

Installation & Operation Manual

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PART NO. 25010401

intelliGen™ Webserver Card (iWC) and Integration Card (iIC)

iWC



iIC



Legend

Long Name	Abbrev. Name
intelliGen Webserver Card	iWC
intelliGen Integration Card	iIC
intelliGen Refrigeration Controller	iRC
intelliGen Refrigeration Controller User Interface	iRCUI
Dynamic Host Configuration Protocol	DHCP
Building Automation System	BAS
Master Slave Token Passing	MS/TP
Remote Terminal Unit	RTU
Media Access Control	MAC

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iWC- intelliGen WEBSERVER CARD

Installation

- While system is powered down, align and insert iWC's pins into intelliGen Refrigeration Controller (iRC) board's plug
- Secure with mounting screws. Use #6-32x1 inch stainless steel machine screws.
- Connect CAT5 Ethernet cable to iWC
- Connect other end of Ethernet cable to a network router

Configuration and Initial Setup

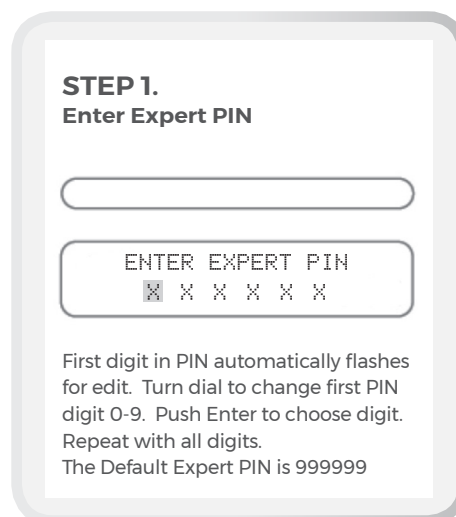
Local Access

IF SYSTEM **HAS NOT** BEEN PREVIOUSLY CONFIGURED

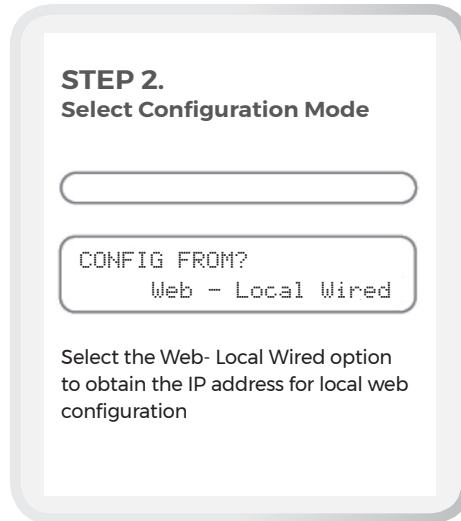
- Follow steps in intelliGen Quick Start Guide to configure system via iRCUI on an evaporator OR following the next steps
- Connect iWC to a network point/router before beginning webserver configuration
- Follow steps to obtain IP address:

