintrac will generate an error. If the flash load write succeeds then Wintrac will finish the flash load in the same way as a normal flash load.

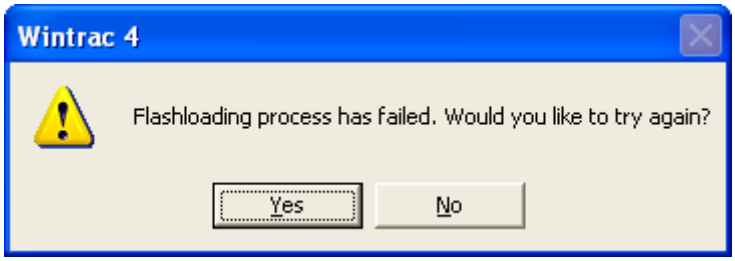
Flash Loading a Base controller Already in Flash Load Mode

There may be instances where the base controller is already in flash load mode, but the flash load did not complete. If this is the case the HMI Control Panel will show "Communication Failure – Lost Controller Connect" and the Status LED (21) will be flashing rapidly (several times per second). The procedure below is usually successful in recovering the flash load.

Make the usual connections and start a flash load as described above. The first flash load attempt will be a Full flash load. Since the base controller is already in flash load mode, it will not respond to the first flash load command "Searching for Device on COM 1". If the search continues for more than 5 seconds, click Cancel.



The Retry message will appear.



Left click "Yes" to retry the flash load process.

With a Retry flash load, Wintrac skips most of the initial communications checking with the device and goes directly to the actual flash load routine. Wintrac simply sends the flash load write commands. If these fail then Wintrac will generate an error. If the flash load write succeeds then Wintrac will finish the flash load in the same way as a normal flash load. The Retry flash load will usually correct the problem.

Flash Loading SR-3 HMI Control Panel Software

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To change or update software for the Thermo King SR-3 HMI Control Panel using a computer and WinTrac 5.1 or later software. **IMPORTANT: This flash load takes at least 10 minutes.** Plan accordingly.

Flash Loading using USB Flash Drive

SR-3 equipped units can also flash load HMI Control Panel and SR-3 Base Controller/Interface Board software using a WinTrac configured USB Flash Drive. See USB Flash Drive in Section 4 of this manual for details.

Materials Required

The following materials are required to perform a flash load.

- Thermo King WinTrac 5.1 or later software loaded on a PC computer.
- Interconnect Cable, Thermo King Service Part Number TK 44-9417 (20 foot, 6 meter) or TK 44-9418 (50 foot, 15 meter).
- Adapter Cable, Thermo King Service Part Number TK 204-918, 15 Pin “D” connector to 5 pin Deutsch.
- The correct HMI Control Panel Flash Load file.

IMPORTANT – CargoWatch Data Logger on SR-3 Trailer Units: Due to CargoWatch Data Logger changes, a HMI Control Panel Cold Start must be performed using WinTrac on both HMI-1 and HMI-2 Control Panels after new HMI Control Panel software is flash loaded. The cold start also sets the Out of Range Checking to OFF. Failure to perform a cold start may result in an inoperative or unresponsive CargoWatch data logger. This may not be apparent until the data logger is downloaded.

Be sure the CargoWatch Data Logger is downloaded before installing new HMI Control Panel software, as the HMI Control Panel Cold Start will erase any existing data in the CargoWatch Logger.

1. Download the CargoWatch Data Logger before flash loading new HMI Control Panel Software

2. After flash loading the new HMI Control Panel software, send a Cold Start to the HMI Control Panel using WinTrac 5.1 or later. Do not attempt a cold start using the interface board jumpers or with the download cable connected to the ServiceWatch port as this will restart the SR-3 Base Controller/Interface Board, not the HMI Control Panel.

3. Verify the data cable is connected to the CargoWatch port.

4. From the WinTrac 5.1 or later Tools menu select “Restart” and “Cold Start”.

Obtaining Flash Load Files on the Internet

When SR-3 Base Controller and/or HMI Control Panel flash load files are downloaded from the Thermo King iService web site, the flash load files are downloaded as a *.ZIP file. When flash load files for SR-3 applications are unzipped, there will now be three flash load files instead of the usual two.

- ✓ The traditional *.mXX and *.cXX files will be unzipped. These two files are for use when flash loading an SR-3 unit in the traditional manner by using a Data Cable to connect the SR-3 Unit to a PC Computer equipped with WinTrac.

  NOTE: Both the *.mXX and *.cXX files must be present in order to perform a flash load using a Data Cable, even though only one of them is shown by WinTrac.

- ✓ A *.FLA file will also be unzipped. This file is for use when flash loading a unit using a WinTrac 5.1 configured USB Flash Drive.

  The Flashload Directory on the configured USB Flash Drive contains sub-directories for HMI and SR3SINGLE TEMP flash load *.FLA files. The *.FLA file must be placed in the correct directory on the flash drive using either the WinTrac 5.1 Upload > Manage Flashload Files feature or Windows Explorer.

The latest SR-3 Revision 65xx Trailer Base Controller/Interface Board software is available on the Thermo King TSA Info Central web site. Go to:

http://www.thermoking.com/tk/index.asp

Choose TSA Info Central and select Home > Software and Downloads > Microprocessors > Trailer Microprocessor Updates.

- ✓ The file name for the *.ZIP file containing both the traditional .mXX and .cXX files and the *.FLA file is Micro Code 65xx Update for the SR-3 HMI Control Panel.zip. Double click this file to install the software.

The only difference between 65xx, 66xx, 67xx and 68xxHMI Control Panel software is language support as shown below.

65xx	66xx	67xx	68xx
English	English	English	Mix and
Spanish	Danish	Japanese	Match Languages
French	Russian		
German	Norwegian		
Italian	Swedish		
Dutch	Finnish		
Portuguese	Polish		
Greek	Hungarian		
Turkish	Romanian		
Hebrew	Bulgarian		
Arabic	Czech		

IMPORTANT: There are also flash load files for the SR-3 Base Controller/Interface Board. Be sure to select the file for SR-3 HMI Control Panel.

Connecting the Cables

The same cables used for downloading are required to perform a flash load. Typically two cables are used to connect the computer to the base controller as shown below.

Data Cable The data cable has a 9 pin “D” connector installed on one end to attach to the computer and a 15 pin “D” connector on the other end. The cable is available as either a 20 foot or 50 foot cable.

Adapter Cable An adapter cable is required to complete the connection to the base controller or data logger. This cable has a 15 pin “D” connector on one end and a 5 pin Deutsch connector on the other end. The 15 pin “D” connector is attached to the 15 pin “D” connector on the data cable and the 5 pin Deutsch connector is attached to the CargoWatch connector above the HMI Control Panel. Do not attach the cable to the ServiceWatch connector.

Flash Load Recovery

The unit must remain on and connections must not be disturbed during the flash load process.

If the HMI is turned off during a flash load it will lock up. Power will need to be completely removed from the HMI before the flash load can be completed. This can be accomplished by removing the connector at the back of the HMI or by disconnecting the unit battery).

If the power was turned off during flash load, the next flash load attempt will generate an error, but a following attempt will flash successfully. The failure on the first attempt is 'as designed'. On the second attempt, some of the error checking between the HMI and WinTrac is bypassed.

Flash Load Procedure

The following procedure should be followed to flash load software using a connection to the CargoWatch connector.

Step	Action	Result	Comments
	IMPORTANT: Download and save the CargoWatch Data Logger before flash loading the HMI Control Panel.		Due to CargoWatch Data Logger changes, a HMI Control Panel Cold Start must be performed using WinTrac on both HMI-1 and HMI-2 Control Panels after new HMI Control Panel software is flash loaded. The cold start also sets the Out of Range Checking to OFF. Failure to perform a cold start may result in an inoperative or unresponsive CargoWatch data logger. This may not be apparent until the data logger is downloaded.
1	Obtain and prepare the flash load files as described above.		
2	Connect the data cables from the PC to the CargoWatch connector as described above.		**Be sure the cable is connected to the CargoWatch connector.**

Step	Action	Result	Comments
3	Connect a power source to the PC computer.		**Do not rely on a laptop battery as low power may cause communications to be lost and the flash load to fail.** See Flash Load Recovery on the previous page.
4	Start WinTrac 5.1 or later as shown in the WinTrac manual.		
5	Turn the unit on. Download and save the CargoWatch Data Logger using WinTrac before flash loading the HMI Control Panel.		
6	The unit can be running. It will shut down automatically during the flash load process.		**The unit must remain on and connections must not be disturbed during the flash load process.**
7	**Allow the unit to fully power up and the Standard Display to appear before starting a flash load.** Failure to do so may result in unreliable results.		

Step	Action	Result	Comments
8	If the WinTrac menu bar does not show TOOLS, press and hold the computers “Ctrl” and “Shift” keys and then press the “T” key.	The TOOLS menu will appear in the WinTrac menu bar.	
9	Left click “Tools”.	The TOOLS menu will appear.	
10	From the Tools menu left click “Flash Load”.	A download data warning menu appears.	
11	Left click “Yes” to continue.	A directory containing the flash load files appears.	If the file is not present, navigate to the file using conventional Windows navigation methods.
12	Double click the flash load directory and locate the correct flash load file.		
13	Double click the flash load file.	A confirmation message will appear.	
14	If the information shown is correct left click “Yes” to continue. The flash load will proceed automatically.	If the unit is running it will shut down. This is normal. **The flash load will take at least 10 minutes.**	**The unit must remain on and connections must not be disturbed during the flash load process.**
15	When the flash load is complete a message appears confirming a successful flash load.		

Step	Action	Result	Comments
16	Left click “OK” to complete the flash load. The unit will automatically restart and run.		
17	Send a Cold Start to the HMI Control Panel using WinTrac 5.1 or later. From the WinTrac Tools menu select “Restart” and “Cold Start”. For additional Cold Start information see Service Procedure A07B Performing an HMI Control Panel Cold Start. Do not attempt a cold start using the interface board jumpers or with the download cable connected to the ServiceWatch port as this will restart the SR-3 Base Controller/Interface Board, not the HMI Control Panel.		Be sure the CargoWatch Data Logger is downloaded before sending a Cold Start to the HMI Control Panel, as the Cold Start will erase any existing data in the CargoWatch Data Logger.
18	Clear any alarm codes.		
19	Run a Pretrip Test as shown in Section 4.		This confirms proper unit operation.

Retrieving and Sending OptiSet Plus Configurations

Where Used

All SR-3 units

Purpose

To retrieve and send OptiSet Plus configurations to and from the Thermo King SR-3 Base Controller using a PC computer, OptiSet Plus Plus 4.1 or later and WinTrac 5.1 or later.

Materials Required

The following materials are required to retrieve and send OptiSet Plus configurations.

- Thermo King WinTrac 5.1 or later software loaded on a PC computer.
- Thermo King OptiSet Plus 4.1 or later software loaded on a PC computer. Thermo King OptiSet Plus software is available from SharePoint InfoCentral under Software Updates.
- Interconnect Cable, Thermo King Service Part Number TK 44-9417 (20 foot, 6 meter) or TK 44-9418 (50 foot, 15 meter).
- Adapter Cable, Thermo King Service Part Number TK 204-918, 15 Pin “D” connector to 5 pin Deutsch.

Description

This Service Procedure allows OptiSet Plus settings to be saved and restored using WinTrac. This eliminates the need to manually retrieve and reprogram the settings using the Guarded Access Menu.

- WinTrac retrieves the existing OptiSet Plus settings from a unit and saves them as a *.opt file.
- OptiSet Plus Setup Guide is used to convert the *.opt file to the *.csv file necessary to send the OptiSet Plus settings back to a unit.
- WinTrac is then used to send the OptiSet Plus settings back to the unit.

Service Procedure Contents

There are four parts to this Service Procedure.

- **Connecting the Cables** is shown on this page.
- **Retrieving an OptiSet Plus Configuration From an SR-3 Unit** is shown on page 3 of this Service Procedure.
- **Converting an OptiSet Plus *.opt File to a *.csv File** is shown on page 7 of this Service Procedure.
- **Sending an OptiSet Plus Configuration to an SR-3 Unit** is shown on page 11 of this Service Procedure.

Connecting the Cables

The same cables used for downloading are required to retrieve and send OptiSet Plus configurations. Typically two cables are used to connect the computer to the base controller as shown below.

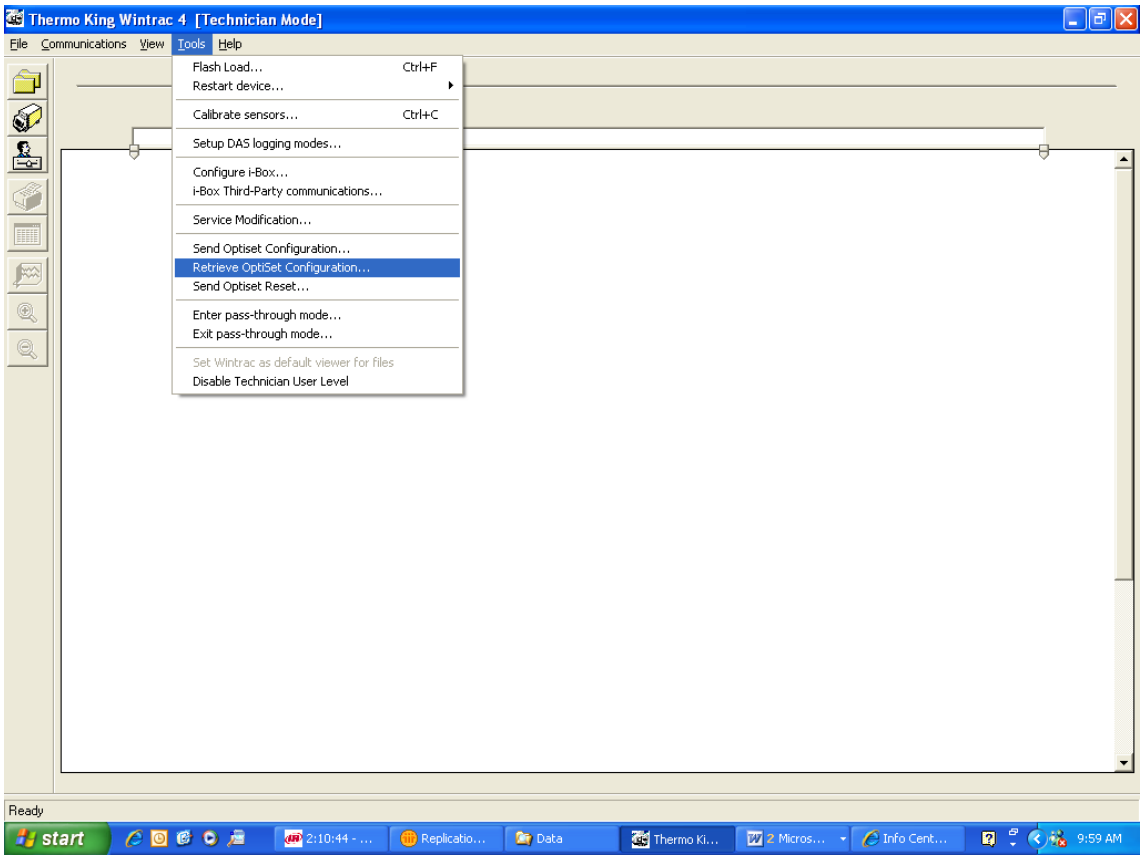
Data Cable The data cable has a 9 pin “D” connector installed on one end to attach to the computer and a 15 pin “D” connector on the other end. The cable is available as either a 20 foot or 50 foot cable.

Adapter Cable An adapter cable is required to complete the connection to the base controller or data logger. This cable has a 15 pin “D” connector on one end and a 5 pin Deutsch connector on the other end. The 15 pin “D” connector is attached to the 15 pin “D” connector on the data cable and the 5 pin Deutsch connector is attached to the Service Watch connector above the HMI Control Panel. Do not attach the cable to the Cargo Watch connector.

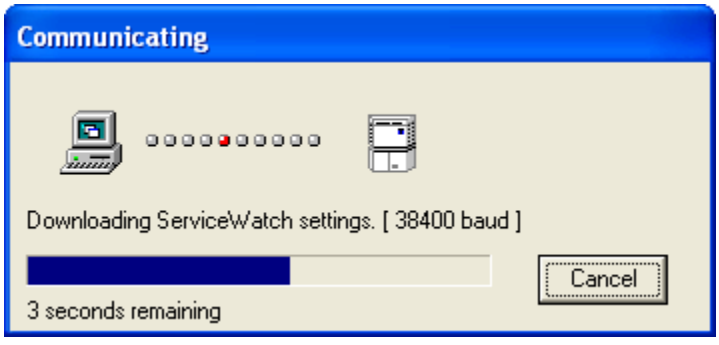
Retrieving an OptiSet Plus Configuration From an SR-3 Unit

The following procedure should be followed to retrieve an OptiSet Plus configuration from an SR-3 unit using WinTrac 5.1 or later and a connection to the ServiceWatch connector. The retrieved OptiSet Plus configuration file will be saved as a *.opt file.

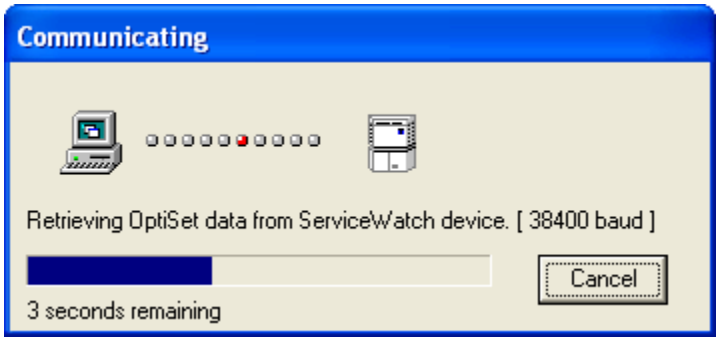
Step	Action	Result	Comments
1	Connect the data cables from the PC to the Service Watch connector as described on page 2.		**Be sure the cable is connected to the Service Watch connector.**
2	Turn the unit on. The unit can be running.		**The unit must remain on and connections must not be disturbed during the OptiSet Plus Configuration download process.**
3	Start WinTrac 5.1 or later as shown in the WinTrac manual.		
4	If the WinTrac menu bar does not show TOOLS, press and hold the computers “Ctrl” and “Shift” keys and then press the “T” key.	The TOOLS menu will appear in the WinTrac menu bar.	
5	Left click “Tools”.	The TOOLS menu will appear.	
6	From the Tools menu left click “Retrieve OptiSet Plus Configuration” as shown below.		



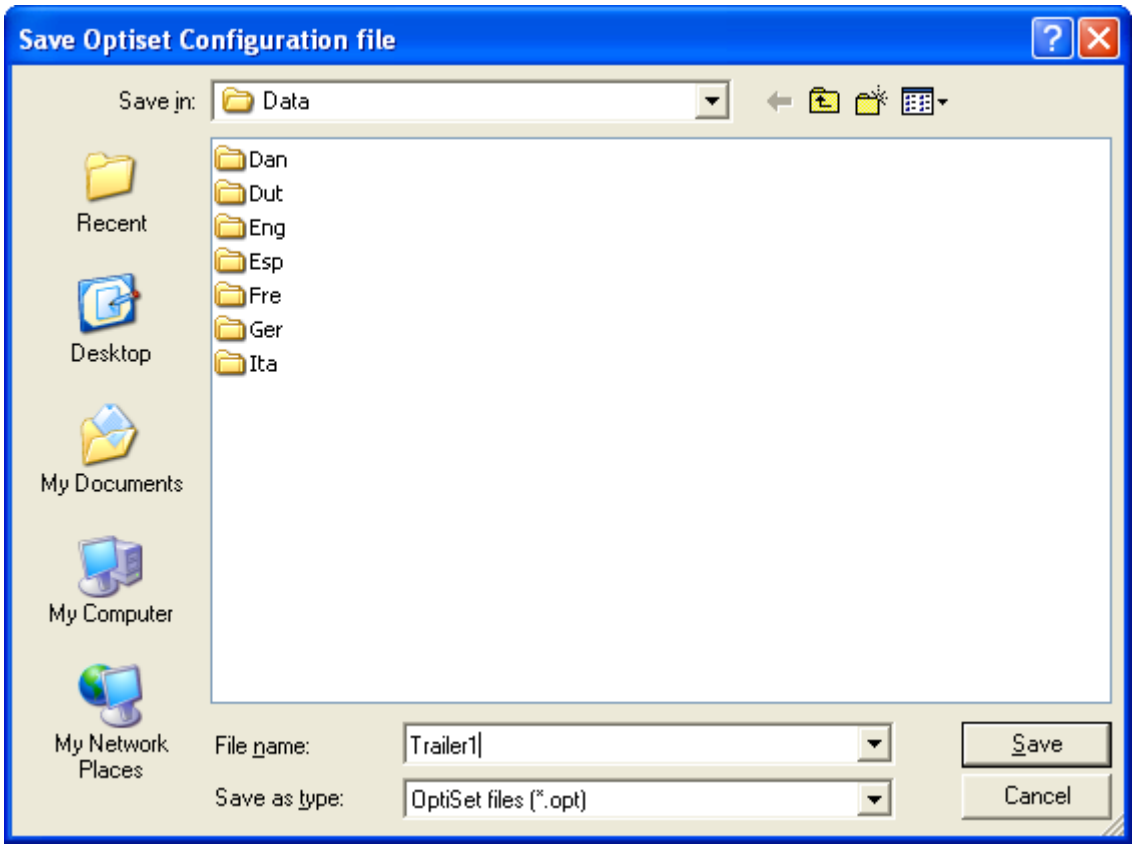
Step	Action	Result	Comments
7	A Downloading ServiceWatch Settings display similar to the one shown below will appear briefly.		



Step	Action	Result	Comments
8	Then the Retrieving OptiSet Plus Data displays similar to those shown below will appear briefly.		



Step	Action	Result	Comments
9	The Save OptiSet Plus Configuration File display will appear as shown on the next page. Choose a file name and location. Left click “Save” to save the file. The file name selected in the display shown on the next page is “Trailer1”.		Be sure to note the file name and location. This file name and location will be necessary to review the retrieved downloaded OptiSet Plus configuration or to convert the file and send the OptiSet Plus configuration back to a unit. The default file location is C:\OptiSet Plus\Data.



Step	Action	Result	Comments
10	The display shown below will appear indicating the OptiSet Plus configuration has been retrieved and saved. Left click "OK" to return to the WinTrac Main Menu.		The OptiSet Plus configuration has been retrieved and saved to the computer.

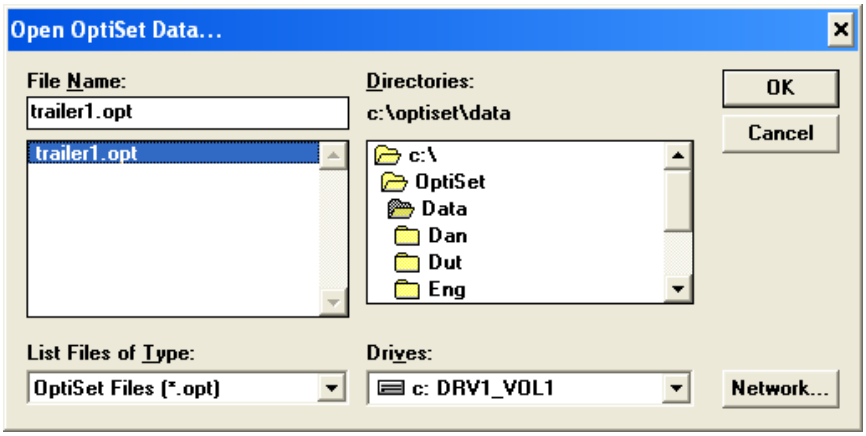
Converting an OptiSet Plus .opt File to a .csv File

The OptiSet Plus configuration file retrieved by WinTrac will be saved as a *.opt file. However, a file formatted as a *.csv file is required to upload the OptiSet Plus configuration to a unit.

Thermo King OptiSet Plus Setup Guide 4.1 or later software loaded on a PC computer is used to convert a *.opt file to a *.csv file. Thermo King OptiSet Plus Setup Guide software is available from SharePoint InfoCentral under Software Updates.

Step	Action	Result	Comments
1	Start OptiSet Plus 4.1 or later.		
2	From the OptiSet Plus Setup Guide Main Menu left click “File _ Open” as shown on the next page.		

Step	Action	Result	Comments
3	Select the desired file and left click “OK”. File “Trailer1.opt” has been selected as shown below.		The file will be opened.



Step	Action	Result	Comments
4	The display will return to the OptiSet Plus Setup Guide Main Menu. Left click “File _ Export for Upload” as shown below.		If necessary, the file can be opened to review or change OptiSet Plus settings. The *.opt file must still be converted to a *.csv file.

5	Select the desired file and left click “OK”. File “Trailer1.opt” has been selected as shown on the next page.	The *.opt file is converted to a *.csv file.	

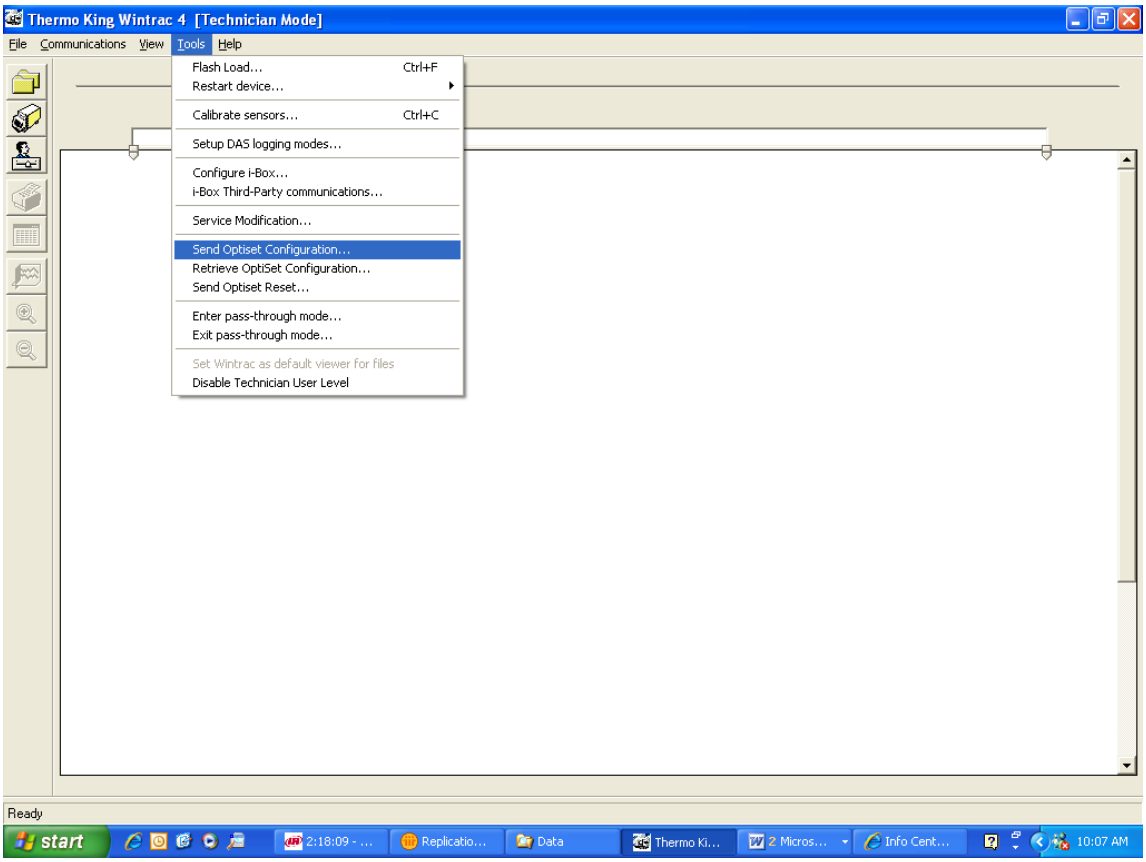
Step	Action	Result	Comments
6	The display shown below will appear indicating the file conversion is complete. Left click "OK" to return to the OptiSet Plus Setup Guide Main Menu.		

7	The file conversion is complete. Exit OptiSet Plus Setup Guide.		

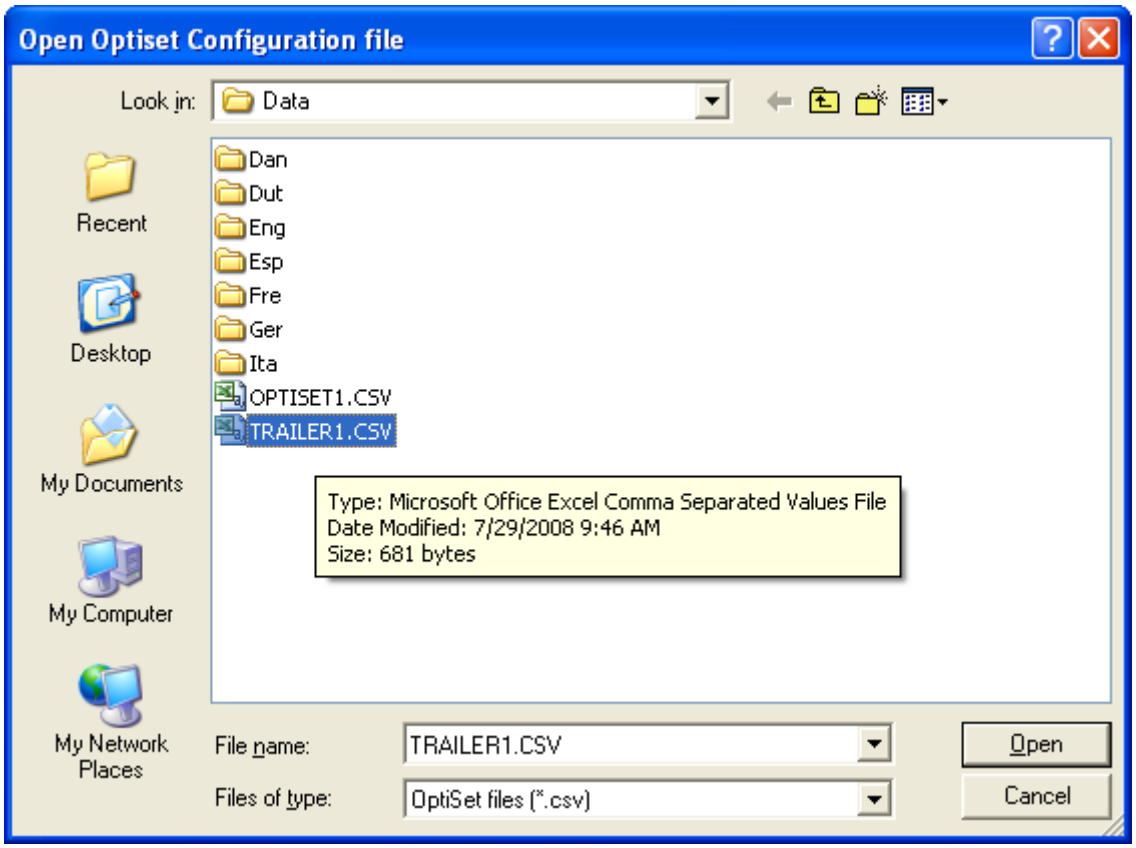
Sending an OptiSet Plus Configuration to an SR-3 Unit

The following procedure should be followed to send an OptiSet Plus configuration to an SR-3 unit using WinTrac 5.1 or later and a connection to the ServiceWatch connector. The correct *.csv OptiSet Plus configuration file is required. If the retrieved OptiSet Plus configuration file is a *.opt file see **Converting an OptiSet Plus .opt File to a .csv File** in this Service Procedure.

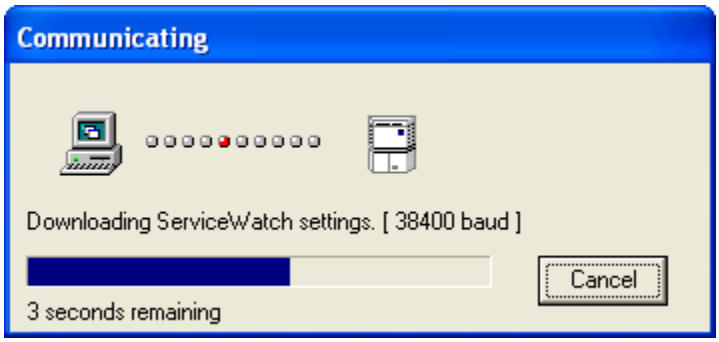
Step	Action	Result	Comments
1	Connect the data cables from the PC to the Service Watch connector as described on page 2.		**Be sure the cable is connected to the Service Watch connector.**
2	Turn the unit on. The unit can be running.		**The unit must remain on and connections must not be disturbed during the OptiSet Plus Configuration download process.**
3	Start WinTrac 5.1 or later as shown in the WinTrac manual.		
4	If the WinTrac menu bar does not show TOOLS, press and hold the computers “Ctrl” and “Shift” keys and then press the “T” key.	The TOOLS menu will appear in the WinTrac menu bar.	
5	Left click “Tools”.	The TOOLS menu will appear.	
6	From the Tools menu left click “Send OptiSet Plus Configuration” as shown on the next page.		



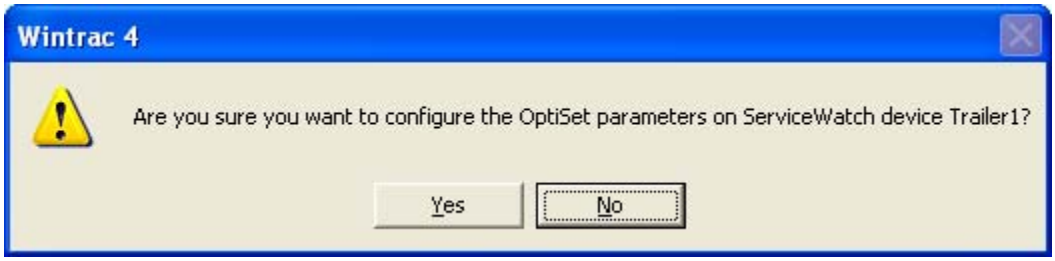
Step	Action	Result	Comments
7	The Open OptiSet Plus Configuration File display will appear. Choose the desired file name and location. Left click "Open" to open the file. The file name selected in the display shown on the next page is "Trailer1".		The default file location is C:\OptiSet Plus\Data.



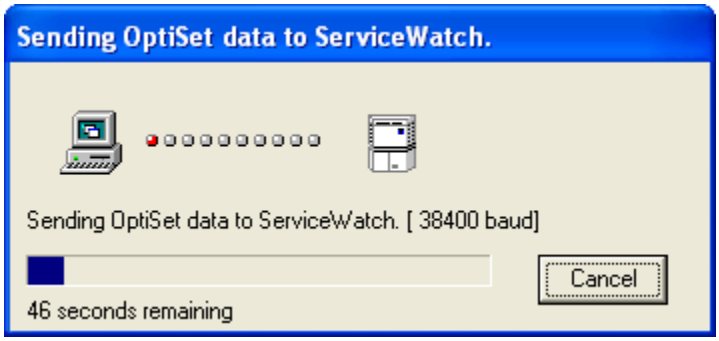
Step	Action	Result	Comments
8	A Downloading ServiceWatch Settings display similar to the one shown below will appear briefly.		



Step	Action	Result	Comments
9	A confirmation display message similar to the one shown below will appear. Left click “Yes” to continue.		

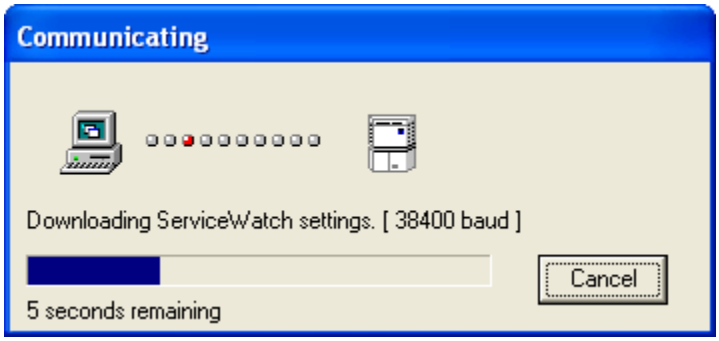


Step	Action	Result	Comments
10	A confirmation display message similar to the one shown below will appear.		

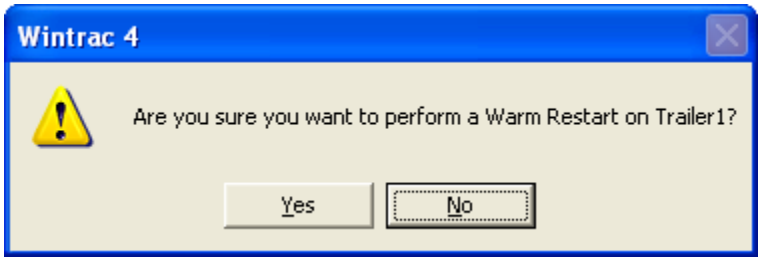


Step	Action	Result	Comments
11	A Warm Restart message similar to the one shown below will appear. Left click “Yes” to continue.		Only the OptiSet Plus settings will be changed. No other data or settings will be lost.

12	The Downloading ServiceWatch Settings display shown below will again appear briefly.		



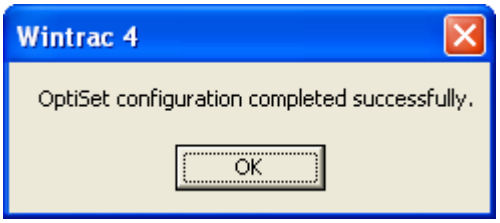
Step	Action	Result	Comments
13	A confirmation display message similar to the one shown below will appear. Left click “Yes” to continue.		



14	A confirmation display message similar to the one shown below will appear.		

Step	Action	Result	Comments
15	A display similar to the one shown below will appear indicating the unit has been restarted. Left click "OK" to continue.		

16	A display similar to the one shown below will appear indicating the OptiSet Plus Download is complete. Left click "OK" to return to the WinTrac Main Menu.		



Phase Detect Module Operation and Diagnostics

Where Used

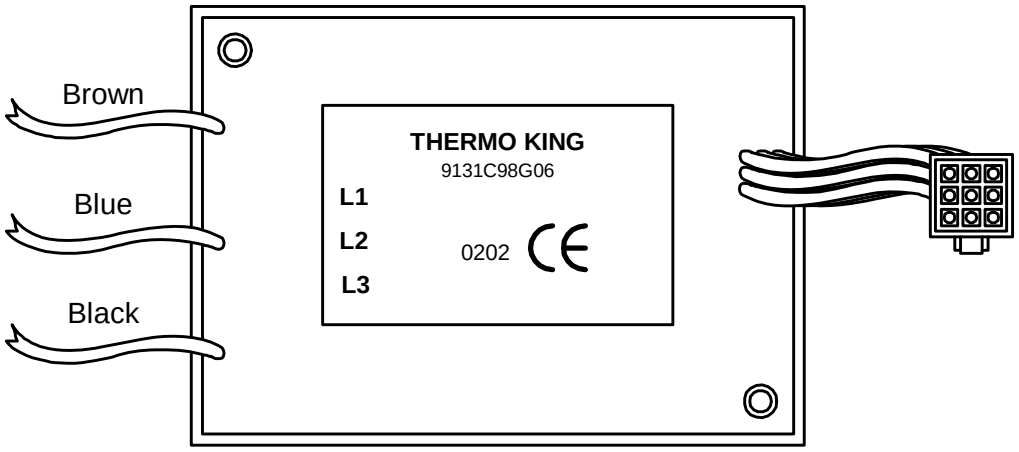
All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units equipped with electric standby

Purpose

To understand phase detect module operation and diagnostic procedures

Description

The phase detect module is designed to monitor 3 phase voltages from 160 volts AC thru 510 volts AC.



CAUTION: Units featuring optional Electric Standby utilize 460, 400 or 230 volt 3 phase AC electrical power any time the unit is operating in Electric Mode. This voltage potential is also present any time the unit is connected to a source of external standby power. Extreme care must be used when working on the unit, as these voltages are capable of causing serious injury or death.

Operation

The brown, blue and black wires are used to sample the power at L1, L2 and L3 respectively. Operating power from 12 to 24 VDC is supplied to the module via the 8 wire and CH wire.

When the voltage sensed rises above 180 volts AC and all three phases are present the module ER wire will output 12-24 VDC after the conditions exist for 2 to 4 seconds. This signal informs the base controller that electric standby operation is possible. If the voltage drops below 160 volts AC or a phase is lost, the output is turned off after the condition exists for 8 to 10 seconds. The module continues to monitor the power and will again output 12-24 VDC within 2 to 4 seconds after the voltage rises above 180 volts AC and all three phases are present.

If phase rotation is L1, L2, L3 the 7EB wire will supply 12 to 24 VDC to energize the appropriate phase rotation contactor. If phase rotation is L1, L3, L2 the 7EC wire will supply a chassis ground to energize the appropriate phase rotation contactor. The 7EB and 7EC wires are interlocked to prevent both phase contactors from being energized at once.

Connections

Connections to the module are shown in the tables below.

Power Connections

Input	Description
8F	Supplies nominal 12-24 volt DC power to the phase detect module.
CH	Chassis ground

Inputs

Input	Description
L1	This brown wire supplies standby power L1 to the phase detect module.
L2	This blue wire supplies standby power L2 to the phase detect module.
L3	This black wire supplies standby power L3 to the phase detect module.

Outputs

Output	Description
7EH	With 12-24 VDC is supplied, then outputs 7EB and 7EC will be at 12-24 VDC.
7EB	If phase rotation is L1, L2, L3 then this wire will provide 12-24 VDC to energize the appropriate phase rotation contactor. The 7EC wire is interlocked to prevent both phase contactors from being energized at once.
7EC	If phase rotation is L1, L3, L2 then this wire will provide 12-24 VDC to energize the appropriate phase rotation contactor. The 7EB wire is interlocked to prevent both phase contactors from being energized at once.
ER	This wire will output 12-24 VDC 2 to 4 seconds after the voltage rises above 180 volts AC and all three phases are present. If the voltage drops below 160 volts AC or a phase is lost and the condition remains for 8 to 10 seconds, the output is turned off. The module continues to monitor and will again output 12-24 VDC 2 to 4 seconds after the power returns to normal (voltage rises above 180 volts AC and all three phases are present).

Connector Pinout

Pin	Wire	Description
1	8F	Power to Module
2	CH	Chassis ground
3	ER	Power OK
4	7EH	Switches the 7EC and 7EB from grounding to power logic
5	7EB	Phase A-B-C
6	7EC	Phase A-C-B
7	Unused	
8	Unused	
9	Unused	

Removal and Replacement

CAUTION: Units featuring optional Electric Standby utilize 460, 400 or 230 volt 3 phase AC electrical power any time the unit is operating in Electric Mode. This voltage potential is also present any time the unit is connected to a source of external standby power. Extreme care must be used when working on the unit, as these voltages are capable of causing serious injury or death.

1. Turn the unit off.
2. Disconnect the unit battery.
3. Disconnect the standby power.
4. Disconnect the three wires from the phase detect module at the motor contactor.
5. Unplug the phase detect module harness.
6. Remove the old phase detect module.
7. Install the new phase detect module.
8. Connect the new phase detect module wires to the upper contactor as follows:
9. Connect the brown wire to L1 on the contactor.
10. Connect the blue wire to L2 on the contactor.
11. Connect the black wire to L3 on the contactor.
12. Use crimp-on terminals as required.
13. Connect the plug on the short harness from the phase detect module.
14. Install the high voltage cover.
15. Secure wires and wire harnesses as required using cable ties.
16. Connect the unit battery.
17. Connect standby power.
18. Perform a Pretrip Test to verify proper operation.

Diagnostics

CAUTION: Units featuring optional Electric Standby utilize 460, 400 or 230 volt 3 phase AC electrical power any time the unit is operating in Electric Mode. This voltage potential is also present any time the unit is connected to a source of external standby power. Extreme care must be used when working on the unit, as these voltages are capable of causing serious injury or death.

Step	Action	Result	Comments
1.	Plug the standby power cord into a known good standby power supply and turn the unit on.		
2.	Using a Fluke Meter, measure the standby voltage between phases L1 - L2, L2 - L3 and L3 - L1 at the input to the terminals where the Brown, Blue and Black wires are connected.	The standby voltage between phases should be between 200 - 500 VAC. If not, repair as necessary to supply the needed voltage to the unit.	
3.	Check the 8F and CH circuits to the phase detect module. 12-24 VDC must be present from 8F to CH.	If this power is not present, check the 8 circuit from the On/Off switch.	
4.	If correct power is present in the test above then the ER circuit on the interface board should have 12-24 VDC present.	If power is not present replace the phase detect module.	Removal and replacement of the phase detect module is detailed on a previous page.

Step	Action	Result	Comments
5.	If LED 6 on the interface board is on then the 7EH circuit should have 12-24 VDC present.	If power is not present check the Diesel/Electric Relay circuit on the interface board.	
6.	If the unit is calling for operation (LED 6 is on) one of the phase select contactors should be energized.	If neither contactor is energized check for 12-24 VDC. If voltage is not present replace the phase detect module.	Removal and replacement of the phase detect module is detailed on a previous page.

CargoWatch Data Logger

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units equipped with optional CargoWatch sensors

Purpose

To understand, use and diagnose the CargoWatch Data Logger

Description

The CargoWatch Data Logger is contained within the HMI Control Panel. This data logger conforms to European standard EN12830. The data logger supports up to 6 optional temperature sensors and 4 digital inputs. These optional sensors are not the same as the temperature sensors used to control the unit. Note that the CargoWatch data logger does not record unit sensors. Unit sensors and other unit operating data are recorded by the ServiceWatch data logger.

The CargoWatch data logger logs the following items:

- Up to 6 optional temperature sensors
- Up to 4 digital inputs (optional door switches)
- Setpoint
- Operating Modes – Timed and Event
- Defrost Entry and Exit
- Shutdown Alarms
- Real Time Clock Updates

CargoWatch Temperature Sensors

The sensors used for the CargoWatch data logger are RTD thermistor type sensors. These sensors are different and cannot be used to replace the unit temperature sensors. The Service Part number for the optional CargoWatch sensors is 41-5436. CargoWatch sensors can be identified by:

- No shrink tubing over sensor barrel
- Shorter sensor barrel than unit sensors
- No sensor grades

Thermistor CargoWatch Sensor

These thermistor sensors change resistance as the temperature changes. Resistance values are as shown in the table. They can be measured directly using a high quality ohmmeter. Note that this applies only to CargoWatch sensors.

CargoWatch Sensor Resistance vs Temperature

°F	°C	Ohms
-20°F	-29°C	166,356
-10°F	-23°C	115,757
0°F	-18°C	86,501
10°F	-12°C	61,737
20°F	-7°C	47,070
30°F	-1°C	34,374
32°F	0°C	32,650
40°F	4°C	26,688
50°F	10°C	19,904
60°F	16°C	15,002
70°F	21°C	11,944
80°F	27°C	9,166
90°F	32°C	7,402
100°F	38°C	5,775

CargoWatch Time and Date

The time and date used by the CargoWatch data logger is held in the HMI Control Panel. To set or change the date and time use the Set Time and Date feature at the end of the Maintenance Menu. The time and date can also be set or changed by using WinTrac 5.1 or later.

The HMI Control Panel will update the SR-3 Controller and the ServiceWatch data logger with the correct time and date each time the unit is turned on.

Downloads

To download the datalogger connect the download cable to the CargoWatch port on the unit. Downloads are obtained using WinTrac 5.1 or later.

Downloads can also be obtained by means of a Wintrac configured USB Flash Drive. See Section 4 of this manual for details.