STEP 1

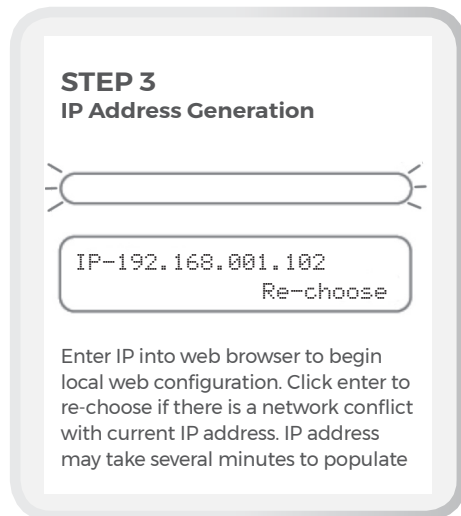
Enter Expert PIN



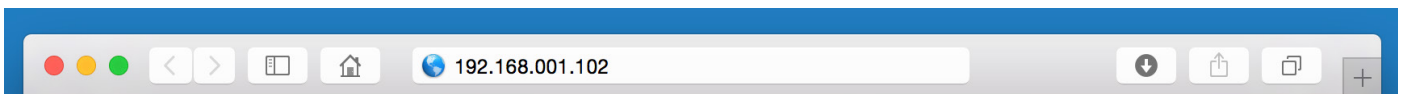
STEP 2 Select Configuration Mode



STEP 3 IP Address Generation



STEP 4 Type IP Address into Browser



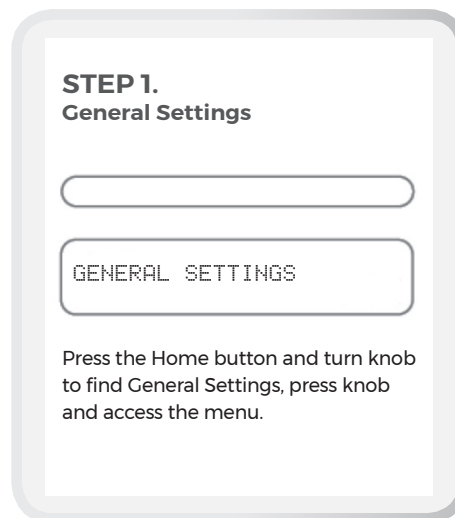
Type IP address into web browser and follow the prompts to complete system configuration

IF SYSTEM **HAS** BEEN PREVIOUSLY CONFIGURED

- Connect iWC to a network point/router before commencing webserver configuration
- Follow steps to obtain IP address:

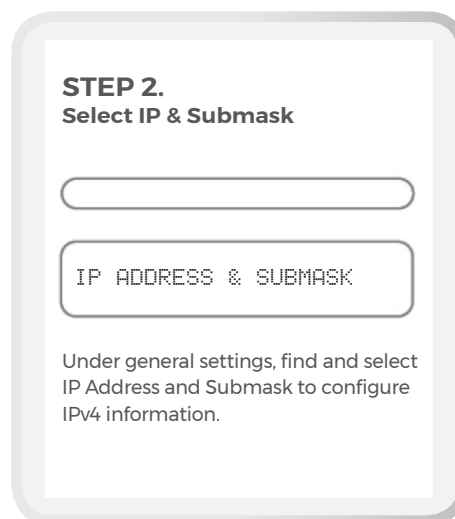
STEP 1

Go To General Setting Menu



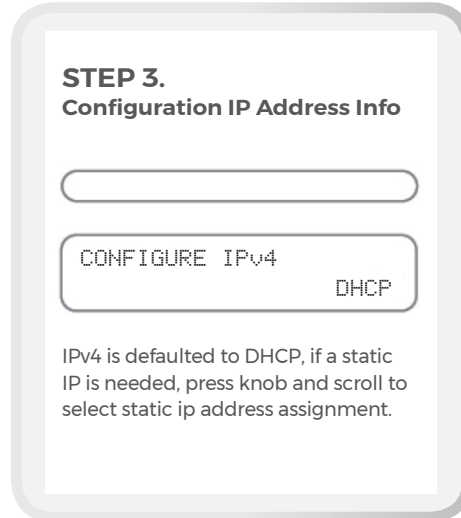
STEP 2

Select IP Address and Submask



STEP 3

Configure IP address information

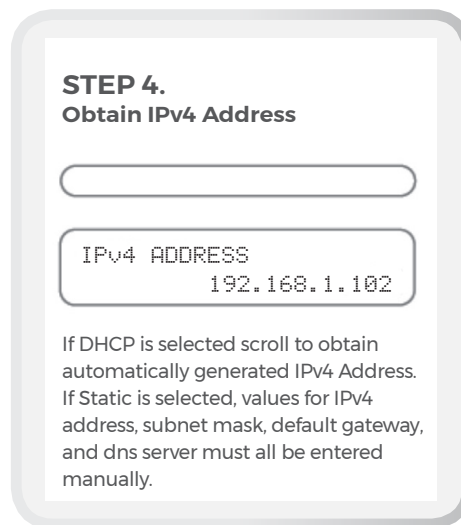


NOTE:

IPv4 Defaults to DHCP, this setting will work with most networks. Highly secured networks may require a static IP address. Contact your IT department for additional support.