Printing Reports

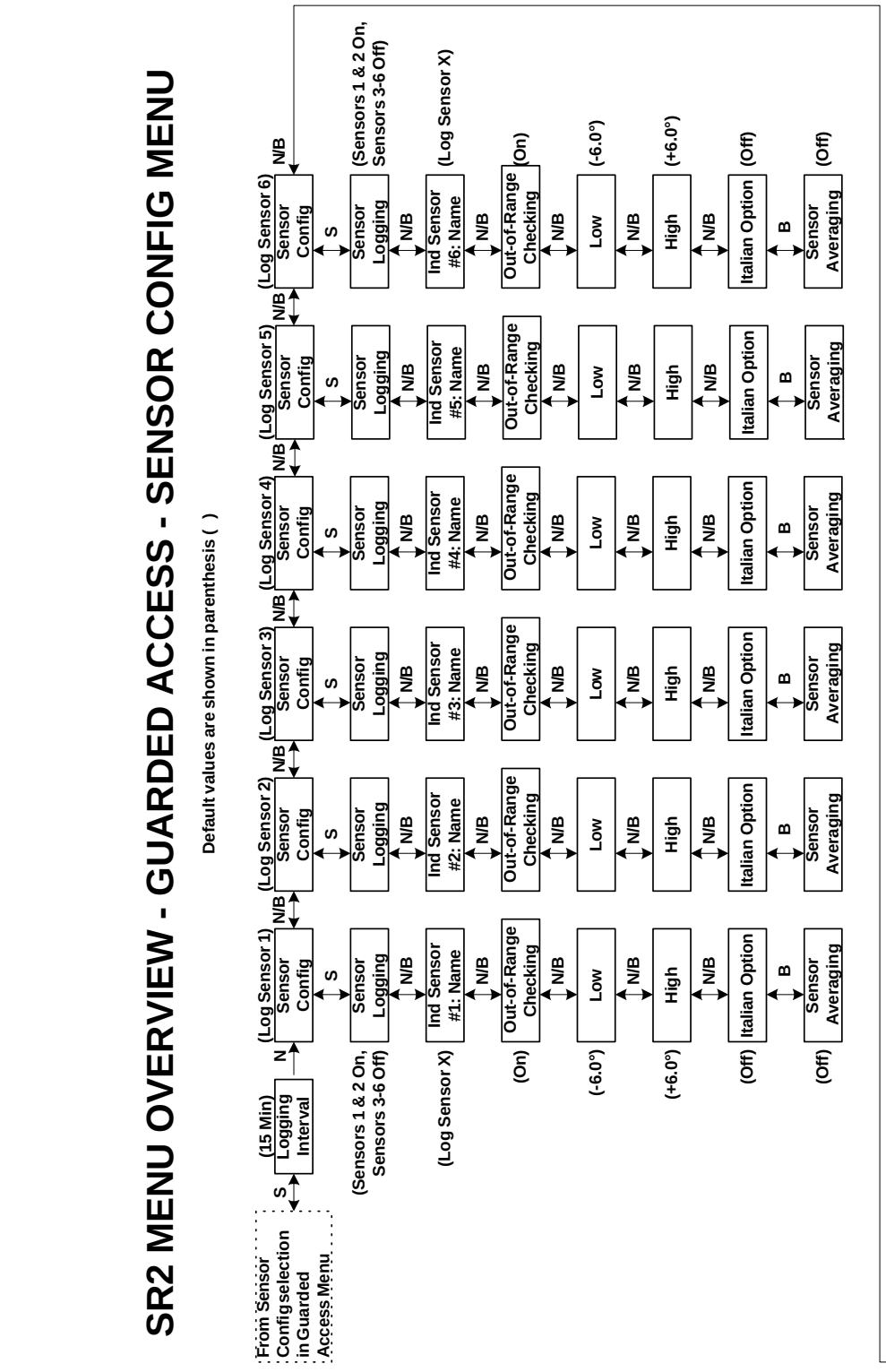
Trip Reports and Delivery Reports can be directly printed. The printer must be connected to the printer port connector located inside the unit control box. This port may be routed to the outside of the unit as required by the individual user.

Programmable Features

The CargoWatch data logger programmable features are set from the Sensor Configuration Sub-menu in the Guarded Access menu. The sensor features allow the logging interval to be set and the sensors and digital inputs to be enabled, named, and tailored to customer requirements. The flowchart on the next page illustrates the features and menu flow. See Section 3 of this manual for complete information on CargoWatch programmable features.

Programmable features may also be set up using WinTrac 5.1 or later.

Factory defaults have the Setpoint and CargoWatch Sensors 1 and 2 turned On. CargoWatch Sensors 3 through 6 and Digital Inputs 1 through 4 are turned Off.


SR2 MENU OVERVIEW - GUARDED ACCESS - SENSOR CONFIG MENU
Default values are shown in parenthesis ( )
From 'Sensor Config' selection in Guarded Access Menu
(15 Min) Logging Interval
(Sensors 1 & 2 On, Sensors 3-6 Off)
(Log Sensor X)
(On)
(-6.0°)
(+6.0°)
(Off)
(Off)
(Log Sensor 1)
(Log Sensor 2)
(Log Sensor 3)
(Log Sensor 4)
(Log Sensor 5)
(Log Sensor 6)
Sensor Config
Sensor Logging
Ind Sensor #1: Name
Ind Sensor #2: Name
Ind Sensor #3: Name
Ind Sensor #4: Name
Ind Sensor #5: Name
Ind Sensor #6: Name
Out-of-Range Checking
Low
High
Italian Option
Sensor Averaging
(Sensors 1 & 2 On, Sensors 3-6 Off)
(Log Sensor X)
(On)
(-6.0°)
(+6.0°)
(Off)
(Off)
Digital In 1
Digital In 2
Digital In 3
Digital In 4
Door Open Logging
Digital Input #1
Digital Input #2
Digital Input #3
Digital Input #4
(Digital 1 On, Digital 2-4 Off)
(Digital Input #X Name)
(Digital 1 On, Digital 2-4 Off)
(Digital Input #X Name)

ServiceWatch Data Logger

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To understand and use the ServiceWatch Data Logger

Description

The ServiceWatch Data Logger is contained within the SR-3 base controller.

ServiceWatch logs the following items:

- Thermo King Unit Serial Number
- Trailer Number
- SR-3 Serial Number
- SR-3 Software Revision
- Temperature Sensors
- Operating Modes
- Alarms Set and Cleared
- Defrost Entry and Exit
- Door Openings
- Real Time Clock Updates

ServiceWatch Time and Date

The time and date used by ServiceWatch are loaded from the HMI Control Panel each time the unit is turned on. To set or change the date and time use the Set Time and Date feature at the end of the Maintenance Menu.

To change the time and date with WinTrac the download cable must be connected to the CargoWarch port to change the time and date in the HMI Control Panel. The HMI Control Panel will then update the base controller and the ServiceWatch Data Logger when the unit is turned off and back on. Time and date can not be changed by connecting directly to the ServiceWatch Data Logger with WinTrac.

Downloads

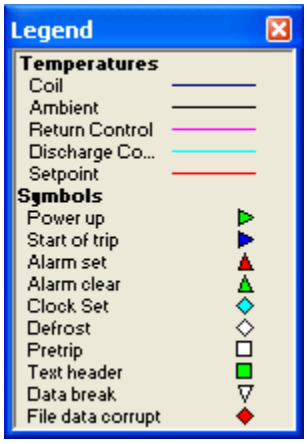
Downloads are obtained using WinTrac 5.1 or later as shown here.

Downloads can also be obtained by means of a Wintrac configured USB Flash Drive. See Section 4 of this manual for details.

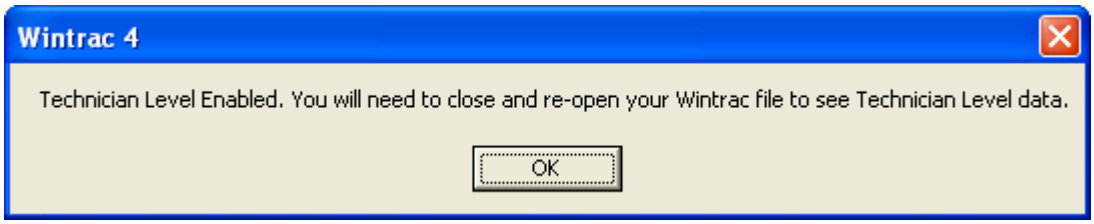
Step	Action	Result	Comments
1	Turn the unit on.		
2	Connect the download cable to the ServiceWatch port on the unit.		
3	Start WinTrac 5.1 or later	The WinTrac Display will appear.	
4	Left click the Truck Icon in the of the WinTrac menu bar.	WinTrac will connect to the SR-3 and display the Unit Serial Number, Trailer Number, SR-3 Serial Number and SR-3 Software Revision.	
5	Left click Download Data button .	The current data will be downloaded and saved.	
6	Left click the Close button.	The Download Display is closed.	

	To View the Customer Level Data	
7	Left click the File Icon in the upper left corner of the WinTrac menu bar.	The Open WinTrac File Menu appears.
8	Select the desired trailer number and data file and left click OK.	The file is opened. Customer Level data is shown according to the list below.

Customer Level Data

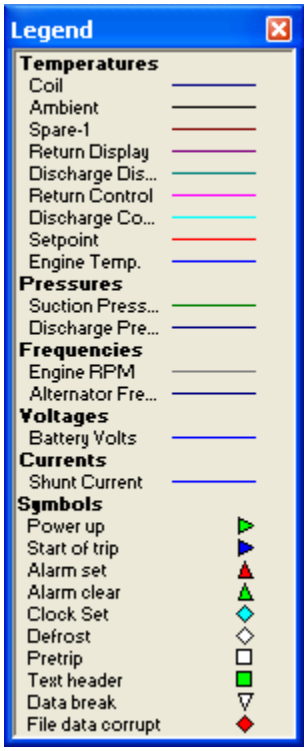
Graphical	Tabular
	• Setpoint • Return Control • Discharge Control • Ambient • Coil • Operating Mode

	To View the Technician Level Data	
7	From the WinTrac display press CTRL-SHIFT-T to enable the WinTrac Tool Menu	The Tool Menu appears in the WinTrac menu bar.
8	Left click the Tool Menu and select Enable Technician User Level.	The Technician Level is enabled and if a file is currently open the message shown below will appear.



9	Left click OK.	
10	Left click the File Icon in the upper left corner of the WinTrac menu bar.	The Open WinTrac File Menu appears.
11	Select the desired trailer number and data file and left click OK.	The file is opened. Technician Level data is shown according to the list on the next page.

Technician Level Data

Graphical	Tabular
	• Setpoint • Return Control • Return Display • Discharge Control • Discharge Display • Ambient • Coil • Spare 1 • Operating Mode • Suction Pressure • Discharge Pressure • ETV Position • Engine RPM • Engine Temp • ETV State • Battery Volts • Shunt Current • Alternator Frequency

Unit Temperature Sensor Test

Where Used

All SR-3 Single Temperature Units

Purpose

To confirm the proper operation of the unit temperature sensors

Materials Required

- Fluke Digital Multimeter.

Operation

Both graded and ungraded sensors are used on SR-3 applications. Graded sensors are used to sense return air and discharge air temperature. The spare sensor (if used) is also a graded sensor. Ungraded sensors are used to sense coil and ambient air temperature. Both graded and ungraded sensors are checked in the same manner.

Dual Sensors

Dual temperature sensors are provided for both return air temperature and discharge air temperature. The sensors are physically located next to each other to insure common readings. The control sensor is used for unit control and the display sensor is used by the HMI Control Panel to display the return and discharge temperatures.

Control and Display Return Air Sensors

These sensors monitor the temperature of the air returning to the evaporator coil. The sensors are located in the return air flow and are connected directly to the Base Controller/Interface Board connector J3. These sensors are graded sensors and must be replaced with graded sensors. The Base Controller/Interface Board must be calibrated to the actual grade of the installed sensor in order to operate properly. The Control Return Air Sensor is marked with one yellow cable tie and is connected to the Base Controller/Interface Board via the RTP and RTN wires. The Display Return Air Sensor is marked with two yellow cable ties and is connected to the Base Controller/Interface Board via the RTRP and RTRN wires. When replacing a sensor, be certain the sensors are connected properly.

Control and Display Discharge Air Sensors

These sensors monitor the temperature of the air leaving the evaporator coil. The sensors are located in the evaporator discharge air path and are connected directly to the Base Controller/Interface Board via connector J3. These sensors are graded sensors and must be replaced with graded sensors. The Base Controller/Interface Board must be calibrated to the actual grade of the installed sensor, in order to operate properly. The Control Discharge Air Sensor is marked with one red cable tie and is connected to the Base Controller/Interface Board via the DTP and DTN wires. The Display Discharge Air Sensor is marked with two red cable ties and is connected to the Base Controller/Interface Board via the DTRP and DTRN wires. When replacing a sensor, be certain the sensors are connected properly.

Hard and Soft Failures

Sensor alarms can occur in the following ways.

A **"Hard Failure"** is defined by an out of range sensor reading, typically caused by an open or shorted sensor. The sensor display will show dashes if a hard failure occurs. If this occurs, only the alarm code for that sensor will be set. Alarm code 13 will not be present. The HMI Control Panel may not be showing dashes for the sensor reading, but the alarm will be active when the unit is inspected. If a sensor alarm code is set, a failure did occur at some point. Checking a ServiceWatch data logger download at Technician Level may indicate when the hard failure occurred.

A **"Soft Failure"** is defined by erratic operation or sensor drift that exceeds acceptable tolerances, (sensor is out of calibration). If this occurs, the alarm code for the suspect sensor or sensors will be set along with Alarm Code 13. This indicates a potential problem that may not be immediately apparent, and that a hard failure as defined above did not occur. Checking a ServiceWatch data logger download at Technician Level may indicate when the soft failure occurred.

Diagnostic Procedure

Step	Action	Result	Comments
			Note: Polarity must be considered when connecting temperature sensors. If the sensors are connected backwards, the display will show dashes (----). Consult the schematic diagram or wiring diagram for the correct connections.
1	Disconnect the sensor to be replaced from the sensor harness.		
2	If the sensor is a soft failure, replace the sensor. Steps 3 thru 6 can be omitted. Go to Step 8.		
3	If the sensor is a hard failure, turn the unit on.		This step can be omitted if the failure is a soft failure.
4	Using a high quality meter check the voltage at the sensor harness wires.	The voltage from the Base Controller/Interface Board must be from 4.90 to 5.10 volts DC with the sensor disconnected.	This step can be omitted if the failure is a soft failure.

Step	Action	Result	Comments
5	If the voltage measured in the previous step is correct, go to Step 8.		This step can be omitted if the failure is a soft failure.
6	If the voltage measured in Step 4 above is incorrect, unplug the sensor connector at the Base Controller/Interface Board and check the harness for shorts and open wires.	Test and repair the harness as required. See Service Procedure H04A for additional information.	This step can be omitted if the failure is a soft failure.
7	If the harness passes inspection, check the Base Controller/Interface Board as shown in Service Procedure A01A.	If the Base Controller/Interface Board fails the test it must be replaced.	This step can be omitted if the failure is a soft failure.
8	If the failure is a soft failure or the voltage at the harness connector is correct replace the sensor.		

Pressure Transducer Test

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To confirm the proper operation of the suction or discharge pressure transducers

Materials Required

- Fluke Digital Multi-meter.

Additional Information

SR-3 Base Controller/Interface Boards have a separate 5 Vdc power supply for the Discharge Pressure Transducer, Suction Pressure Transducer and Coolant Level switch. A short circuit condition in one transducer or switch circuit should not affect the other devices.

Discharge Pressure Transducers

The maximum discharge pressure that can be displayed is 500 psig. If the sensed pressure is greater than 500 psig, the HMI Control Panel will display [- - - -] instead of the discharge pressure.

The minimum discharge pressure that can be sensed is -10 psig. The control system cannot determine if the minimum sensed pressure is the result of an electrical short or very low system pressure.

Suction Pressure Transducers

The maximum suction pressure that can be displayed is 200 psig. If the sensed pressure is greater than 200 psig, the HMI Control Panel will display [- - - -] instead of the suction pressure. When the unit is off and the refrigerant pressures have equalized, the system pressure can exceed 200 psig when ambient temperatures are above 90°F (35°C). If this occurs the HMI Control Panel will display [- - - -]. This is normal operation and no cause for concern.

The minimum suction pressure that can be sensed is -12 psig.

If the suction pressure transducer opens the display will read -10 PSIG. An alarm may not be generated immediately but the unit will be forced to low speed due to low suction pressure.

Pressure Transducer Identification

The Discharge Pressure Transducer will have “500” on the body of the part. The Suction Pressure Transducer will have “200” on the body of the part. The transducers are not interchangeable.

Diagnostic Procedure

Step	Action	Result	Comments
1.	Turn the unit on.		
2.	Access the Gauge menu and display the suction pressure or discharge pressure.	The display should show the pressure reading for the transducer. If the transducer reading is obviously incorrect or the display shows [- - - -], proceed as shown below.	Confirm reading with refrigeration gauges as necessary.
3.	Turn the unit off and disconnect the suction or discharge pressure transducer at the transducer plug.		
4.	Turn the unit on.		
5.	Check the voltage at the transducer harness connector.	The voltage between the DPP and DPN wires (Discharge Pressure) or SPP and SPN wires (Suction Pressure) must be from 4.90 to 5.10 volts DC. If the voltage is not present go to Step 6. If the voltage is correct go to Step 7.	

Step	Action	Result	Comments
6.	If the voltage is not present, check the harness continuity of the DPP-DPN or SPP-SPN wires.	If the continuity checks good and voltage is still not present, check the Base Controller/Interface Board using Service Procedure A01A. Replace the Base Controller/Interface Board if necessary.	
7.	IF the voltage is correct, check the harness continuity of the DPI or SPI wires.	If the voltage at Step 5 is present and the DPI or SPI wire has continuity, replace the transducer in question.	
8.	Transducer circuit operation can be verified by installing a known good transducer in the center port of a gauge manifold. Connect the transducer to the unit wiring harness and check the gauge reading.	If the transducer in the gauge manifold reads properly the unit transducer is bad.	Apply discharge or suction pressure to the test transducer via the gauge manifold center port.

CargoWatch Temperature Sensor Test

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To confirm the proper operation of the CargoWatch temperature sensors

Materials Required

- Fluke Digital Multimeter.

CargoWatch Temperature Sensors

The optional sensors used for the CargoWatch data logger are RTD thermistor type sensors. These sensors are different and cannot be used to replace the unit temperature sensors. The Service Part number for the optional CargoWatch sensors is 41-5436. CargoWatch sensors can be identified by:

- No shrink tubing over sensor barrel
- Shorter sensor barrel than unit sensors
- No sensor grades
- The sensor is not polarity sensitive
- Both wires are black

Thermistor CargoWatch Sensor

CargoWatch Temperature Sensor Resistor Values vs Temperature

CargoWatch thermistor type sensors change resistance as the temperature changes. Resistance values are as shown in the table below. They can be measured directly using a high quality ohmmeter. Note that this applies only to CargoWatch Data Logger sensors.

CargoWatch Sensor Resistance vs Temperature

°F	°C	Ohms
-20°F	-29°C	166,356
-10°F	-23°C	115,757
0°F	-18°C	86,501
10°F	-12°C	61,737
20°F	-7°C	47,070
30°F	-1°C	34,374
32°F	0°C	32,650
40°F	4°C	26,688
50°F	10°C	19,904
60°F	16°C	15,002
70°F	21°C	11,944
80°F	27°C	9,166
90°F	32°C	7,402
100°F	38°C	5,775

Diagnostic Procedure

Step	Action	Result	Comments
1	Disconnect the sensor to be tested from the sensor harness. This can be done at the 12 pin Deutsch connector in the evaporator compartment.		
2	Using a high quality meter, check the sensor resistance. This can be done at the 12 pin Deutsch connector in the evaporator compartment.	The sensor resistance is dependant on the sensor temperature as shown by the table on the previous page. The measured sensor resistance should approximate the value shown for the current sensor temperature.	If the sensor resistance does not match the table the sensor must be replaced.
3	If the resistance measured in the previous step is correct, go to Step 4. If the resistance measured is not correct replace the sensor.		
4	Using a high quality meter check the voltage at the sensor harness wires. This can be done at the 12 pin Deutsch connector in the evaporator compartment.	The voltage from the HMI Control Panel should be 2.5 Vdc with the sensor disconnected.	

Step	Action	Result	Comments
5	If the voltage measured in the previous step is correct, go to Step 7. If the voltage measured is not correct go to Step 6.		
6	If the voltage measured in Step 4 above is incorrect, unplug the 35 pin connector at the HMI Control Panel and check the harness for shorts and open wires.	Test and repair the harness as required. See Service Procedure H04A for additional information.	
7	If the harness passes inspection, check the HMI Control Panel as shown in Service Procedure A01B.	If the HMI Control Panel fails the test it must be replaced.	

Checking and Replacing the Oil Level Switch

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To test the oil level switch for proper operation

Materials Required

- Fluke Digital Multimeter.

Operation

The switch is open with the float up (indicating full oil level). The switch is closed with the float down (indicating low oil level).

Diagnostic Procedure

Step	Action	Result	Comments
1.	Turn the unit off.		
2.	Disconnect the Deutsch connector at the switch.		The oil level switch is located on the top of the oil pan.
3.	Use an ohmmeter to check switch continuity.	With the oil above the "add" mark, the switch should be open. If the engine is 6 or more quarts low the switch should be closed.	This check can be performed while changing oil.
4.	Reconnect the Deutsch connector.		

Replacing the Switch – Screw In Applications

Step	Action	Result	Comments
1.	Turn the unit off.		
2.	Disconnect the Deutsch connector at the switch.		The oil level switch is located on the top of the oil pan.
3.	Unscrew and remove the old switch.		
4.	Apply Teflon tape to the threads on the new switch.		
5.	Screw the new switch into the hole in the oil pan. Tighten until snug. Do not over-tighten.		
6.	Reconnect the Deutsch switch connector.		

Checking the Oil Pressure Switch

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To test the oil pressure switch for proper operation

Materials Required

- Fluke Digital Multi-meter.

Diagnostic Procedure

Step	Action	Result	Comments
1.	Connect a multi-meter set for DC Volts between the 20B wire at the oil pressure shutdown switch and chassis ground.		
2.	Turn the unit on and observe the meter reading.	The voltage with the unit on and the engine not running should be 0. If there is voltage present the switch is defective.	
3.	Start the engine and observe the meter reading.	Battery voltage should be present when the engine is running. If the voltage is low or is 0, proceed to Step 4.	

Step	Action	Result	Comments
4.	With the unit running, disconnect the 20B wire from the switch. Measure the voltage from the 20B wire to chassis ground.	If the battery voltage is present on the wire, the switch is defective and should be replaced.	
		If the voltage on the 20B wire is low or 0, there is a problem in the 20B circuit.	Check the 20B circuit as required to determine the cause.

Magnetic Coolant Level Sensor Test

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To confirm proper operation of the magnetic coolant level sensor

Materials Required

- Fluke Digital Multimeter.

Operation

A magnetic reed switch is used to determine the coolant level. This two wire switch is supplied with +5 VDC from the Base Controller/Interface Board on the CLP wire (J7 Pin 15). The switch outputs +5 VDC on the CLS wire (J7 Pin 16) when coolant level is above the sensor and less than 0 VDC when the coolant level is below the sensor.

The switch is housed in an isolated chamber within the coolant tank. A magnetic float is located in the engine coolant adjacent to the switch chamber. The switch will open or close as the magnetic float falls or rises with the coolant level. The switch can be changed without removing coolant from the radiator. Exercise care when removing and installing the reed switch as the switch is enclosed in a glass shell.

Diagnostic Procedure

Step	Action	Result	Comments
1	Disconnect the switch and check the voltage between the CLP wire at the sensor harness connector and chassis ground for + 5 VDC.	+ 5 VDC should be present between the CLP wire and chassis ground. If not, check the harness and connectors as required to determine the cause.	

Step	Action	Result	Comments
2	If + 5 VDC is present at the sensor, check the voltage on the CLS wire at the sensor harness connector.	Less than 0.5 VDC should be present when the coolant level is below the switch and +5 VDC should be present when the coolant level is above the switch. If these voltages are not present the sensor must be replaced.	
3	The switch is housed in an isolated chamber within the coolant tank. The switch can be changed without removing coolant from the radiator.		Exercise care when removing and installing the reed switch as the switch is enclosed in a glass shell. Carefully pry the switch from the chamber in the coolant tank. To install the switch carefully press it into the chamber by hand.

Coolant Temperature Sensor Test

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

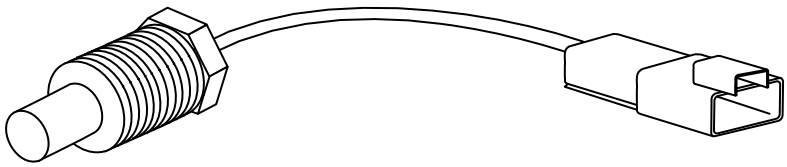
Purpose

To test the coolant temperature sensor for proper operation

Materials Required

- Fluke Digital Multi-meter.

Engine Temperature Sensor



Diagnostic Procedure

Step	Action	Result	Comments
1.			**Note:** Polarity must be considered when connecting temperature sensors. If the sensors are connected backwards, the display will show dashes [- - - -]. Consult the schematic diagram or wiring diagram for the correct connections.
2.	Turn the unit off.		
3.	Disconnect the sensor at the plug next to the sensor.		
4.	Turn the unit on.	The Standard Display will appear.	
5.	Access the Gauge menu and display Coolant Temperature.	The display for the Engine Coolant Temperature sensor should show dashes [- - - -].	If all the temperature sensors show dashes [- - - -] without being disconnected, the Base Controller/Interface Board is defective.
6.	Using a high quality meter check the voltage at the sensor plug on the harness.	The voltage must be from 4.90 to 5.10 volts DC.	
7.	If the voltage at the harness connector is correct, replace the sensor.		

Step	Action	Result	Comments
8.	If the voltage measured in Step 6 above is incorrect, check the Base Controller/Interface Board as shown in Service Procedure A01A.	If the Base Controller/Interface Board fails the test it must be replaced.	
9.	If the Base Controller/Interface Board passes the test, the problem is in the wiring harness.	Test and repair the harness as required.	

RPM Sensor Test and Adjustment

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To test and adjust the RPM sensor

Materials Required

- Fluke Digital Multimeter.

Operation

The RPM sensor rarely fails but may require adjustment for proper operation.

Diagnostic Procedure

Step	Action	Result	Comments
1.	Turn the unit off.		
2.	Remove the FS1 and FS2 wires from the sensor.		
3.	Check the sensor resistance using a high quality multi-meter.	The sensor resistance should be 250 to 300 ohms with the wires removed. If not, the sensor should be replaced.	
4.	Loosen the lock nut, turn the sensor in until it contacts the ring gear on the flywheel, then back it out ½ turn and tighten the lock nut.		

Step	Action	Result	Comments
5.	Start the unit.		
6.	Using Service Test Mode, place the unit in high speed cool [HSC].		For information on Service Test Mode see Section 4.
7.	Check the voltage across the sensor terminals with the FS1 and FS2 wires removed.	The voltage in high speed should read from 1.0 to 5.0 volts ac.	Set the meter to read AC volts.
8.	If the required voltage is not present, replace the RPM sensor. If the required voltage is present, check the harness wires and repair as required.		
9.	Reattach the FS1 and FS2 wires to the sensor.		Polarity is not important.
10.	Access the Gauge menu and display Engine RPM.	The display should show the engine RPM.	
11.	If the RPM reading does not appear in the display, check the base controller as shown in Service Procedure A01A.	If the base controller fails the test it must be replaced.	

Electronic Throttling Valve (ETV) Test

Where Used

All SR-3 units equipped with an Electronic Throttling Valve (ETV)

Purpose

To confirm proper operation of the Electronic Throttling Valve

- Test ETV to confirm operation.
- If the ETV must be changed consult the Maintenance Manual for the specific unit.

Materials Required

- Fluke Digital Multimeter.

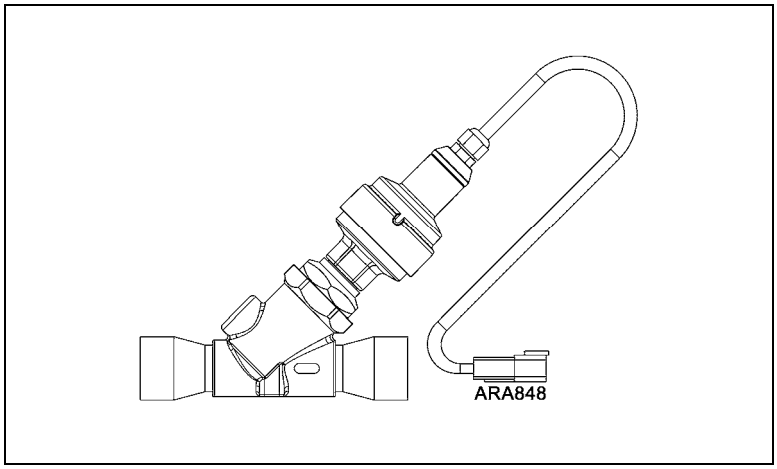
Operation

This procedure should be used to check the operation of the electronic throttling valve if Alarm Code 89 Check Electronic Throttling Valve Circuit occurs. Alarm Code 89 indicates that refrigeration system pressures did not respond as expected. This may be caused by a malfunction in the electronic throttling valve circuits or a refrigeration system problem such as low refrigerant level, frozen expansion valve or a severe suction side restriction.

The Electronic Throttling Valve has two internal coils. The Base Controller/Interface Board operates the valve is by energizing the coils with a variable frequency ac signal. The sequence in which the Base Controller/Interface Board energizes the coils determines the direction of travel and the frequency of the signal determines the speed of valve motion. Wires EVA and EVB energize one coil and wires EVC and EVD energize the other coil. The ETV circuits are protected by Smart FETs. Valve position may be monitored by using the Gauge key. 0 indicates the valve is fully closed and 800 indicates the valve is fully opened.

IMPORTANT: The LED's on SR-3 Base Controller/Interface Boards can be used to verify controller output to the ETV.

Electronic Throttling Valve Types and Wire Color Codes



Electronic Throttling Valve

- The current electronic throttling valves do not have a removable connector on the valve. There is a sheathed cable consisting of colored wires that run from the connector on the valve to the Deutsch harness connector on this pigtail as shown above. The color code and connections for this valve are shown in the table below.

Harness Wire	Wire Colors
EVA	Red
EVB	Green
EVC	White
EVD	Black

SR-3 Base Controller/Interface Boards feature yellow and green ETV LED's located at the lower right edge of the board. These LED's flash when a signal is being sent to the ETV. These LED's flash rapidly for a brief period of time on initial startup. They flash at a slower rate when the valve is opening or closing normally. If LED's are flashing a signal is being sent to the ETV.

Diagnostic Procedure

Step	Action	Result	Comments
1	Be certain that all connectors are secure.		
2	Disconnect the Base Controller/Interface Board connector J7 and measure the resistance from the EVA wire to the EVB wire at the connector. J7 Pin 24 – EVA wire J7 Pin 23 – EVB wire	The resistance should be from 20 to 35 ohms. If the resistance is incorrect check the EVA and EVB wires and connectors leading to the electronic throttling valve. Also check the EVA and EVB wires for shorts to ground. Be sure the valve connector is properly attached to the valve.	Identify the associated pins on the ETV and check for continuity at the valve. If the resistance from the EVA and EVB pins directly on the valve is not from 20 to 35 ohms the valve is defective. Neither pin should show a short to ground.
3	Measure the resistance from the EVC wire to the EVD wire at the connector. J7 Pin 11 – EVC wire J7 Pin 12 – EVD wire	The resistance should be from 20 to 35 ohms. If the resistance is incorrect check the EVC and EVD wires and connectors leading to the electronic throttling valve. Also check the EVC and EVD wires for shorts to ground. Be sure the valve connector is properly attached to the valve.	Identify the associated pins on the ETV and check for continuity at the valve. If the resistance from the EVC and EVD pins directly on the valve is not from 20 to 35 ohms the valve is defective. Neither pin should show a short to ground.
4	Reconnect J7 to the Base Controller/Interface Board.		

Step	Action	Result	Comments
5	Temporarily connect a known good test ETV at the ETV connector. **IMPORTANT:** Be sure to use the entire valve, not just a replacement stepper motor and piston assembly. If only a stepper motor and piston assembly is used, the piston may become completely unscrewed from the stepper motor shaft.		The original valve can be left in place on the unit. **IMPORTANT:** If the piston becomes completely unscrewed from the stepper motor shaft then further disassembly is required to reinstall the piston on the stepper motor shaft.
6	Position an assistant in the trailer to report valve operation.		
7	From the Maintenance Menu, enter Evacuation Test.	The test ETV should open when Evacuation Test is entered.	
8	Exit Evacuation Test.	The test ETV should close when Evacuation Test is exited.	
9	If the test ETV opens and closes as described in Step 7 & 8, replace the unit ETV stepper motor/piston assembly.		If the entire ETV must be changed consult the Maintenance Manual for the specific unit.

Step	Action	Result	Comments
10	If the test ETV does not open and close as described in Steps 7 and 8, test the Base Controller/Interface Board as shown in Service Procedure A01A.		
11	If the Base Controller/Interface Board Test fails, replace the Base Controller/Interface Board.		
12	When repairs are complete perform a Full Pretrip Test as shown in Section 4 to confirm proper operation.		

Wiring Harness Continuity Test

Where Used

All SR-3 Single Temperature and SR-3 Spectrum Multi-Temperature units

Purpose

To illustrate the correct procedures for checking harness continuity on equipment utilizing solid state devices

Materials Required

- Fluke Digital Multimeter
- Jumper wires as required

Important Notes

- Do not use battery and light test tools to check continuity.
- Do not check to see if a circuit is energized by tapping a circuit wire to ground and watching for a spark.

Diagnostic Procedure

Step	Action	Result	Comments
1.	Do not use battery and light test tools to check continuity.		Using such devices may present excessive voltage or current to solid state devices. In many cases the device will be damaged or destroyed.

Step	Action	Result	Comments
2.	Use a high quality digital multi-meter or an analog meter with high input impedance.		Older analog (needle type meter movement) meters and some inexpensive “mechanic tool box” meters present a large load to the circuit being tested. This can significantly alter the meter reading, especially when measuring small voltages or currents.
3.	Never test a circuit to see if it is energized by tapping the circuit wire to ground and watching for a spark.		This will damage solid state components or blow a fuse.
4.	Locate the suspect circuit on the appropriate wiring diagram.		

Step	Action	Result	Comments
5.	Isolate both ends of the circuit using the following methods as required. • Disconnect the appropriate connector at the Base Controller/Interface Board. • Disconnect the device connector at the device. • Remove the wire from the device terminal.		Harness connections are identified in the Service Procedures appropriate to the device in question. They may also be determined by consulting the wiring diagrams. ***CAUTION: Failure to isolate both ends may cause misleading results.***
6.	Using jumpers as required, connect each end of the circuit to a high quality multimeter.	The meter must show a very low resistance (less than 1.0 ohm), indicating circuit continuity. If not, the circuit is open or has excessive resistance. Troubleshoot the circuit to determine the cause using the wiring diagrams.	Be certain the ohmmeter battery is good and the meter zeros with the leads held together to prevent misleading results.

Step	Action	Result	Comments
7.	After determining that the circuit passes a continuity test, remove one lead and connect it to chassis ground to check for a short to ground.	The meter should indicate an open circuit. If not, the circuit is shorted to ground. Trouble-shoot the circuit to determine the cause using the wiring diagrams.	

Table of Contents Section 7

Section 7 – SR-3 Service Information Index

SR-3 Hardware Features

Table of Contents

SR-3 BASE CONTROLLER/INTERFACE BOARDS

SR-3 Base Controller/Interface Board Hardware Versions

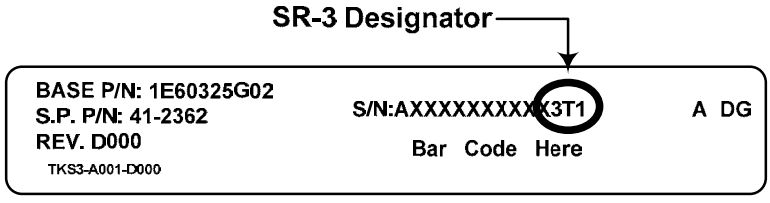
There are currently two versions of the SR-3 (3T1) Base Controller/Interface Board/Interface Board as shown in the Table below.

Service Parts Numbers for SR-3 Base Controller/Interface Boards

Dates	Base Controller/Interface Board Description	Type Designator	Service Part #
Production SLX S/T Units from September 2010 To Present	Supports Damper Gear Motor Does not support USB Port	N/A	45-2362
Production SB S/T Units from February 2011 To Present	Does not support Damper Gear Motor Supports USB Port	N/A	45-2361

SR-3 Base Controller/Interface Board Identification

The SR-3 Base Controller/Interface Board is identified by Service Part Number as shown above. The serial number of SR-3 Base Controller/Interface Boards ends in 3T1 as shown below.



SR-3 Base Controller/Interface Board Software Requirements

Single temperature applications with SR-3 Base Controller/Interface Boards must use SR-3 Base Controller/Interface Board Software Revisions D0xx.

SR-3 Base Controller/Interface Board Compatibility

The SR-3 Base Controller/Interface Board is 100% compatible with and may be used to replace the combined SR-2 Base Controller/Interface Board and Interface Board assembly. The SR-3 Base Controller/Interface Board mounting base uses the same mounting hole pattern as did the SR-2 Base Controller/Interface Board. The connectors on the SR-3 Base Controller/Interface Board are located in approximately the same positions as they are on an SR-2 Interface Board. However, when replacing an SR-2 Base Controller/Interface Board/Interface Board with an SR-3 Base Controller/Interface Board the wiring harness may need to be relocated slightly to reach the some of the connectors.

It is critical that the correct software be used.

- Single temperature applications with SR-2 Base Controller/Interface Boards must use Base Controller/Interface Board Software Revisions B0xx.

- Single temperature applications with SR-3 Base Controller/Interface Boards must use Base Controller/Interface Board Software Revisions D0xx.

- Multi-temperature applications with SR-3 Base Controller/Interface Boards have not yet been implemented.

SR-3 HMI CONTROL PANELS

SR-3 HMI Control Panel Hardware Versions

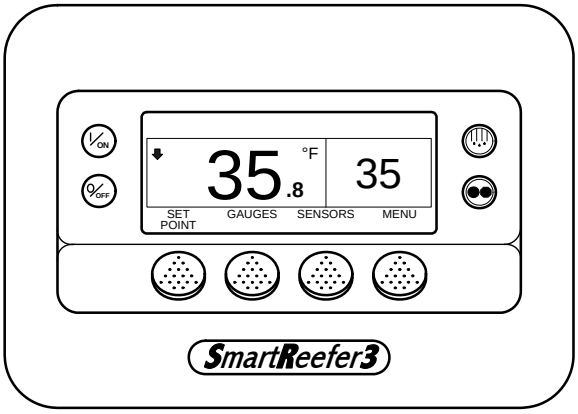
The SR-3 Control System uses essentially the same HMI Control Panel as does the SR-2 Control System. However, SR-3 HMI Control Panels feature 8 MB of memory and are marked Smart Reefer 3 on the lower front panel as shown below.

Service Part Number 45-2372 SR-3 Base Controller/Interface Board

- Production release for NAD SB units starting February 2011.

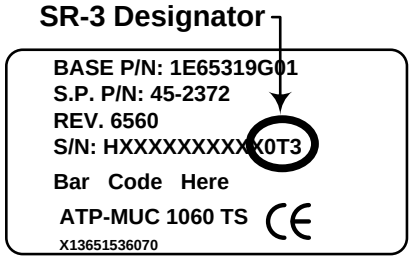
SR-3 HMI Control Panel Identification

The SR-3 HMI Control Panel is identified by Service Part Number as shown on the label. It can be physically identified by the Smart Reefer 3 Decal on the front panel as shown below.



SR-3 HMI Control Panel Label Location

The HMI Control Panel label showing the Service Part number is located on the back of the assembly. The serial number of SR-3 HMI Control Panel ends in 0T3 as shown below.



SR-3 HMI Control Panel Software Requirements

- SR-3 HMI Control Panels used on SR-3 applications without USB capability and use HMI Control Panel Software Revision 6550 or later.

- SR-3 HMI Control Panels used on SR-3 applications with USB capability and use HMI Control Panel Software Revision 6560 or later.

SR-3 HMI Control Panel Compatibility

The SR-3 Control System uses essentially the same HMI Control Panel as does the SR-2 Control System. However, SR-3 HMI Control Panels feature 8 MB of memory and are marked Smart Reefer 3 on the lower front panel as shown below. The SR-2 HMI Control Panels feature 4 MB of memory. Other than memory, the SR-3 HMI Control Panel is compatible with and may be used to replace the SR-2 HMI Control Panel.

Service Parts Numbers for SR-3 HMI Control Panels

HMI Control Panel	HMI Control Panel Description	Type Designator	Service Part #
SR-3	Current SR-3 HMI Control Panel. Front panel art reads "SR-3".	HMI-3	45-2372

SR-2/SR-3 DIAGNOSTIC TOOL

Base Controller/Interface Board and HMI Control Panel Diagnostic Tool

An SR-2/SR-3 Diagnostic Tool with Diagnostic Tool Software 4.1 or greater is required to test the SR-3 Base Controller/Interface Board. The SR-3 Base Controller/Interface Board is currently used on SR-3 Single Temperature Trailer applications. This Diagnostic Tool will also work on all previous SR-2 Truck and Trailer Base Controller/Interface Boards and Trailer HMI Control Panels. It also tests the Truck Premium HMI Control Panel.

The new Diagnostic Tool is available as a complete tool and also as an update kit for the SR-2 Blue Diagnostic Tool.

Features:

The SR-2/SR-3 Diagnostic Tool includes the following new features.

- ✓ Tests the SR-3 Base Controller/Interface Board
- ✓ Tests the SR-3 USB Communications Port
- ✓ Tests the SR-2 and SR-3 Base Controller and HMI Control Panel CAN Ports using a USB to CAN Adaptor

Service Parts Number for the Complete SR-2/SR-3 Diagnostic Tool

The complete SR-2/SR-3 Diagnostic Tool is available as Service Part Number 204-1930. It includes the following:

- ✓ The Blue Diagnostic Tool. This component is the same as the Blue Diagnostic Tool supplied with earlier versions of the Diagnostic Tool.
- ✓ All cables supplied with previous Blue Diagnostic Tool.
- ✓ A USB Cable to connect the USB Port on the SR-3 Base Controller to a USB Flash Drive.
- ✓ A USB to CAN Adaptor. This adaptor is required to perform the CAN Test that is part of the new Diagnostic Tool.
- ✓ A CAN Test Cable to connect the USB to CAN Adaptor to the Diagnostic Tool J1 Connector.
- ✓ A Premium Truck HMI Cable to connect the Premium Truck HMI Control Panel to the Diagnostic Tool J2 Connector.
- ✓ SR-2/SR-3 Diagnostic Tool Software Revision 4.1.
- ✓ Instructions and Storage Box.

Service Parts Number for the SR-2/SR-3 Diagnostic Tool Upgrade Kit

The SR-2/SR-3 Diagnostic Tool Upgrade Kit is available as Service Part Number 204-1931. It utilizes the current Blue SR-2 Diagnostic Tool hardware (Part Number 204-1196) and cables with no changes and includes the following:

- ✓ A USB Cable to connect the USB Port on the SR-3 Base Controller to a USB Flash Drive.
- ✓ A USB to CAN Adaptor. This adaptor is required to perform the CAN Test that is part of the new Diagnostic Tool.
- ✓ A CAN Test Cable to connect the USB to CAN Adaptor to the Diagnostic Tool J1 Connector.
- ✓ A Premium Truck HMI Cable to connect the Premium Truck HMI Control Panel to the Diagnostic Tool J2 Connector.
- ✓ SR-2/SR-3 Diagnostic Tool Software Revision 4.1.
- ✓ Instructions.

SR-3 SOFTWARE FEATURES

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SR-3 BASE CONTROLLER/INTERFACE BOARD/INTERFACE BOARD SOFTWARE

SR-3 Trailer Single Temperature Base Controller/Interface Board Software Revisions

IMPORTANT: When necessary to flash load new software to a Base Controller/Interface Board use the most recent revision available.

IMPORTANT: Software upgrades made to units with previous software revisions are not covered by a warranty labor allowance.

Single Temperature Applications The Base Controller/Interface Board software family for single temperature applications is D0xx. The current single temperature SR-3 Base Controller/Interface Board software is available on SharePoint InfoCentral.

Base Controller/Interface Board Software Revision D000

Dates	Features	Interchange with:
Production SLX S/T Units from September 2010 To March 2011	• ESA SLX Production release • SR-2 Feature Set • Supports Damper Gear Motor • Does not support USB Port	None

Base Controller/Interface Board Software Revision D005

Dates	Features	Interchange with:
Production SB S/T Units from February 2011 To March 2011	• NAD Production release • SR-2 Feature Set • Does not support Damper Gear Motor • Supports USB Port	None

Base Controller/Interface Board Software Revision D006

Dates	Features	Interchange with:
Units with Fresh Air Exchange only starting June 2011	• All D005 and D007 Features • Supports Fresh Air Exchange Feature	Use only for units equipped with the Fresh Air Exchange Feature

Base Controller/Interface Board Software Revision D007

Dates	Features	Interchange with:
Production SB and SLX S/T Units from March 2011 To Current	• All D000 and D005 Features • Corrected nuisance refrigeration Alarm Code 21 Cooling Cycle Check and Alarm Code 26 Check Refrigeration Capacity on SR-3 units equipped with ETV	Replaced D005 by Campaign CB528 in all NAD SB Units

Availability of SR-3 Base Controller/Interface Board Single Temp Software

The most current version of SR-3 Single Temperature Base Controller/Interface Board software is available on the internet.

When SR-3 Base Controller and/or HMI Control Panel flash load files are downloaded from the Thermo King iService web site, the flash load files are downloaded as a *.ZIP file. When flash load files for SR-3 applications are unzipped, there will now be three flash load files instead of the usual two.

- ✓ The traditional *.mXX and *.cXX files will be unzipped. These two files are for use when flash loading an SR-3 Unit in the traditional manner using a Data Cable to connect the SR-3 Unit to the PC Computer equipped with WinTrac.

  NOTE: Both the *.mXX and *.cXX files must be present in order to perform a flash load using a Data Cable, even though only one of them is shown by WinTrac.

- ✓ A *.FLA file will also be unzipped. This file is for use when flash loading a unit using a WinTrac 5.1 configured USB Flash Drive.

  The Flashload Directory on the configured USB Flash Drive contains sub-directories for HMI and SR3SINGLE TEMP flash load *.FLA files. The *.FLA file must be placed in the correct directory on the flash drive using either the WinTrac 5.1 Upload > Manage Flashload Files feature or Windows Explorer.

Revision D007 Trailer Single Temperature SR-3 Base Controller Software is available on the Thermo King TSA Info Central web site. Go to:

http://www.thermoking.com/tk/index.asp

Choose TSA Info Central and select Home > Software and Downloads > Microprocessors > Trailer Microprocessor Updates.

- ✓ The file name for the *.ZIP file containing both the traditional .mXX and .cXX files and the *.FLA file is Micro Code D007 Update for the SR-3 Single Temp Base Controller.zip. Double click this file to install the software.

Flash Loading using PC Computer

For additional information on flash loading Base Controller software using a PC computer, WinTrac 5.1 and a data cable, see Service Procedure A46A Flash Loading Base Controller Software in Section 6 of the SR-3 Trailer Single Temperature Diagnostic Manual (TK 54842).

Flash Loading using USB Flash Drive

SR-3 equipped units can also flash load HMI Control Panel and SR-3 Base Controller software using a WinTrac configured USB Flash Drive. See USB Flash Drive in Section 4 of the SR-3 Trailer Single Temperature Diagnostic Manual (TK 54842) for details.

SR-3 POWER ON/OFF CONTROL

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SR-3 POWER ON/OFF CONTROL

SR-3 HMI Control Panels with software revision 6550 or later control power on and power off operations by the use of a Supervisor Microprocessor located within the SR-3 HMI Control Panel.