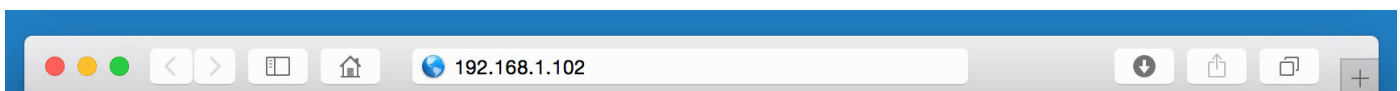
STEP 4

Obtain IPv4 address



STEP 5

Enter IPv4 address in Browser



Type IPv4 address into web browser on a device that is connected to the local network to access system information through the web.

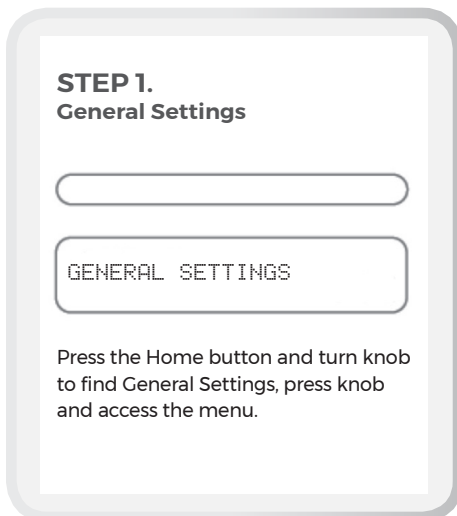
Remote Access

USER SETUP : *Log-in information including passwords and 6 digit pin*

- iWC must be configured per Local Access instructions
- Create an account by visiting: <https://intelligen.online>
- Log in and select 'REGISTER NEW SYSTEM'. A prompt for a 6 digit PIN will appear
- To obtain PIN follow these steps

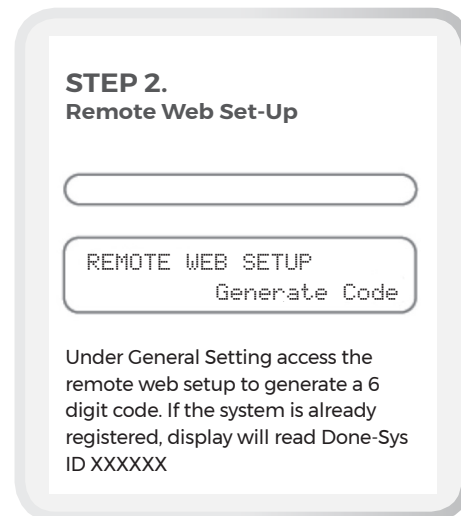
STEP 1

Go To General Setting Menu

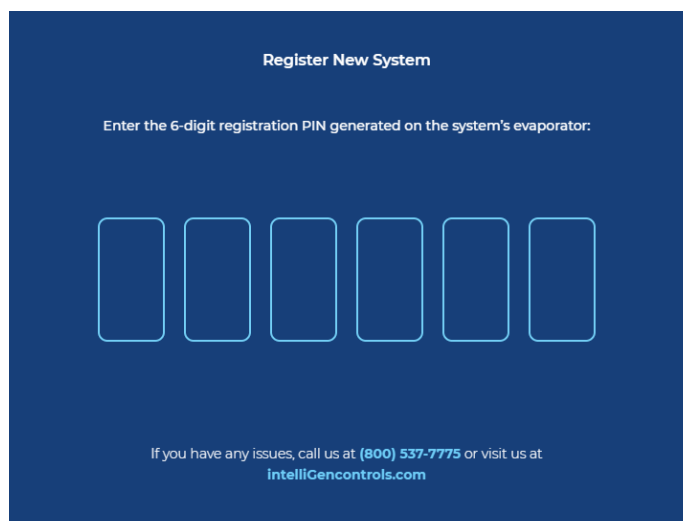


STEP 2

Remote Web Set-Up



When registering a new system, enter 6 digit code that was generated on the iRCUI into the web browser