- Power on requests are controlled by turning on the SR-3 HMI Control Panel. This in turn supplies a path to chassis ground to energize the On/Off Relay K9. The unit will turn on.
- Power off requests are controlled by removing the path to chassis ground to de-energize Relay K9.
- The CargoWatch Data Logger will document power on and what device turned power on (SR-3 HMI Control Panel, SCOM or an external device such as iBox).
- The CargoWatch Data Logger will document power off and what device turned power off (SR-3 HMI Control Panel, SCOM or an external device such as iBox).

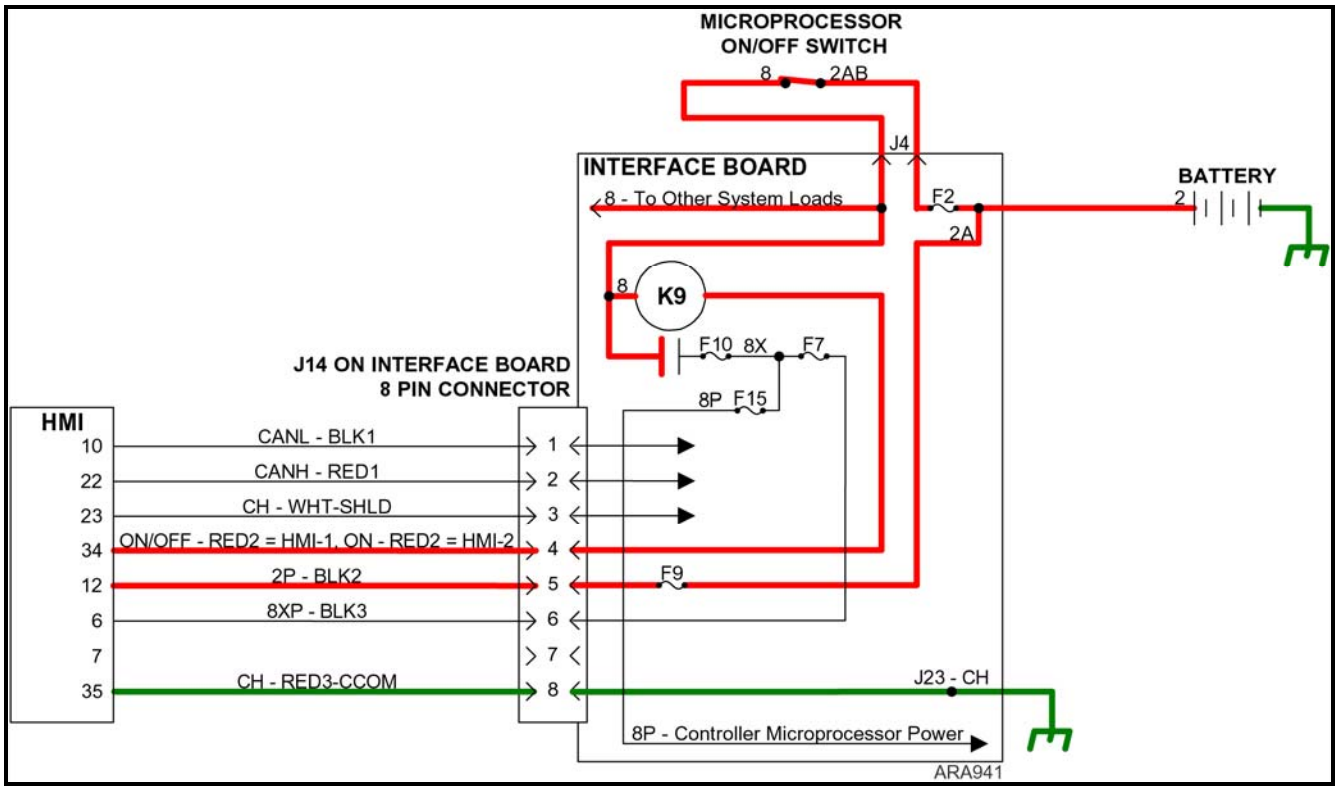
SCHEMATIC DIAGRAM TEXT COLOR DEFINITIONS

The text colors shown below are used on the schematic diagrams in this section:

- **CH chassis ground circuits are shown in green on the diagrams.**
- **Power circuits are shown in red on the diagrams.**
- **Other text colors are defined in the descriptions.**
- **The Microprocessor On/Off Switch is turned on (closed).**

SR-3 HMI CONTROL PANEL - UNIT NOT TURNED ON

The diagram below shows the power conditions present before the unit has been turned on. Note that battery voltage is present at SR-3 HMI Control Panel Pin 34 through the coil of the On/Off Relay K9 and the ON/OFF circuit.



Unit is Turned Off – Microprocessor Power Switch is On

NOTE: SR-3 HMI Control Panel Pin 12 will have power from the battery even if the Microprocessor On/Off Switch is turned off (open).

SR-3 HMI CONTROL PANEL - TURNING THE UNIT ON

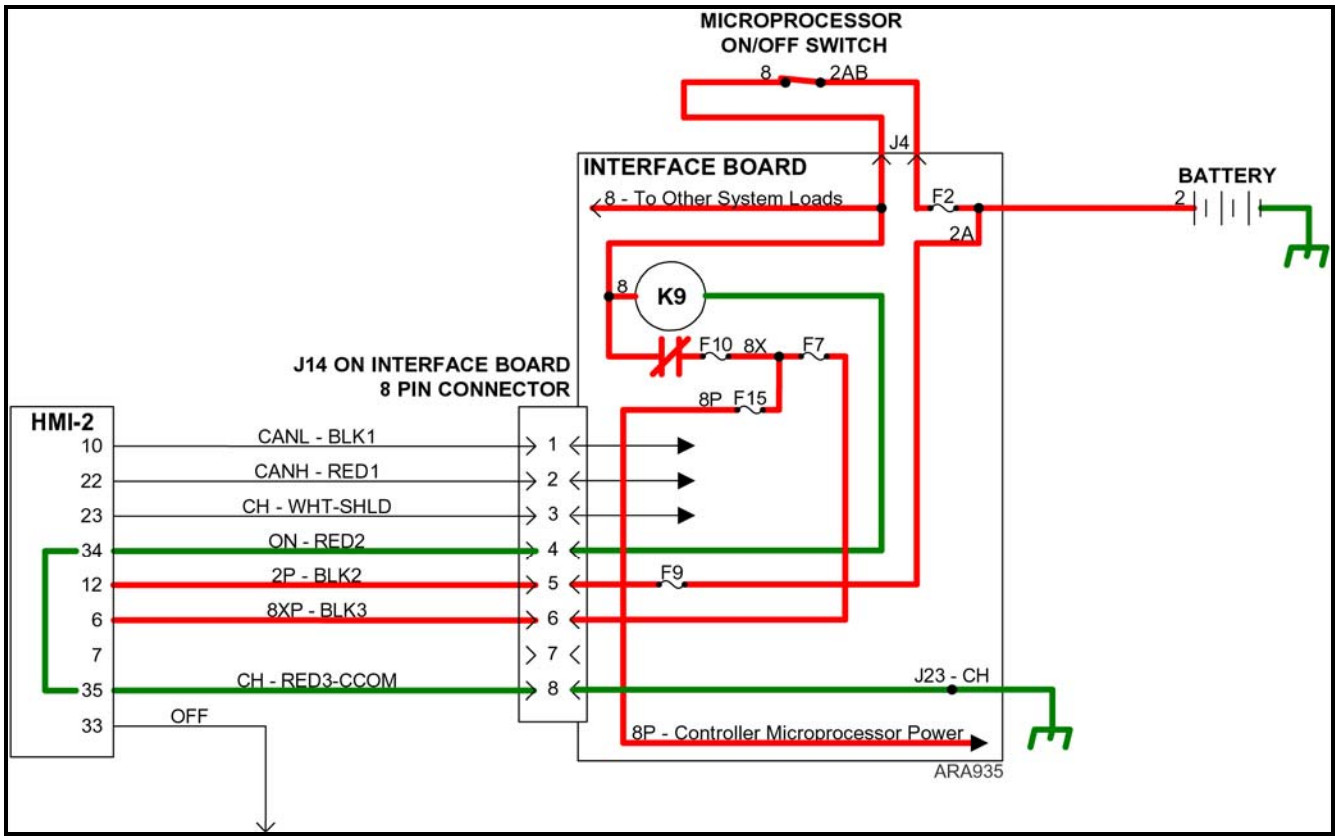
The diagram on the facing page shows the power conditions when the unit has been turned on by pressing the On Key of an SR-3 HMI Control Panel.

1. **Pressing the On Key of the SR-3 HMI Control Panel turns the SR-3 HMI microprocessor on. The SR-3 HMI Control Panel microprocessor then supplies chassis ground to the ON/OFF circuit at HMI Control Panel Pin 34 by connecting it internally to HMI Control Panel Pin 35.**
2. **This energizes the On/Off Relay K9, which closes the normally open K9 contacts to supply power to the 8X, 8P, and 8XP - BLK3 circuits. The K9 LED 23 will light to indicate the On/Off Relay K9 is energized. The 8P circuit signals the Base Controller/Interface Board to turn on. The Base Controller/Interface Board Heart Beat LED 21 will begin to flash, indicating that the Base Controller/Interface Board is powered up. The 8XP – BLK3 wire supplies feedback to pin 6 of the HMI Control Panel that the SR-3 Base Controller is powered up.**
3. **The unit will start and run as determined by the SR-3 Base Controller/Interface Board programmable feature settings.**

NOTE: Battery power is present at SR-3 HMI Control Panel Pin 12 even if the Microprocessor On/Off Switch is turned off (open).

NOTE: The SR-3 HMI Control Panel communicates with the SR-3 Base Controller through the CAN (Controller Area Network) bus connections CANL - BLK1 and CANH - RED1. CAN is a standard serial communications protocol that allows communication between two or more devices. The circuit that connects devices is called the CAN Bus.

NOTE: The SR-3 HMI Control Panel monitors power on the 8X circuit through the 8XP – BLK3 circuit.

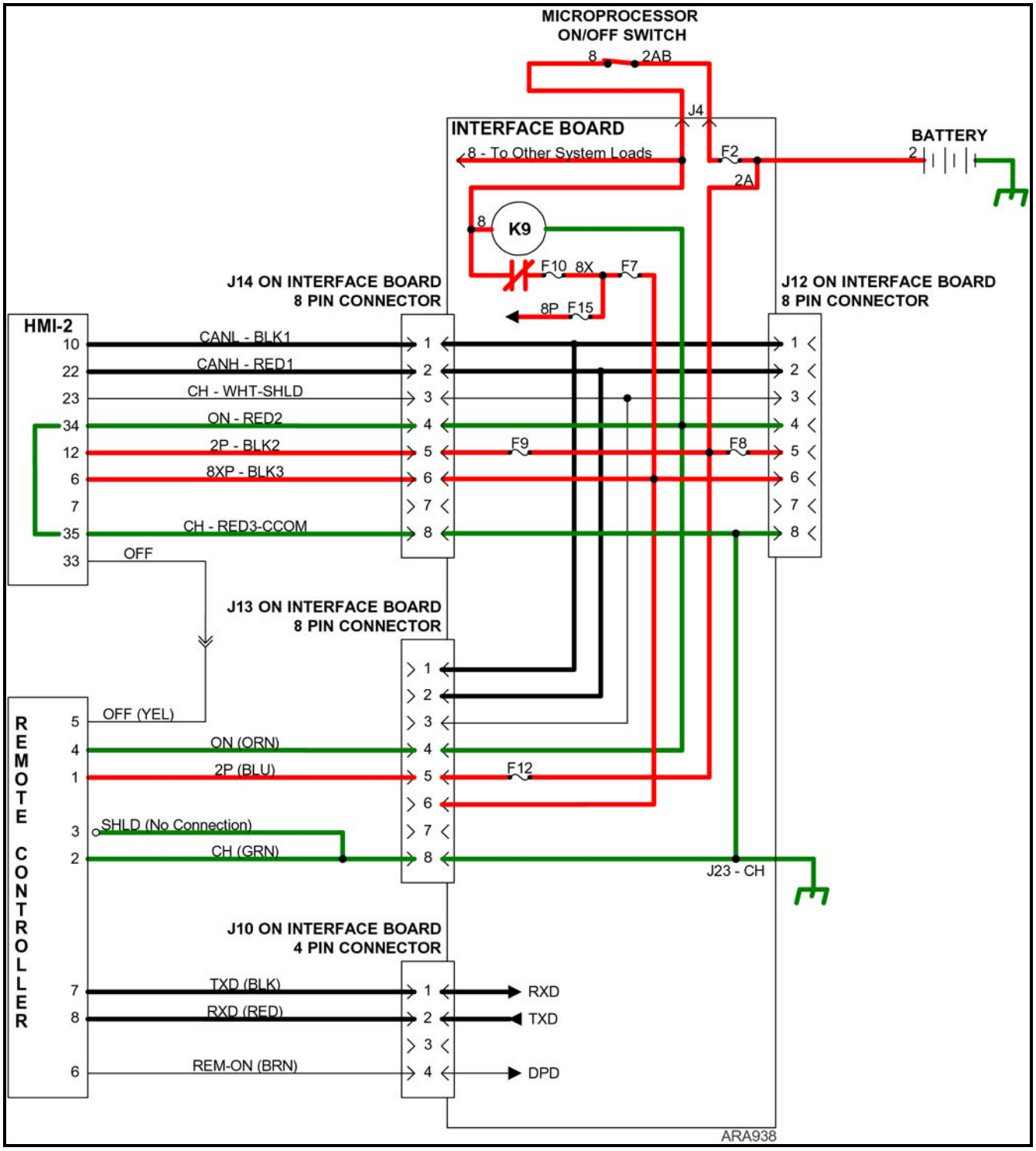


Turning Unit On with SR-3 HMI Control Panel

SR-3 HMI CONTROL PANEL – TURNING THE UNIT ON WITH A REMOTE CONTROL PANEL

The diagram on the facing page shows the power conditions present when the unit has been turned on by pressing the On Key of a Remote Control Panel on a unit equipped with an SR-3 HMI Control Panel.

1. **Pressing the On Key of the Remote Control Panel initiates turning the unit on by supplying chassis ground to the ON (ORN) circuit at the Remote Control Panel Pin 4 for 5 seconds. This turns the HMI Control Panel on and energizes the On/Off Relay K9. During this 5 second interval the communications in steps 2 through 7 occur. After 5 seconds the Remote Control Panel removes the ground from the ON (ORN) circuit but the On/Off Relay K9 is now provided a ground by the HMI Control Panel (see step 7) and will remain on.**
2. **The SR-3 HMI Control Panel powers up and displays the "REMOTE START-PLEASE WAIT" screen.**
3. **The SR-3 HMI Control Panel then sends a query via the CAN Bus to the SR-3 Base Controller asking if the Remote Control Panel is attempting to turn the unit on.**
4. **The SR-3 Base Controller then sends a query via the RS-232 serial port (RXD and TXD circuits) to the Remote Control Panel asking if the Remote Control Panel is attempting to turn the unit on.**
5. **The Remote Control Panel will then reply via the RS-232 serial port (RXD and TXD circuits) to the SR-3 Base Controller that it is attempting to turn the unit on.**
6. **The SR-3 Base Controller then replies to the HMI Control Panel via the CAN Bus that the Remote Control Panel is attempting to turn the unit on.**
7. **The SR-3 HMI Control Panel microprocessor then supplies chassis ground to the ON/OFF circuit at HMI Control Panel Pin 34 by connecting it internally to HMI Control Panel Pin 35.**
8. **This energizes the On/Off Relay K9, which closes the normally open K9 contacts to supply power to the 8X, 8P, and 8XP - BLK3 circuits. The K9 LED 23 will light to indicate the On/Off Relay K9 is energized. The 8P circuit signals the Base Controller/Interface Board to turn on. The Base Controller/Interface Board Heart Beat LED 21 will begin to flash, indicating that the Base Controller/Interface Board is powered up. The 8XP – BLK3 wire supplies feedback to pin 6 of the HMI Control Panel that the SR-3 Base Controller is powered up.**
9. **The unit will start and run as determined by the SR-3 Base Controller and the Remote Control Panel programmable feature settings.**



Turning Unit On with SR-3 HMI Control Panel and Remote Control Panel

This simplified diagram does not show the remote controller harness connector located in the evaporator.

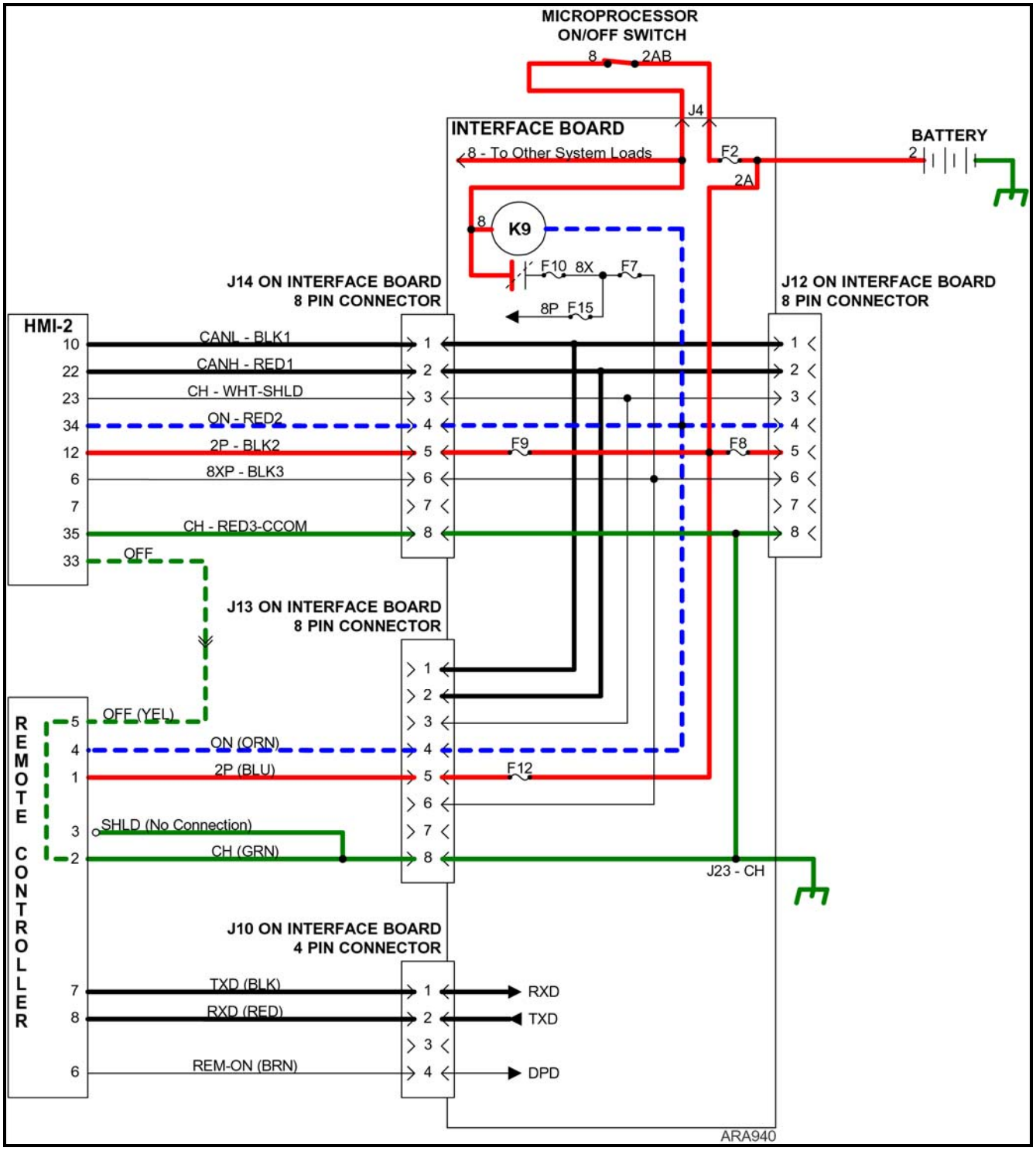
SR-3 HMI CONTROL PANEL – TURNING THE UNIT OFF WITH A REMOTE CONTROL PANEL

The diagram on the facing page shows the power conditions present when the unit has been turned off by pressing the Off Key of a Remote Control Panel on a unit equipped with an SR-3 HMI Control Panel.

1. **Pressing the Off Key of the Remote Control Panel momentarily supplies a chassis ground to the OFF circuit at the Remote Control Panel Pin 5 as shown by the green dashed lines. This causes the SR-3 HMI Control Panel to begin to power down.**
2. **The SR-3 HMI Control Panel then powers down. This turns the unit off by removing the ground from the ON/OFF circuit at HMI Control Panel pin 34 to de-energize the On/Off Relay K9 relay as shown by bold blue dashed lines.**
3. **When the On/Off Relay is de-energized power is removed from the 8X, 8P, and 8XP – BLK3 circuits as shown in thin black on the diagram. When power is removed from the 8P circuit this signals the Base Controller/Interface Board to turn off. The Base Controller/Interface Board Heart Beat LED 21 will stop flashing, indicating that the Base Controller/Interface Board is powered down.**

NOTE: If the OFF (YEL) circuit from the Remote Controller to the SR-3 HMI Control Panel is not connected, the SR-3 HMI Control Panel will power down by sending messages via the communications ports.

NOTE: On SR-3 applications the Off Line is connected to CAN Connectors J12, J13 and J14 at Pin 7. The OFF Line is also connected to CAN Connector J98 Pin 10.


MICROPROCESSOR
ON/OFF SWITCH
8
2AB
J4
INTERFACE BOARD
8 - To Other System Loads
F2
2A
BATTERY
2
8
K9
F10
8X
F7
8P
F15
J14 ON INTERFACE BOARD
8 PIN CONNECTOR
J12 ON INTERFACE BOARD
8 PIN CONNECTOR
HMI-2
10
22
23
34
12
6
7
35
33
CANL - BLK1
CANH - RED1
CH - WHT-SHLD
ON - RED2
2P - BLK2
8XP - BLK3
CH - RED3-CCOM
OFF
F9
F8
J13 ON INTERFACE BOARD
8 PIN CONNECTOR
REMOTE CONTROLLER
5
4
1
3
2
OFF (YEL)
ON (ORN)
2P (BLU)
SHLD (No Connection)
CH (GRN)
F12
J23 - CH
J10 ON INTERFACE BOARD
4 PIN CONNECTOR
7
8
6
TXD (BLK)
RXD (RED)
REM-ON (BRN)
RXD
TXD
DPD
ARA940

SR-3 HMI CONTROL PANEL SOFTWARE

SR-2 and SR-3 HMI Control Panel Revisions

HMI Control Panel Software Revisions 65xx, 66xx, 67xx and 68xx functions with both single temperature and multi-temperature SR-2 and SR-3 applications.

The four revisions of HMI Control Panel software (65xx, 66xx, 67xx and 68xx) are identical other than the languages supported. All four support English. The languages supported by each revision are shown below.

65xx Software	66xx Software	67xx Software	68xx Software
English Spanish French German Italian Dutch Portuguese Greek Turkish Hebrew Arabic	English Russian Polish Hungarian Romanian Bulgarian Czech Danish Swedish Norwegian Finnish	English Japanese Chinese	68xx allows three configurations of languages. • English only • English and Spanish only • English and up to five languages from the 65xx and 66xx lists

IMPORTANT: When necessary to flash load new software to an HMI Control Panel use the most recent revision available.

IMPORTANT: Software upgrades made to units with previous software revisions <u>are not covered by a warranty labor allowance</u>.

Compatibility

HMI Control Panels used on SR-3 applications must use HMI Control Panel Software Revision 6550 or later.

HMI Control Panel Software Revision 6550-6650-6750-6850 for SR-3 Applications

Dates	Features	Interchange with:
Production SLX Units starting September 2010 To Current	Production release.	None

HMI Control Panel Software Revision 6560-6660-6760-6860 for SR-3 Applications

Dates	Features	Interchange with:
Production SB Units starting March 2011 to Current	Production release. Supports USB Communications Port	None

HMI Control Panel Software Revision 6561-6661-6761-6861 for SR-3 Applications

Dates	Features	Interchange with:
Units with Fresh Air Exchange only starting June 2011	Supports Fresh Air Exchange feature.	Use only for units equipped with the Fresh Air Exchange Feature

Availability of Current SR-2 and SR-3 HMI Control Panel Software

The most current version of SR-2 and SR-3 HMI Control Panel software is available on the internet.

When SR-3 Base Controller and/or HMI Control Panel flash load files are downloaded from the Thermo King iService web site, the flash load files are downloaded as a *.ZIP file. When flash load files for SR-3 applications are unzipped, there will now be three flash load files instead of the usual two.

- ✓ The traditional *.mXX and *.cXX files will be unzipped. These two files are for use when flash loading an SR-3 unit in the traditional manner by using a Data Cable to connect the SR-3 Unit to a PC Computer equipped with WinTrac.

  NOTE: Both the *.mXX and *.cXX files must be present in order to perform a flash load using a Data Cable, even though only one of them is shown by WinTrac.

- ✓ A *.FLA file will also be unzipped. This file is for use when flash loading a unit using a WinTrac 5.1 configured USB Flash Drive.

  The Flashload Directory on the configured USB Flash Drive contains sub-directories for HMI and SR3SINGLE TEMP flash load *.FLA files. The *.FLA file must be placed in the correct directory on the flash drive using either the WinTrac 5.1 Upload > Manage Flashload Files feature or Windows Explorer.

SR-2 and SR-3 Revision 6560 Trailer HMI Control Panel Software is available on the Thermo King TSA Info Central web site. Go to:

http://www.thermoking.com/tk/index.asp

Choose TSA Info Central and select Home > Software and Downloads > Microprocessors > Trailer Microprocessor Updates.

- ✓ The file name for the *.ZIP file containing both the traditional .mXX and .cXX files and the *.FLA file is Micro Code 6560 Update for the SR-3 HMI Control Panel.zip. Double click this file to install the software.

Flash Loading using PC Computer

For additional information on flash loading HMI Control Panel software using a PC computer, WinTrac 5.1 and a data cable, see Service Procedure A46B Flash Loading HMI Control Panel Software in the appropriate SR-2 or SR-3 Diagnostic Manual.

- ✓ SR-2 Trailer Single Temperature Diagnostic Manual (TK 51727)
- ✓ SR-3 Trailer Single Temperature Diagnostic Manual (TK 54842)

Flash Loading using USB Flash Drive

SR-3 equipped units can also flash load HMI Control Panel and SR-3 Base Controller software using a WinTrac configured USB Flash Drive. See USB Flash Drive in Section 4 of the SR-3 Trailer Single Temperature Diagnostic Manual (TK 54842) for details.

SR-2/SR-3 DIAGNOSTIC TOOL SOFTWARE

Base Controller/Interface Board and HMI Control Panel Tester

An SR-2/SR-3 Diagnostic Tool with Diagnostic Tool Software 4.1 or greater is required to test the SR-3 Base Controller/Interface Board. The SR-3 Base Controller/Interface Board is currently used on SR-3 Single Temperature Trailer applications. This Diagnostic Tool will also work on all previous SR-2 Truck and Trailer Base Controller/Interface Boards and Trailer HMI Control Panels. It also tests the Truck Premium HMI Control Panel. The new Diagnostic Tool is available as a complete tool and also as an update kit for the SR-2 Blue Diagnostic Tool.

Features:

The SR-2/SR-3 Diagnostic Tool includes the following new features.

- ✓ Tests the SR-3 Base Controller/Interface Board
- ✓ Tests the SR-3 USB Communications Port
- ✓ Tests the SR-2 and SR-3 Base Controller and HMI Control Panel CAN Ports using a USB to CAN Adaptor

Service Parts Number for the Complete SR-2/SR-3 Diagnostic Tool

The Diagnostic Tester for SR-3 applications is Service Part # 204-1930.

Service Parts Number for the SR-2/SR-3 Diagnostic Tool Upgrade Kit

The Service Part Number for the Upgrade Kit is 204-1931.

Diagnostic Tool Software

SR-2 Diagnostic Tool Revision 4.1 software is available on the Thermo King TSA Info Central web site. Go to:

http://www.thermoking.com/tk/index.asp

Choose TSA Info Central and select Home > Software and Downloads > SR-2 and SR-3 Diagnostic Tool. The file name is SR-2 SR-3 Diagnostic Tool Software Version 4.1 for the Blue Tester.zip. It will take a few moments to load. Save and unzip the file to the desired directory on your computer. It will take a few moments to unzip and there will be several files as a result. If necessary, double click Setup.exe to install the software.

SR-3 OPTISET REQUIREMENTS

If OptiSet Plus is being used with an SR-3 unit, then OptiSet Plus 4.1 Software and WinTrac 5.1 Software is required. Original OptiSet or OptiSet Plus 1.0, 2.0 or 3.0 software and WinTrac 4.9 or earlier software cannot be used for OptiSet Plus applications on SR-3 trailer units.

OptiSet Plus 4.1 is fully backwards compatible with all previous Thermo King applications requiring OptiSet Plus software.

Features:

- ✓ OptiSet Plus 4.1 supports SR-3 Single Temperature Trailer Units.
- ✓ OptiSet Plus 4.1 allows Revision D005 Base Controller software and HMI Control Panel 6560 software to be selected when setting up OptiSet Plus files.
- ✓ Other OptiSet Plus 4.1 features are similar to OptiSet Plus 3.0.

Compatibility:

- ✓ If OptiSet Plus is being used, OptiSet Plus 4.1 Software is required for use with SR-3 Trailer Units.
- ✓ OptiSet Plus 4.1 Software is fully compatible with all previous OptiSet Plus applications.
- ✓ WinTrac 5.1 software is required.

Sending and Retrieving OptiSet Plus Files using a Data Cable and PC Computer with WinTrac

OptiSet Plus *.XML files can be sent directly to and from the unit in the traditional manner using a Data Cable and a PC Computer. No file conversion is required.

Using OptiSet Plus with a WinTrac configured USB Flash Drive

Thermo King SR-3 Trailer Units provide a USB (Universal Serial Bus) Port located on the unit control panel. A USB Flash Drive can be connected to the USB port. The Flash Drive used must first be configured using WinTrac 5.1 or later. When the Flash Drive has been properly configured and enabled, the following functions can be performed.

- ✓ Send and Retrieve OptiSet Plus files

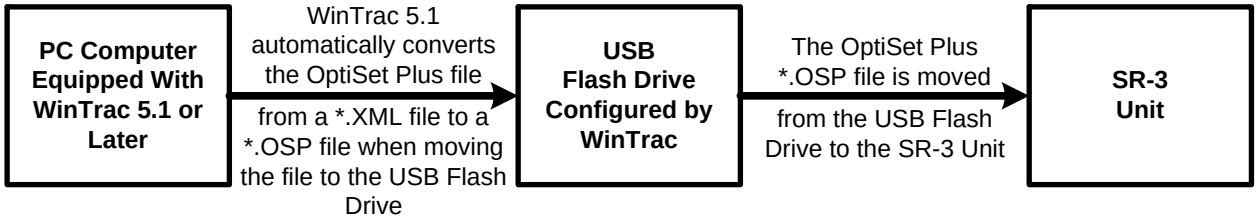
OptiSet Plus Data Files when using a USB Flash Drive

If OptiSet Plus is being used with a USB Flash Drive, the file formats of the OptiSet Plus data files must be considered.

IMPORTANT: The WinTrac 5.1 Upload > Manage OptiSet Plus Files feature must be used to move OptiSet Plus files to or from the flash drive or the file conversion process will not take place. Do not move OptiSet Plus files to or from the flash drive using Windows Explorer. Only ServiceWatch and CargoWatch Data Logger data files and flash load *.FLA files can be moved using Windows Explorer.

- ✓ OptiSet Plus only uses data files that are in the *.XML format.
- ✓ When sending and retrieving OptiSet Plus data using the USB Flash Drive, the data is transferred between the flash drive and the SR-3 unit using *.OSP files. OptiSet Plus is unable to directly use these *.OSP files. These *.OSP files must be converted to *.XML files before they can be used by OptiSet Plus.
- ✓ This file conversion is done automatically when the files are moved to or from the flash drive using the WinTrac 5.1 Upload > Manage OptiSet Plus Files feature as shown below and on the next page.

Sending OptiSet Plus Files to the SR-3 Unit using a USB Flash Drive and WinTrac



Retrieving OptiSet Plus Files from the SR-3 Unit using a USB Flash Drive and WinTrac

For additional details see USB Flash Drive in Section 4 of the SR-3 Single Temperature Trailer Diagnostic Manual (TK54842) and Service Bulletin TT562 WinTrac 5.0 and 5.1 Software.

Availability:

OptiSet Plus on the Internet OptiSet Plus 4.1 software is available on the Thermo King TSA Info Central web site. Go to:

http://www.thermoking.com/tk/index.asp

Choose TSA Info Central and select Home > Software and Downloads > OptiSet Plus > OptiSet Plus 4.1. The file name is OptiSetPlus-4.1.zip. It will take a few moments to load. Save and unzip the file to the desired directory on your computer. It will take a few moments to unzip and there will be several files as a result. If necessary, double click Setup.exe to install the software.

For additional information on installing and using OptiSet Plus 4.1 Software see the extensive help information available from the OptiSet Plus 4.1 Help Menu.

SR-3 WINTRAC REQUIREMENTS

WinTrac 5.1 or later is required for use with SR-3 applications.

Features

- WinTrac 5.1 software supports Thermo King SR-3 single temperature trailer applications.
- The WinTrac 5.1 User Manual was updated and improved.
- WinTrac 5.1 provides improved flash load recovery compared to earlier WinTrac versions.
- WinTrac 5.1 supports the configuration of a USB flash drive for use with SR-3 units. When a properly configured USB flash drive is connected to the SR-3 front panel USB connector, the flash drive user interface is shown on the HMI Control Panel. The USB flash drive provides SR-3 CargoWatch and ServiceWatch Data Logger downloads, flash loading SR-3 HMI Control Panel and Base Controller software as well as sending and retrieving OptiSet Plus files. See additional information on page 3 of this bulletin.

Compatibility:

WinTrac 5.1 software is fully backwards compatible with all previous Thermo King applications requiring WinTrac software.

WinTrac 5.1 Software is required for compatibility with North American SR-3 single temperature trailer units with USB Communications Port and with HMI Control Panel software 6560 and Base Controller software D005.

Availability:

WinTrac on the Internet WinTrac 5.1 Upgrade software is available on the Thermo King TSA Info Central web site. **NOTE:** An existing version of WinTrac must be present on the computer in order to install WinTrac 5.1 Upgrade software. Go to:

http://www.thermoking.com/tk/index.asp

Choose TSA Info Central and select Home > Software AND Downloads > WinTrac. The file name is WinTrac 5.1 Upgrade.zip. It will take a few moments to load. Save and unzip the file to the desired directory on your computer. It will take a few moments to unzip and there will be several files as a result. If necessary, double click Setup.exe to install the software.

WinTrac on CD Both the full version and upgrade version of WinTrac 5.1 are available on CD from Service Parts under the numbers shown below.

Version	Where Used	Interchange With	Service Parts #
WinTrac 5.1 Full Version Publications # 54696-8-CD	All WinTrac Applications	Replaces all previous	204-1934
WinTrac 5.1 Upgrade Version Publications # 54697-8-CD See **NOTE 1**.	All WinTrac Applications	Replaces all previous	204-1935

NOTE 1 - An existing version of WinTrac must be present on the computer in order to install WinTrac 5.1 Upgrade software.

For additional information on installing and using WinTrac Revision 5.1 Software see the WinTrac 5.0 User's Guide (TK 54890-8-MS). The WinTrac 5.0 User's Guide is also available from the WinTrac 5.1 Help Menu.

SR-3 HMI CONTROL PANEL MESSAGES AND THEIR CAUSES

The following error messages will appear on the SR-3 HMI Control Panel display if the stated conditions occur.

[SYSTEM IS POWERING DOWN]

If the HMI Control Panel ON key is pressed and the TK Logo display is shown and then [SYSTEM IS POWERING DOWN] appears, the OFF Line between a remote control device and the HMI Control Panel is likely shorted to ground. The HMI Control Panel will not remain powered up if the OFF Line is shorted to ground. On SR-3 applications the Off Line is connected to CAN Connectors J12, J13 and J14 at Pin 7. The OFF Line is also connected to CAN Connector J98 Pin 10.

NOTE: In some cases, if the OFF Line circuit is shorted to ground the HMI Control Panel may not power up at all.

[COMMUNICATIONS FAILURE -- LOST CONTROLLER CONNECT]

This message indicates that the HMI Control Panel has not received any messages from the SR-3 Base Controller for 20 seconds. The HMI Control Panel will stay powered up and try to re-establish communications with the SR-3 Base Controller via the CAN Bus. This message can result from one of the following conditions.

- This message may appear if there are open or shorted circuits on the CANL or CANH wires between the HMI Control Panel and the SR-3 Base Controller CAN Bus circuits.

- This message may appear if the CAN communications fail between the HMI Control Panel and SR-3 Base Controller or if CAN communications are not operational.

- This message may appear if the HMI Control Panel or SR-3 Base Controller is defective.

[LOST CONTROLLER POWER]

This message indicates that the HMI Control Panel has detected a loss of power on the 8XP circuit and that the SR-3 Base Controller did not respond to messages from the HMI Control Panel for at least 3 seconds. If this occurs the HMI Control Panel will display LOST CONTROLLER POWER -- POWERING DOWN and shut down. This message can result from one of the following conditions.

- This message may appear if there are open circuits or bad connections on the 8XP and CAN Bus circuits between the HMI Control Panel and the SR-3 Base Controller
- This message may appear if Fuse F10 is blown or if the K9 On/Off Relay on the Base Controller is defective.
- This message may appear if the SR-3 Base Controller is defective.

[CHECK 8X WIRING]

If this message appears it indicates that the HMI Control Panel has detected a loss of power on the 8XP circuit but that CAN communications between the HMI Control Panel and the SR-3 Base Controller still exist. This message can result if 8XP power is lost as a result of one of the following conditions.

- Loss of 8XP power could be caused by an open 8XP circuit or a bad connection between the HMI Control Panel and the SR-3 Base Controller.
- Loss of 8XP power will occur if Fuse F7 on the SR-3 Base Controller is blown.

HMI Power Up and Power Down Documentation

SR-3 HMI Control Panels have a Supervisor microprocessor that documents the reason a unit is powered up or powered down. The power up and power down information is logged into the CargoWatch Data Logger contained in the HMI Control Panel. This data can be very helpful in determining the causes of power up and power down issues. One exception to the logging of these items is if a power supply or ground problem turns the HMI off instantly. If this should happen the HMI is immediately Off and will not make the normal logs that it does in a controlled power down sequence.

The table's below list the Power Up and Power Down reasons along with a brief description.

Power Up Reasons

Number	Description	Comments
1	On Key	Pressing the HMI Control Panel On Key is the reason for an On Key power up.
2	On Line	Providing a ground to the On Line is the reason for an On Line power up. The On Line power up is normally initiated by a Remote Controller On key being pressed or a 3rd party Telematic device providing a ground via the iBox. Grounding of the On Line will cause the K9 On/Off Relay coil to energize and initiate a power up of the SR-3 Base Controller and the HMI Control Panel.
3	DPD	Connecting a download cable to the CargoWatch Download Port is the reason for a DPD power up. Connecting the download cable will ground the DPD wire causing the HMI to power up. This will allow the user to perform a download without the unit running.
4	Cold Crank	A Cold Crank power up may occur during a low voltage situation during an attempted engine start.
5	Reset	A Reset power up may occur if the CAN communication to the HMI Control Panel has been interrupted and then reestablished. Essentially the HMI Control Panel reboots and comes back on line. This can be observed in downloads where the SR-3 Unit and HMI Control Panel are both operating and a Power Up Reset will be observed without a prior Power Down being present.

Power Up Reasons - continued

Number	Description	Comments
6	Unknown	Unknown
7	Conservative Mode Power Up	A Conservative Mode power up will be present if the Conservative Mode has been programmed in the HMI Control Panel. This power up happens at user defined time intervals to document temperature readings on the CargoWatch Sensors when the unit is turned Off.

Power Down Reasons

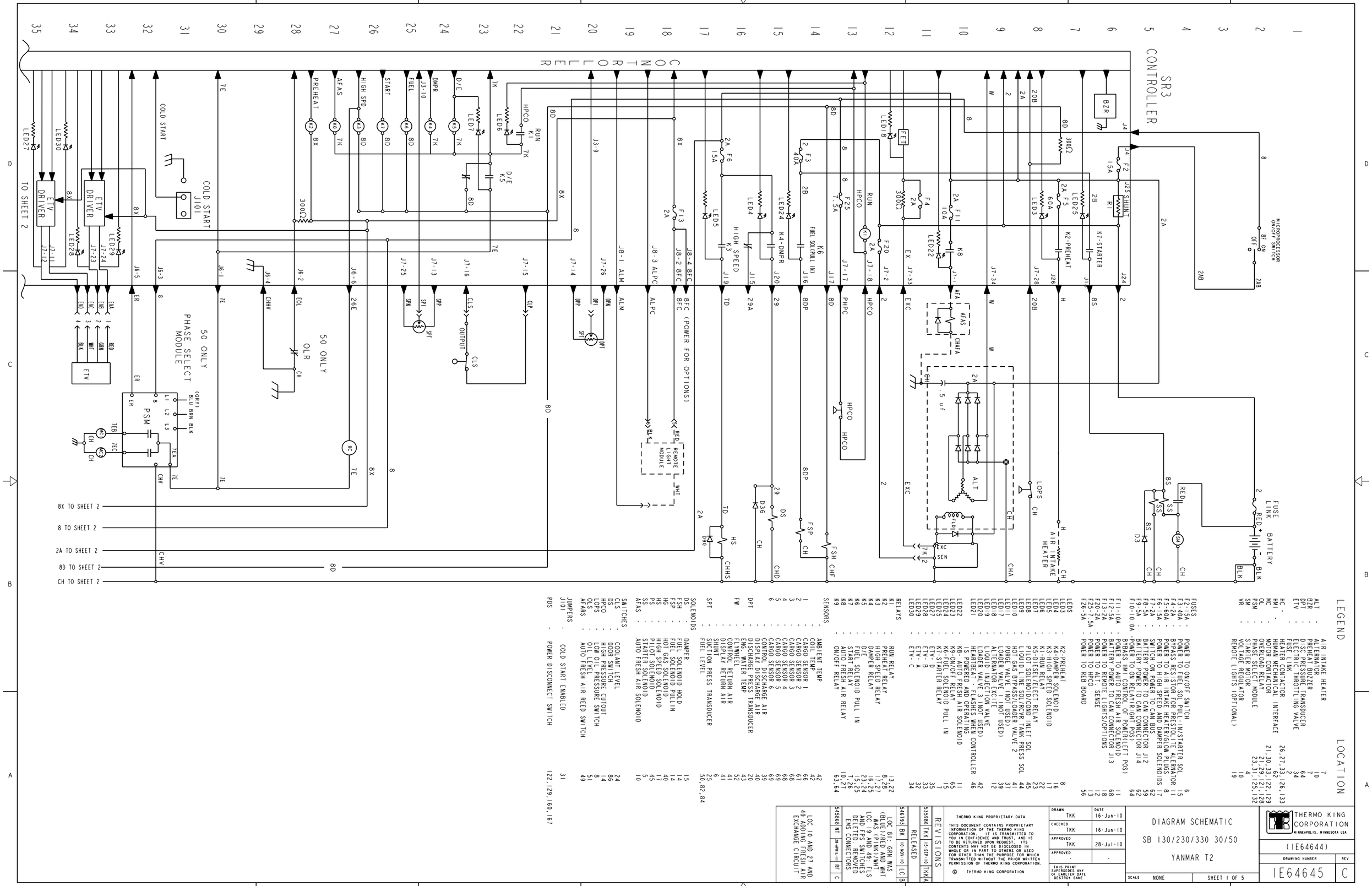
Number	Description	Comments
0	Unknown	
1	Off Key	Pushing the HMI Control Panel Off Key is the reason for an Off Key power down
2	Off Line	An Off Line power down is normally initiated by pushing a Remote Controller Off key or by a 3rd party telematic device. Pushing the Remote Controller Off key or a Remote Off command from a 3rd party Telematics device will ground the Off line to Pin 33 of the HMI Control Panel. This will cause the unit to turn off. Note: A grounded Off Line can be reason for a unit not turning on at all or be the cause of nuisance Off Line power downs if the Off Line wire has an intermittent ground.
3	Reserved	
4	8XP No Controller On Signal	A 8XP No Controller On Signal power down will occur if the 8XP feedback is not present from the K9 On/Off relay 8X circuit to pin 6 of the HMI Control Panel and there is no CAN communication between the Base Controller and HMI Control Panel.
5	Communications Request Timeout (SCOM).	A Communication Request Time Out power down will occur if a download cable has caused a power up of the HMI and there has been no activity, such as a download, on the HMI download port. If no activity had been present on the port the HMI will power down to preserve the battery.
6	Network Power Down	A Network Power Down will occur if there is a serial command from a Remote Controller to turn the unit Off. Normally the Remote Controller turning the unit Off is accomplished by the Off button pulling the Off Line low resulting in an Off Line power down. If the Off Line were not present or the Off wire had an open circuit the Remote Controller Off key also initiates a serial command to turn the unit off. In this case the HMI will log a Network Power Down
7	Remote Start Timeout	A Remote Start Timeout power down will occur if the Remote Control does not communicate with the controller after an On Line (Remote Control On Key) power up. If the Remote Controller will not communicate via the J10 serial port that it had initiated the On Line power up the HMI Control Panel will do a Remote Start Timeout log and power the HMI Control Panel and SR-2 Base Controller down.
8	Conservative Mode Power Down	A Conservative Mode power down complements a Conservative Mode power up. It will be present if the Conservative Mode has been programmed in the HMI Control Panel. The HMI Control Panel power up happens at user defined time intervals to document temperature reading on the CargoWatch Sensors. After the temperature readings are taken the Conservative Mode power down will turn the HMI Control Panel off.

SR-3 Schematic Diagrams and Wiring Diagrams

1E64645 Rev C – SB 130 / 230 / 330 Single Temp 30 / 50 Yanmar T2 Schematic Diagram

1E64644 Rev C – SB 130 / 230 / 330 Single Temp 30 / 50 Yanmar T2 Wiring Diagram

Section 8 – SR-3 Trailer Single Temp Diagrams



LEGEND

AIH	-	AIR INTAKE HEATER
ALT	-	ALTERNATOR
APT	-	AMBIENT PRESSURE TRANSDUCER
DPT	-	DISCHARGE PRESSURE TRANSDUCER
ETV	-	ELECTRIC THROTTLING VALVE
FL	-	FUSE LINK
HC	-	HEATER CONTACTOR
HMI	-	HUMAN MECHANICAL INTERFACE
MC	-	MOTOR CONTACTOR
OL	-	OVERLOAD RELAY
PSM	-	PHASE SELECT MODULE
SM	-	STARTER MOTOR
VR	-	VOLTAGE REGULATOR
	-	REMOTE LIGHTS (OPTIONAL)

LOCATION

	7
	10
	64
	44
	2
	26,27,33,126,133
	62
	21,30,33,122,129
	21,29,121,128
	23,31,125,132
	40
	19

FUSES

F1-15A	POWER TO ON/OFF SWITCH
F3-40A	POWER TO FUEL SOL PULL-IN/STARTER SOL
F4-20A	BYPASS RESISTOR FOR PRESTOLITE ALTERNATOR
F5-60A	POWER TO AIR INTAKE HEATER/GLOW PLUGS
F6-15A	POWER TO HIGH SPEED AND DAMPER SOLENOIDS
F7-2A	SWITCH ON POWER TO CAN BUS
F8-5A	BATTERY POWER TO CAN CONNECTOR J12
F9-5A	BATTERY POWER TO CAN CONNECTOR J14
F10-10.0A	POWER TO ON/OFF RELAY(RIGHT POS)/ENGINE(LEFT POS)
F11-10A	POWER TO AUTO FRESH AIR SOLENOID
F12-5A	BATTERY POWER TO CAN CONNECTOR J13
F13-2A	POWER TO REMOTE LIGHTS/OPTIONS
F20-2A	POWER TO ALT. SENSE
F25-7.5A	POWER TO HPCO
F26-5A	POWER TO REB BOARD

LEDS	-	
LED1	-	W2-PREHEAT SOLENOID
LED2	-	K4-DAMPER SOLENOID
LED3	-	K3-HIGH SPEED SOLENOID
LED4	-	K1-RUN RELAY
LED5	-	K5-DIESEL/ELECT RELAY
LED6	-	PILOT SOLENOID/COND INLET SOL
LED7	-	LIQUID LINE SOL/RCVR TANK PRESS SOL
LED8	-	HOT GAS BYPASS/LOADER VALVE 2
LED9	-	PURGE VALVE (NOT USED)
LED10	-	LOADER VALVE 1 (NOT USED)
LED11	-	LIQUID INJECTION VALVE
LED17	-	LOADER VALVE 3 (NOT USED)
LED18	-	HEARTBEAT - FLASHES WHEN CONTROLLER
LED20	-	IS POWERED AND OPERATING
LED21	-	K8- AUTO FRESH AIR SOLENOID
LED22	-	K9-ON/OFF RELAY
LED23	-	K6-FUEL SOLENOID PULL IN
LED24	-	K7-STARTER RELAY
LED25	-	ETV- B
LED26	-	ETV- A
LED28	-	ETV- C
LED29	-	
LED30	-	

RELAYS	-	
K1	-	RUN RELAY
K2	-	PREHEAT RELAY
K3	-	HIGH SPEED RELAY
K4	-	DAMPER RELAY
K5	-	FUEL SOLENOID PULL IN
K6	-	START RELAY
K7	-	AUTO FRESH AIR RELAY
K8	-	ON/OFF RELAY
K9	-	
SENSORS	-	
	-	AMBIENT TEMP
1	-	COIL TEMP
2	-	CARGO SENSOR 1
3	-	CARGO SENSOR 2
4	-	CARGO SENSOR 3
5	-	CARGO SENSOR 4
6	-	CARGO SENSOR 5
	-	CARGO SENSOR 6
DPT	-	CONTROL DISCHARGE AIR
	-	DISPLAY DISCHARGE AIR
FW	-	DISCHARGE PRESS TRANSDUCER
	-	ENG. WATER TEMP
	-	FLYWHEEL
	-	CONTROL RETURN AIR
	-	DISPLAY RETURN AIR
SPT	-	SUCTION PRESS TRANSDUCER
	-	FUEL LEVEL

SOLENOIDS	-	
DS	-	DAMPER
FSH	-	FUEL SOLENOID HOLD
FSP	-	FUEL SOLENOID PULL IN
HG	-	HOT GAS SOLENOID
HS	-	HIGH SPEED SOLENOID
PS	-	PILOT SOLENOID
SS	-	STARTER SOLENOID
AFAS	-	AUTO FRESH AIR SOLENOID
SWITCHES	-	
CLS	-	COOLANT LEVEL
DS	-	DOOR SWITCH
HPCO	-	HIGH PRESSURE CUTOUT
LOPS	-	LOW OIL PRESSURE SWITCH
OLS	-	OIL LEVEL
AFARS	-	AUTO FRESH AIR REED SWITCH
JUMPERS	-	
J101	-	COLD START ENABLED
PDS	-	POWER DISCONNECT SWITCH

	42
	42
	66
	67
	68
	68
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	69
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	40
	20
	43
	52
	41
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	41
	25
	50,82,84

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	14
	40
	14
	17
	45
	5
	10

	24
	86
	14
	8
	51
	49

	31

	122,129,160,167

		8
		16
		17
		22
		23
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		44
		41
		37
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		12
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	17
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	64
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	18
	12
	13
	56

LOC 10 AND 27 AND 49 ADDING FRESH AIR EXCHANGE CIRCUIT

REVISIONS			
545868	NT	24-APRIL-11	RF	C
546193	BK	10-NOV-10	LC	B
535988	TKK	15-SEP-10	TKK	A
	RELEASED			

LOC 81: GRN WAS (BLUE/RED AND WHT WAS (PINK)/WHT
LOC 19 AND 49: FLS AND FPS SWITCHES ADDED TO DEUTSCH DRC26 CONNECTORS

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CHECKED	TKK	16-Jun-10
APPROVED	TKK	28-Jul-10
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SB I30/230/330 30/50
YANMAR T2

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(IE64644)

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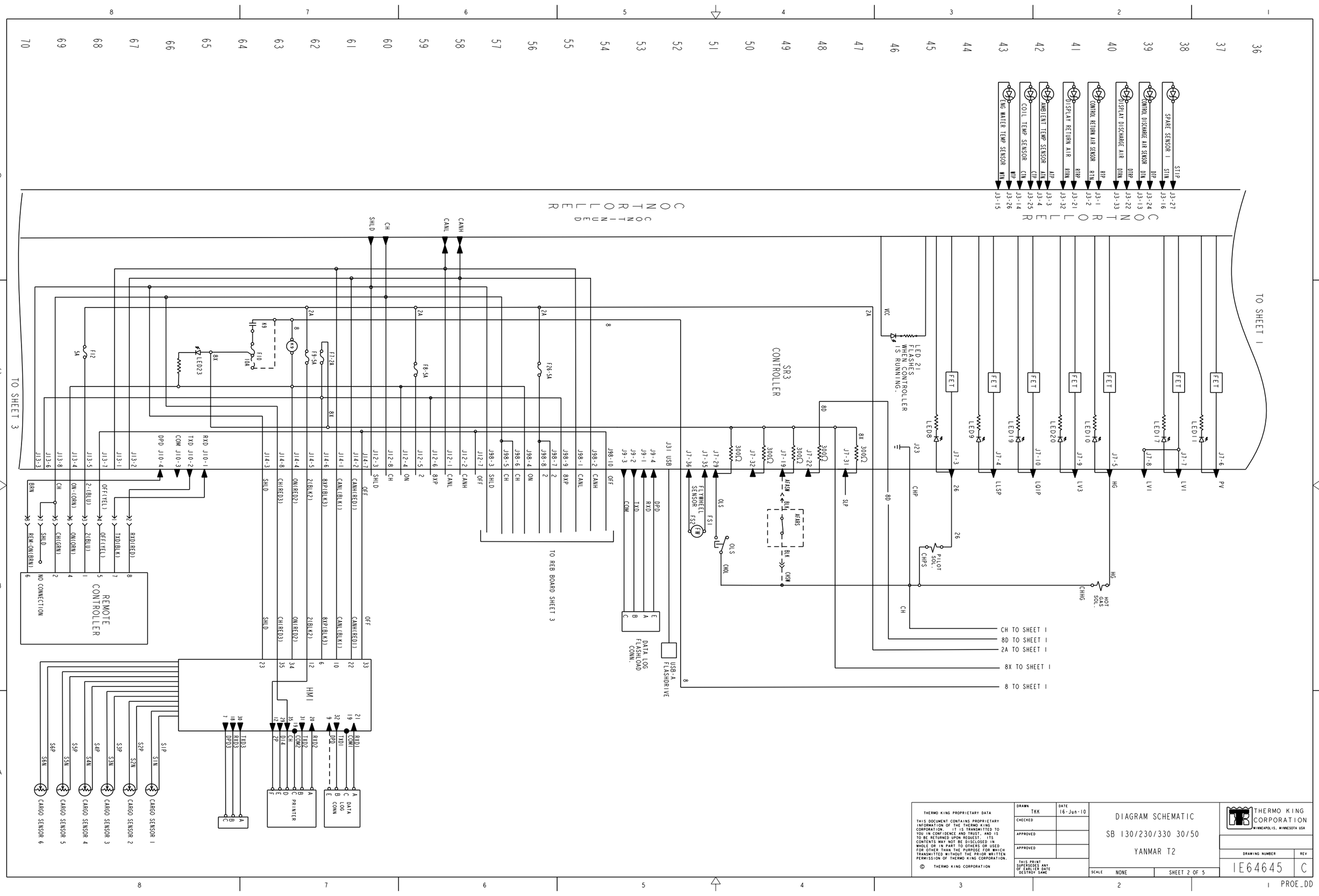
CONTROLLER
SPARE SENSOR 1 STIP STIN J3-27 J3-16
CONTROL DISCHARGE AIR SENSOR DTP DTN J3-24 J3-13
DISPLAY DISCHARGE AIR DTRP DTRN J3-22 J3-33
CONTROL RETURN AIR SENSOR RTP RTN J3-1 J3-2
DISPLAY RETURN AIR RTRP RTRN J3-21 J3-32
AMBIENT TEMP SENSOR ATP ATN J3-3 J3-4
COIL TEMP SENSOR CTP CTN J3-25 J3-14
ENG WATER TEMP SENSOR WTP WTN J3-26 J3-15
TO SHEET 1
SHLD CH CANL CANH
TO SHEET 3
SR3 CONTROLLER
LED 21 FLASHES WHEN CONTROLLER IS RUNNING.
WCC
FET
LED8 LED9 LED19 LED20 LED10 LED17 LED11
J7-3 J7-4 J7-10 J7-9 J7-5 J7-8 J7-7 J7-6
LLSP LOIP LV3 HG LV1 LV1 PV
J23 CHP 26 8D CH
F12 5A
F10 10A
F9-5A
F7-2A
F26-5A
LED23
REMOTE CONTROLLER
BRN REM-ON(BRN) SHLD CH CHLGRN ON-LORN ON-LORN 2-(BLU) 2(BLU) OFF(YEL) OFF(YEL) TXD(BLK) RXD(RED)
NO CONNECTION
RXD J10-1 TXD J10-2 COM J10-3 DPD J10-4
J13-3 J13-6 J13-8 J13-4 J13-5 J13-7 J13-1 J13-2
J14-3 J14-8 J14-4 J14-5 J14-6 J14-2 J14-7 J14-1
J12-3 J12-8 J12-4 J12-5 J12-6 J12-1 J12-2 J12-7
J98-10 J98-2 J98-1 J98-9 J98-7 J98-8 J98-4 J98-6 J98-5 J98-3
OFF CANH(RED) CANL(BLK) 8XP(BLK3) 2(BLK2) ON(RED2) CH(RED3) SHLD
TO REB BOARD SHEET 3
J31 USB
J9-4 J9-1 J9-2 J9-3
DPD RXD TXD COM
A B C
E A B C
DATA LOG FLASHLOAD CONN.
USB-A FLASHDRIVE
J7-36 J7-35 J7-29 J7-32 J7-19 J7-22 J7-31
300Ω
FLYWHEEL SENSOR FS2 FS1
OLS CMOL
AFMS BLK CMOS
SIP
PILOT SOL. CHPS
HOT GAS SOL. CHHG
CH TO SHEET 1
8D TO SHEET 1
2A TO SHEET 1
8X TO SHEET 1
8 TO SHEET 1
HMI
23 35 34 12 6 10 22 33
TXD3 RXD3 DPD3 7 18 30
TXD2 RXD2 COM2 CH DPD 31 29 35 19 32 9
RXD1 COM1 21 19
S1P S1N S2P S2N S3P S3N S4P S4N S5P S5N S6P S6N
CARGO SENSOR 6 CARGO SENSOR 5 CARGO SENSOR 4 CARGO SENSOR 3 CARGO SENSOR 2 CARGO SENSOR 1
PRINTER
DATA LOG CONN
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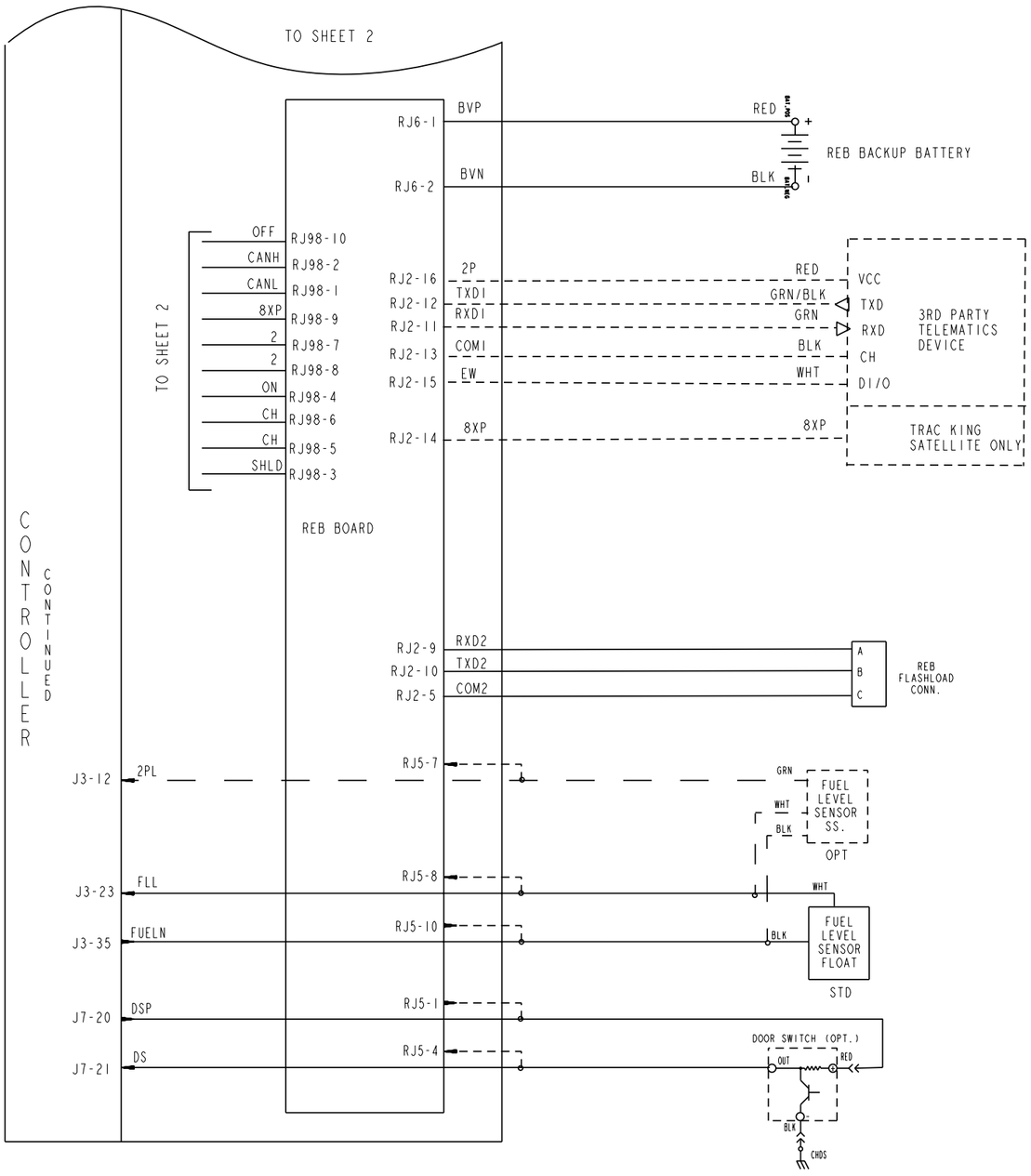

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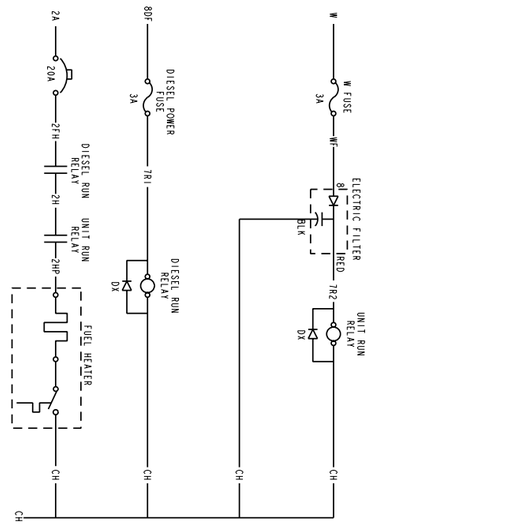
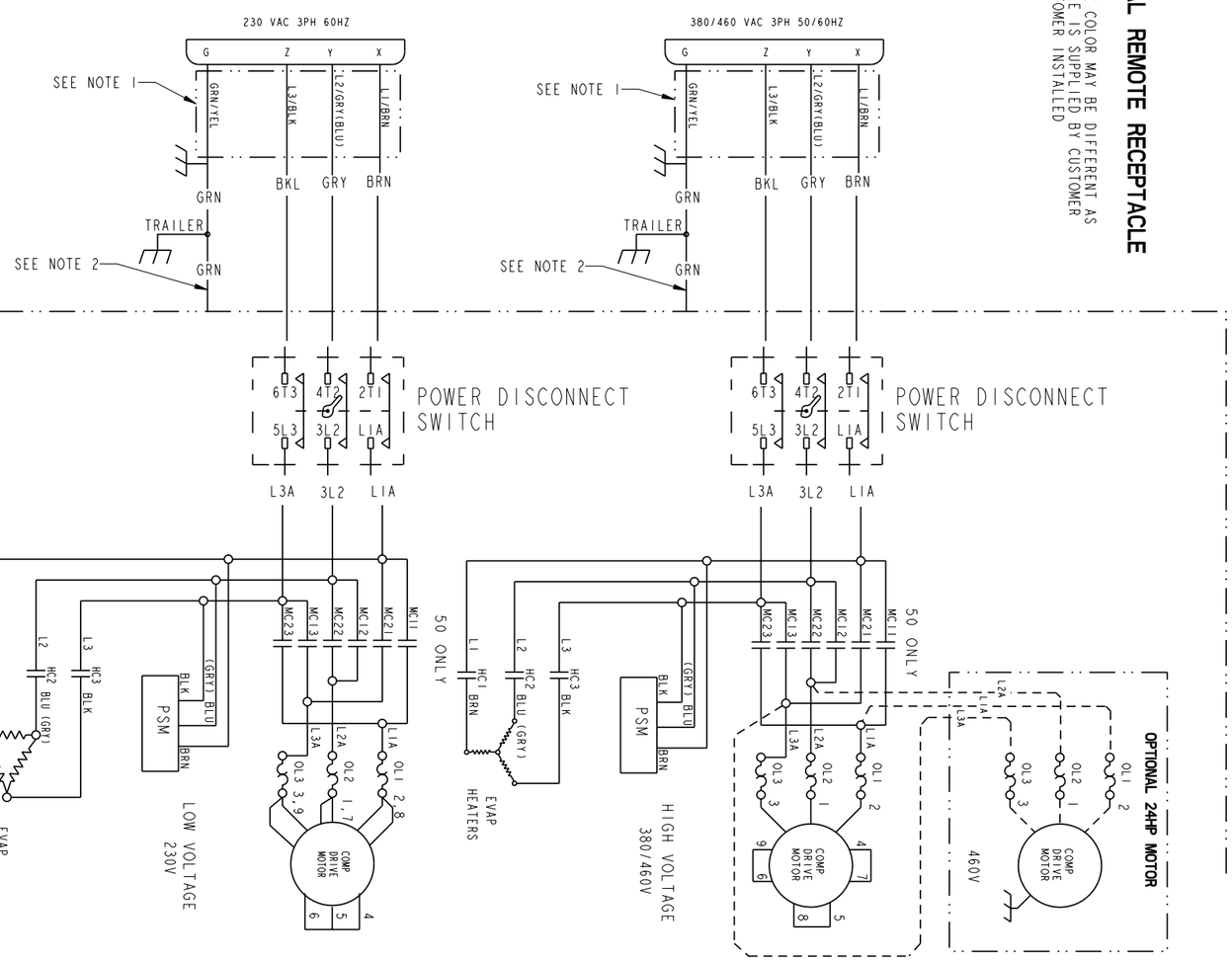
OPTIONAL ELECTRIC FUEL HEATER



OPTIONAL REMOTE RECEPTACLE

NOTE:
1. WIRE COLOR MAY BE DIFFERENT AS CABLE IS SUPPLIED BY CUSTOMER
2. CUSTOMER INSTALLED



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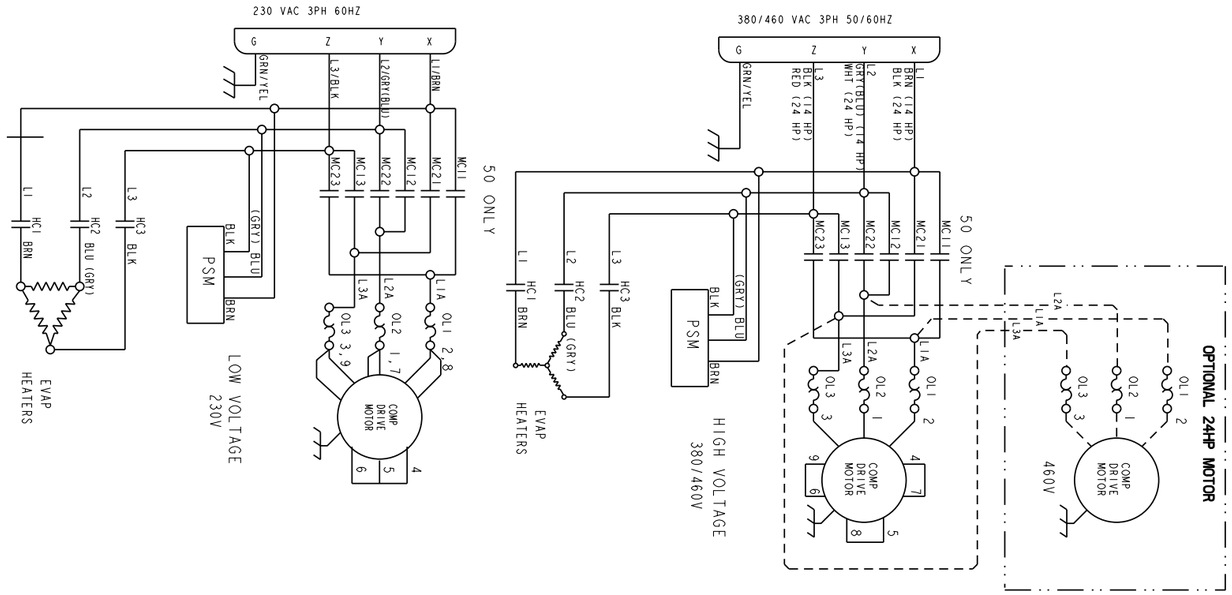

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REVISIONS				
CHANGE ORDER	REV	DESCRIPTION	DATE	APPROVED

SR3 CONTROLLER

TO SHEET 4
REMOTE CONTROLLER

REMOTE FLUSHMOUNT HARNESS

TO SHEET 4
TO J46_HMI

HMI HARNESS

SERVICEWATCH DOWNLOAD
J52_CRTL_DNLD_CONN
RXD-RED1-08
TXD-BLK2-06
COM-BLK1-09
DPD-RED2-05

ON CONTROL BOX DOOR
USB-A FLASHDRIVE
J_USBA
BLACK
GREEN
WHITE
RED

CAN3 J14_PCBD
CANL-BLK1-01
CANH-RED1-01
SHLD
ON-RED2-01
2-BLK2-01
8XP-BLK3-01
OFF
CH-RED3-01
SEE DETAIL A

CAN2 J13_PCBD
ON-ORN
2-BLU
OFF-YEL
SHLD — CH
GRN
SEE DETAIL A

CAN1 J12_PCBD
SEE DETAIL A

J9_PCBD
RXD-RED1-08
TXD-BLK2-06
COM-BLK1-09
DPD-RED2-05
SEE DETAIL B1

J10_PCBD
RXD-BLK
TXD-RED
REM-ON-BRN
SEE DETAIL B1

7D-01
29-01
8DF
8D-01
8DP-01
8S-01

RJ98
SEE DETAIL F

REB BOARD (OPTIONAL)

RJ5 SEE DETAIL D
FUELN-02
FLL-02
2PL-02
DS-02
DSP-02

RJ6 SEE DETAIL B
BVN
BVP

RJ2
SEE DETAIL E
COM2
RXD2
TXD2
RXD1
TXD1
COM1
8VP
FLW
2P

3RD PARTY HARNESS OPTION

SEE DETAIL B2
J8_PC_BD
TO REMOTE LIGHT MODULE
8FC-02
ALPC-01
8FC-01
ALM-01

TO SHEET 4
REB FLASHLOAD HARNESS

PIN LOCATIONS SHOWN FROM WIRE END

DETAIL A
DETAIL B1
DETAIL B2
DETAIL C
DETAIL D
DETAIL E
DETAIL F

50 UNITS ONLY
TO SHEET 3 H.V. CTL

7E, EOL, 8, CHHV, ER, 26E

J6_PCBD
7E-01
EOL-01
8-01
CHHV-01
ER-01
26E-01
SEE DETAIL C

OPTIONAL DS TO REB CONNECTION
J_DS1
P_DS1
DSP-02
DS-02
DSP
DS
J_DS
P_DS
DSP-01
DS-01

USB HARNESS

TO SHEET 3
ON/OFF SWITCH

TO SHEET 2

RED-03

8-02

2AB-01

TO FUSE LINK

J31
RED
WHITE
GREEN
BLACK

CH
TO GND PLATE
CHP

2A-01
2A
TO ALT

H
TO AIR INTAKE HEATER
H-01

MAIN HARNESS

J7_PCBD
AFA-01
2-01
29-01
HG-01
EVC-01
EVD-01
SPP-02
DPP-02
CLP-01
CLS-01
PHPCO-01
HPCO-01
AFASW-01
DSP-01
DS-01
EVB-01
EVA-01
SPN-02
DPN-02
20B-01
OLS-01
EXC-01
W-04
FSI-01
FS2-01

J3-PCBD-SENSOR
RTP-01
RTN-01
RTP-01
ATN-01
DPI-01
SPI-01
2PL-01
CTN-01
CTP-01
WTN-01
STIN-01
RTRP-01
DTRP-01
FLL-01
DTP-01
CTP-01
WTP-01
STIP-01
RTRN-01
DTRN-01
FUELN-01

J30_SEN
SPN-01
SPP-01
DPN-01
DPP-01
SPN-02
SPP-02
DPN-02
DPP-02
P30_MAIN

MAIN HARNESS

ALT HARNESS TO SHT 2
J32_MAIN
J32_ALT
2-02
EXC-02
W-02
2-01
EXC-01
W-01
W-04

J52 POWER FOR OPTIONS
8FC-02

MAIN HARN TO SHEET 2 & 3

DIESEL RUN RELAY
CH — 7R1 — FUSE 3A — 8DF
UNIT RUN RELAY
DIESEL RUN RELAY
CB
TO SHEET 2 — 2HP — 2H — 2FH — 2A
UNIT RUN RELAY
ELEC FILTER
FUSE 3A
CH — 7R2 — RED — 8 — WF — W — BLK
W

OPTIONAL ELECTRIC FUEL HEATER

STANDARD FLOAT FUEL LEVEL SENSOR
J-ORFLS
P-ORFLS
TO SHEET 2
BLK
WHT
2PL
FUELN
FLL

OPTIONAL SOLID STATE FUEL LEVEL SENSOR
J-ORFLS.
P-ORFLS.
GRN
BLK
WHT
2PL-01
FUELN-01
FLL-01

SENSOR HARNESS

J_FL
P_FL
2PL
FLL
FUELN
2PL-01
FLL-01
FUELN-01

J_FL1
P_FL1
2PL-02
FLL-02
FUELN-02

OPTIONAL FL TO REB CONNECTION

SENSOR HARNESS
TO SHEET 2

545868	SS	23-APR-11	BF	C
ADDED AIR OPTION HARNESS CONNECTIONS AT J1, J7, SH2 HW, AT J5, SH2 CHASSIS.				
546793	BR	11-NOV-10	JC	B
IN ZONE A/7 SHI GRN WAS RED- REMOVED FLS, FPS, AND EMS WIRING.				
535986	KM	15-SEP-10	TM	A
RELEASED				

CAD GENERATED DRAWING, DO NOT MANUALLY UPDATE

DRAWN	TKK	16-JUN-10
CHECKED	CAMACHO	16-Jul-10
APPROVED	TKK	28-Jul-10
ENG APPVL	-	-

Ingersoll-Rand. Thermo King

TITLE
DIAGRAM - WIRING
SB130/230/330 30/50
YANMAR T2

SIZE	CODE IDENT NO	DWG NO	REV
D		IE64644	C

SCALE: NONE | REF DWG: (IE46347) | SHEET 1 OF 5

TO SHEET 1 — FUEL LEVEL SENSOR
TO SHEET 1 — ALTERNATOR HARNESS
TO SHEET 1 — ELECTRIC FUEL HEATER
TO SHEET 4 — HMI HARNESS CHPR

W

MAIN HARNESS

AUTO_FRESH_AIR_REED_SWITCH
AFASW-01
CHSW
BLK
BLK

AUTO_FRESH_AIR_SOLENOID
AFA-01
CHAFA

SENSOR HARNESS

CONTROL_DISCHARGE_AIR
DTP-01
DTN-01
BLU
BRN

DISPLAY_DISCHARGE_AIR
DTRP-01
DTRN-01
BLU
BRN

CONTROL_RETURN_AIR
RTP-01
RTN-01
BLU
BRN

DISPLAY_RETURN_AIR
RTRP-01
RTRN-01
BLU
BRN

COIL_TEMP
CTP-01
CTN-01
BLU
BRN

SPARE_SENSOR_NO.1
J33.SPSEN
STIP-01
STIN-01
BLU
BRN

AMBIENT_AIR
ATP-01
ATN-01
BLU
BRN

COOLANT_LEVEL_SWITCH
J34.CLS
CLP-01
CLS-01

CONDENSER SECTION

DS
DSP
CHDS
J38.DSW
C B A
C B A
WHT
RED
BLK
DOOR_SW

CHD
29-01
J39.DS
4 3 2 1
4 3 2 1
DAMPER_SOLENOID

J35.ETV
EVA-01
EVB-01
EVC-01
EVD-01
RED
GRN
WHT
BLK
ETV

2HP
CH
OPTIONAL FUEL HEATER

SUCTION_PRESSURE_TRANSDUCER
J36.SPTI
SPN-01
SPP-01
SPI-01
BLK
RED
WHT
SHIELD

DISCHARGE_PRESSURE_TRANSDUCER
J37.DPT
DPN-01
DPP-01
DPI-01
BLK
RED
WHT
SHIELD

GROUND_PLATE
9.GND.PLT
8.GND.PLT
7.GND.PLT
6.GND.PLT
5.GND.PLT
4.GND.PLT
3.GND.PLT
2.GND.PLT
1.GND.PLT
CHA
CHAFA
CH
CHSW
CHPR
CHPS
CHHG
CHDS
CHD
BLK-03
CHP
BLK-04
BLK-05

TO SHEET1
FUSE_LINK
RED-03
RED-01
RED-04
BAT.POS
BAT.NEG
BATTERY
STAR.CONT
STAR.COIL
STARTER
8S-01
BLK-04
BLK-03

WHT
BLK
FLOAT FUEL LEVEL SENSOR
BLK

GRN
RED
WHT
YEL
BLK
BLK
OPTIONAL US FUEL LEVEL SENSOR

2-02
EXC-02
EXC
SENSE
W
W-02
W
B A
ALTERNATOR
2A-01
OUTPUT
CHA

ENGINE SECTION

PILOT_SOLENOID
CHPS
J40.PS
26-01

HOT_GAS_SOLENOID
J41.HGS
CHHG
HG-01

THROTTLE_SOLENOID
7D-01
TS.1
TS.CH
CHOL
CHHS

FSI-01
FW.1
FLYWHEEL_SENSOR
FW.2
FS2-01
CHF

J42.FS
C C
B B
A A
BLK
PULL IN
WHT
HOLD
RED
FUEL_SOLENOID
8DP-01
8D-01

HIGH_PRESSURE_CUTOUT_SWITCH
J43.HPCO
PHPCO-01
HPCO-01

ENGINE_LOW_OIL_PRESSURE_SWITCH
20B-01

OIL_LEVEL_SWITCH
J44.OLS
CHOL
OLS-01

H-01
J45.CTS
WTP-01
WTN-01
BLU
BRN
COOLANT_TEMPERATURE_SENSOR
AIHTR
AIR_INTAKE_HEATER

CHHS
GND3.ENGINE
CHF
GND_ENGINE_1

GND4.ENGINE
GND_ENGINE_2

Ingersoll-Rand. Thermo King

SIZE	CODE IDENT NO	DWG NO	REV
D		IE64644	C
SCALE: NONE	REF DWG: (IE46347)	SHEET 2 OF 5	

FROM SHEET 1 J6

7E,EOL,8
CH, ER.26E

UP ON/OFF
SWITCH

1_UOF
2_UOF
U_O_F

8-02
2AB-01

SWITCH HARNESS
TO SHEET1

7E-01
EOL-01
8-01
CHHV-01
ER-01
26E-01

P53-HV_LV
J53_HV_LV

7E-03
EOL-02
8-03
CHHV-02
ER-02
26E-02

GRN_YEL-03
GRN_YEL_02
GRN_YEL_01
GNDI_HV

OVERLOAD
CONTACTOR
OLC

T3
T2
T1
95
96
L3
L2
L1

T3-01
T9-01
T1-01
T7-01
T2-01
T8-01

T3A-02
T2A-02
T1A-02
CH-06
EOL-02

HEATER
CONTACTOR
HC

BLK_02
BLUE_02 (GRY)
BRN_02
7E-03
7E-02
A1
A2
I3
I4
L3-02
L2-02
L1-02
26E-02

PHASE
SELECT
MODULE
BLK
BRN
BLU (GRY)

MC1
7EB-01
T3A-02
T3A-01
T2A-02
T2A-01
T1A-02
T1A-01

TIMER
MODULE
RED
BLK

MOTOR
CONTACTOR
CH-01
RED
BLK-01
L3-01
WHT (BLU)
GRY-01
L2-01
BLK
BRN-01
L1-01

MC2
7EC-01
T1A-01
T2A-01
T3A-01
CH-02
L3-02
L2-02
L1-02

CH-06
CHHV-01
CHV
GND2_HV
CH-02

P54
J54A
8
CH
ER
7EA
7EB
7EC
SP-GND
SP
8-03
CHV
ER-02
7E-02
7EB-01
7EC-01

BLK
WHT
GRN/YEL
RED
GND
RECEPTACLE
(OPTIONAL 24 HP WIRING SHOWN)

BRN-01
GRY-01 (BLU)
GRN_YEL_01
BLK-01
RECEPTACLE
(14 HP WIRING SHOWN)

L3A
L2A
L1A
POWER_CABLE

50 UNITS
ONLY

200/230 VAC
60 HZ

380/460 VAC
60 HZ

MOTOR CONNECTIONS-14 HP MOTOR

T1 T2 T3 GROUND
L1 L2 L3 GROUND
MOTOR CONNECTIONS-24 HP MOTOR
460 VAC
50/60 HZ

T1 T2 T3
MOTOR
460V
OPTIONAL 24HP MOTOR

GRN_YEL-03
T2-01
T1-01
T3-01
T8-01
T7-01
T9-01
T6-1
T5-1
T4-1
MOTOR
14 HP
SPLICE_1

EVAP_HTRS_2

EVAP HEATERS
380/460 VAC
CONNECTIONS

EVAP HEATERS
230 VAC
CONNECTIONS

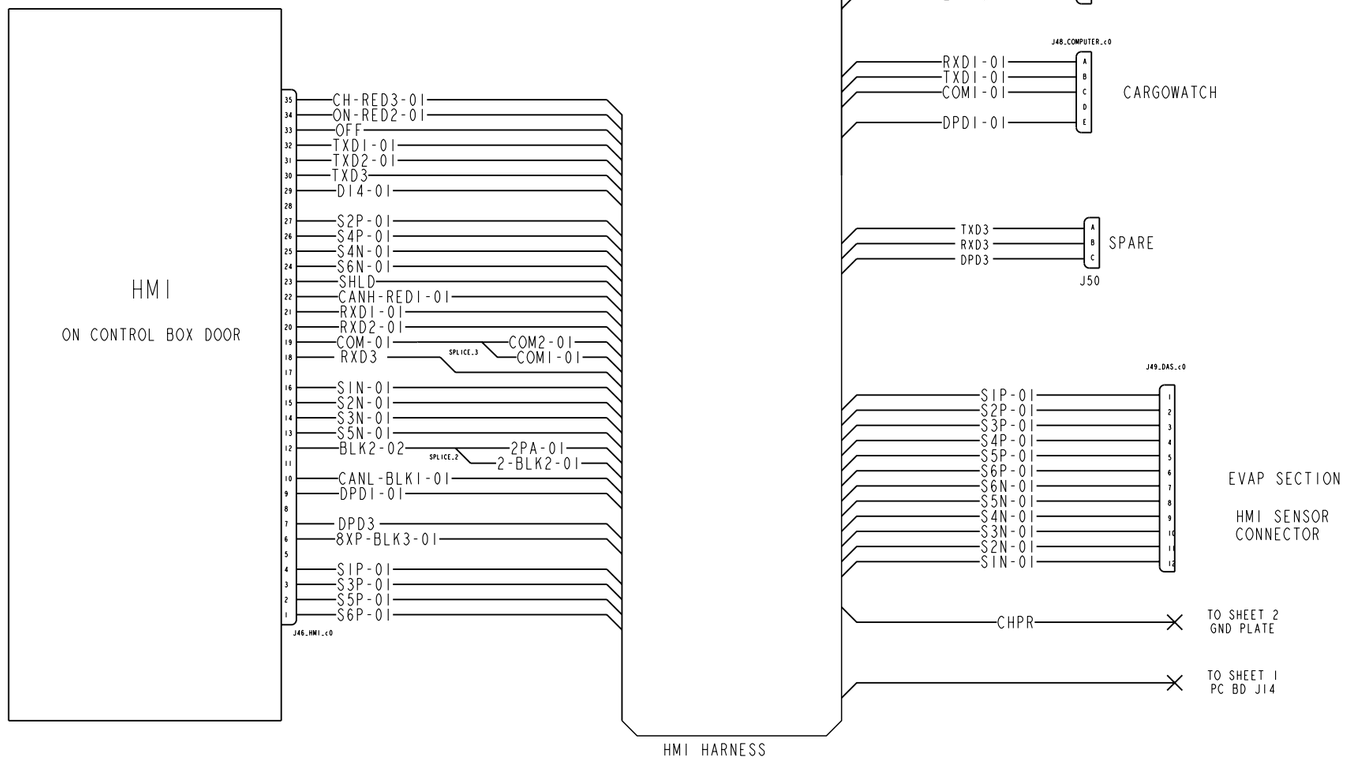
HTR_CABLE
GRN_YEL
GRN_YEL_02
BRN
BRN_02
BLUE (GRAY)
BLUE_02
BLK
BLK_02
EVAP_HTRS_1

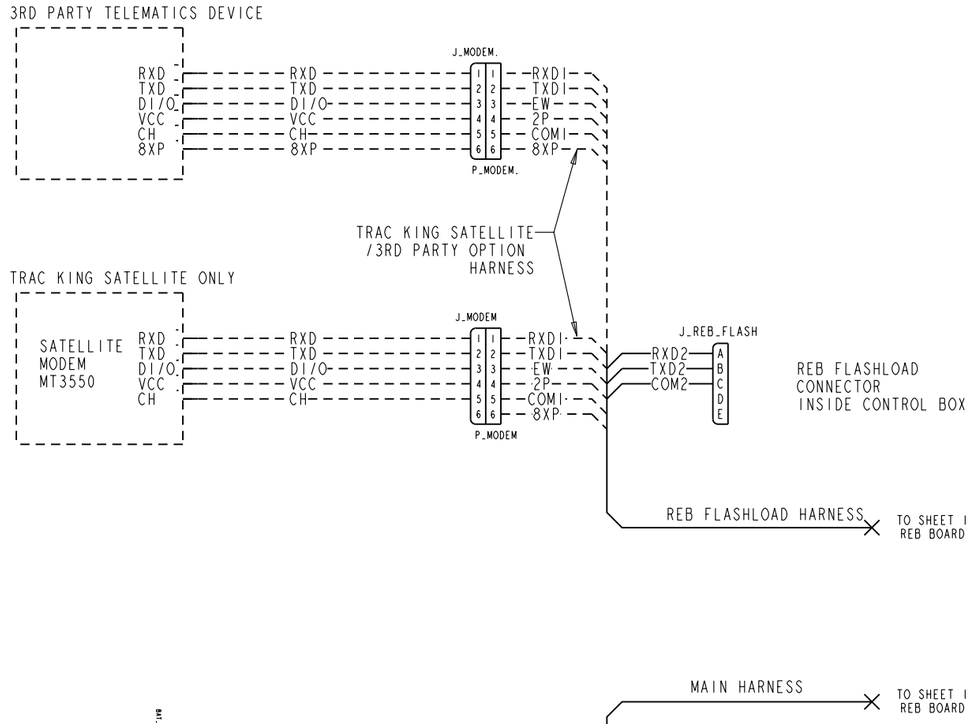
P16_RML
J16_RML
WHT-02
ALM-01
RED-02
8FC-01
BLK-02
ALPC-01
TO SHEET 1
MAIN HARNESS

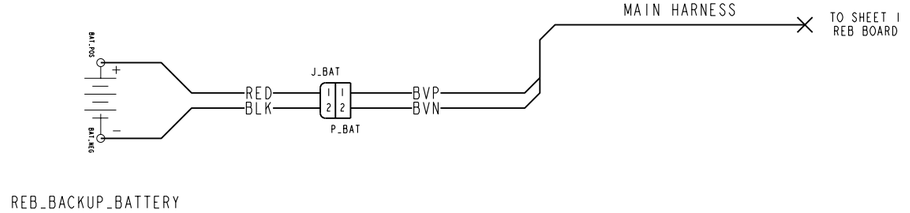
RED-02
WHT-02
BLK-02
POWER
INPUT
GND
REMOTE
LIGHT
MODULE
RML
(OPTIONAL)

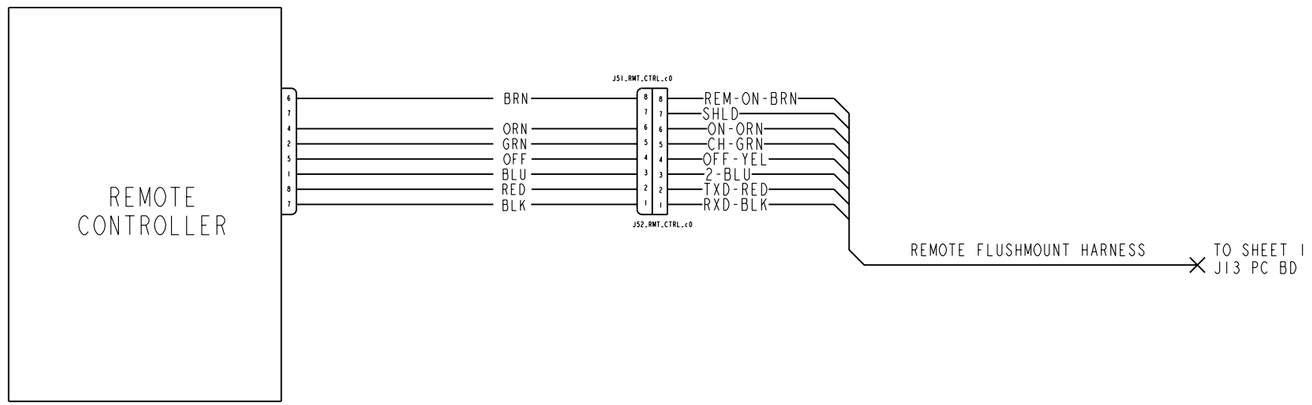
Ingersoll Rand.
Thermo King

SIZE	CODE IDENT NO	DWG NO	REV
D		IE64644	C
SCALE: NONE	REF DWG: (IE46347)	SHEET 3 OF 5	

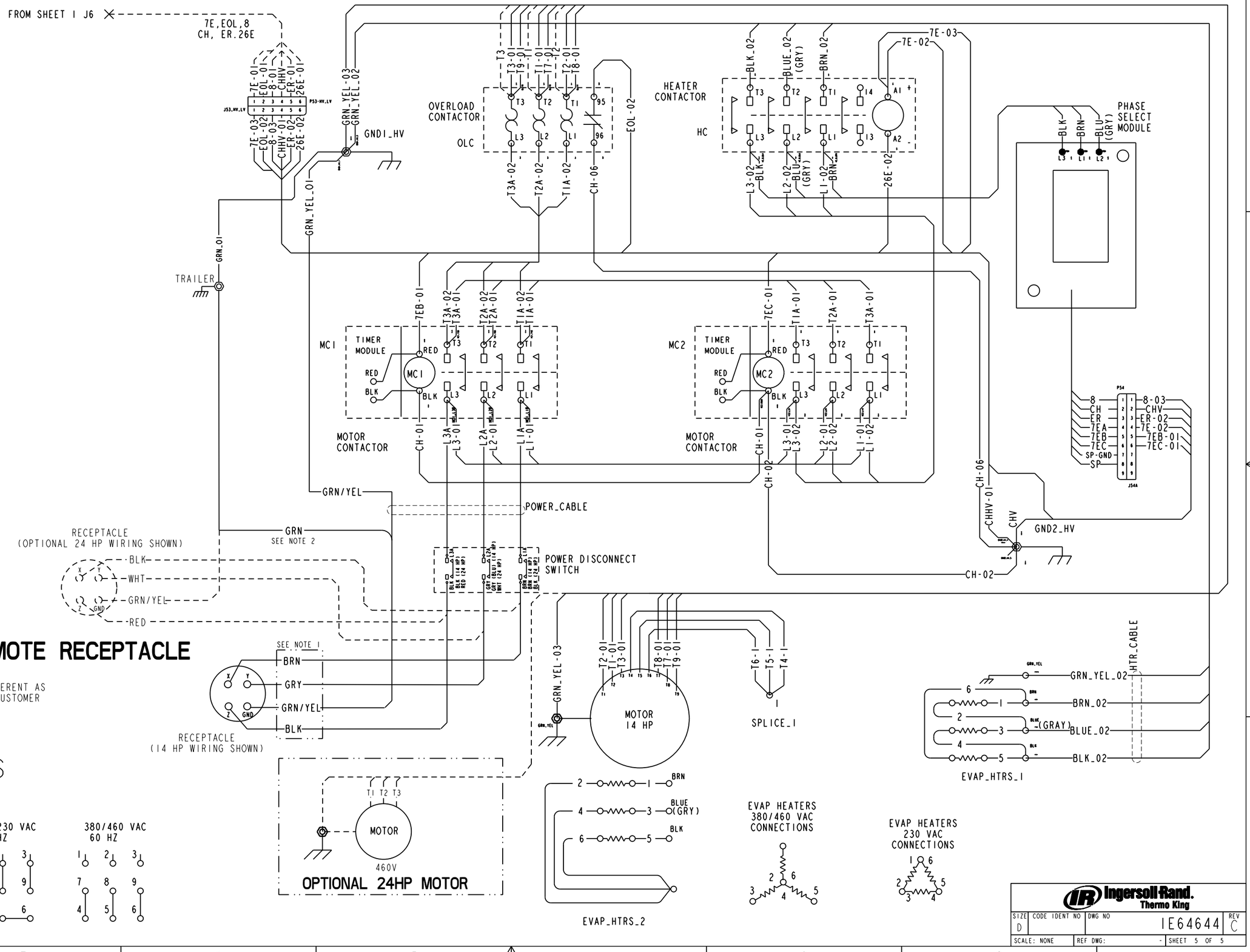








Ingersoll-Rand. Thermo King			
SIZE D	CODE IDENT NO	DWG NO IE64644	REV C
SCALE: NONE	REF DWG: (IE46347)	SHEET 4 OF 5	



Ingersoll-Rand. Thermo King			
SIZE D	CODE IDENT NO	DWG NO IE64644	REV C
SCALE: NONE	REF DWG: -	SHEET 5 OF 5	