WEB NAVIGATION

The screenshot shows the IntelliGen web dashboard interface. At the top, there is a navigation bar with the following menu items: DASHBOARD, intelliGen, intelliGen, and a notification bell with '164'. Below this is a secondary menu with: MONITOR, UNITS, SYSTEM HISTORY, DEFROST SETTINGS, ALARMS/ERRORS, BOX SETTINGS, and GENERAL SETTINGS. The main content area displays 'System Name' with a note 'INTEGRATION CARD: NOT INSTALLED'. It features three buttons: IDENTIFY SYSTEM, FORCE DEFROST, and ENTER SERVICE. A status row includes: OPERATING MODE (OFF), PRODUCT LOAD TIMER, DOOR SENSOR (CLOSED), DEFROST CYCLES (3 DEFROSTS SINCE 12 AM), ACTIVE ALARMS (0 ALARMS), ACTIVE ERRORS (0 ERRORS), and INFORMATION TIPS (2 TIPS). The current system temperature is shown as 38.7°F. A section for 'LATEST ACTIVE ALARMS/ERRORS' shows 'YOU DON'T HAVE ANY ACTIVE ALARMS/ERRORS'. A section for 'LATEST INFORMATION TIPS' shows a tip: 'IN05:Too Few Defrost' dated 09/7/2018 at 12:43 pm for COOLER 1A.

Callout lines from the text above point to the following menu items:

- Monitor system operating conditions** points to the **MONITOR** menu item.
- Monitor and control individual units** points to the **UNITS** menu item.
- Track and plot system operation** points to the **SYSTEM HISTORY** menu item.
- Select defrost method and adjust defrost parameters** points to the **DEFROST SETTINGS** menu item.
- Monitor system and units alarms and errors** points to the **ALARMS/ERRORS** menu item.
- Adjust temperature set-point and other box parameters** points to the **BOX SETTINGS** menu item.
- Set new pins, determine control firmware version, and access other important system information** points to the **GENERAL SETTINGS** menu item.

Dashboard Menu Options:

DASHBOARD: Lists all your sites in a single location

QUESTION MARK: Takes you to the Heatcraft Support Site (internet Connectivity required)

PROFILE: Change User settings, including E-mail and Text Alerts and Alert Frequency

NOTIFICATIONS: Lists all the notifications from all your systems

LOG OUT: To Exit the Dashboard

System Menu Options:

MONITOR: Monitor system operating conditions

UNITS: Monitor and control individual units

SYSTEM HISTORY: Track and plot system operation

DEFROST SETTINGS: Select defrost method and adjust defrost parameters

ALARMS/ERRORS: Monitor system and units alarms and errors

BOX SETTINGS: Adjust temperature set-point and other box parameters

GENERAL SETTINGS: Set new pins, determine control firmware version, and access other important system information.

TROUBLESHOOTING GUIDE

Local Webserver Access

Problem:	Step:	Action Item:	If OK:	If Not OK:
Cannot Access Local Webpage	1) Confirm IP address is assigned to IntelliGen controller	1) Navigate to 'GENERAL SETTINGS' > 'IP ADDRESS & SUB-NET MASK' > 'IPv4 ADDRESS'. Confirm a valid IP address is displayed, this should be a value other than 0.0.0.0	1) Go to Next Step	1a) Power off the unit that has the iWC connected for 30 seconds, then re-apply power and wait 5 minutes for the iWC to acquire a valid IP address. 1b) Remove Ethernet cable from iWC and connect it to a laptop or PC. Disable wireless connection on computer. Open 'command prompt' application and type command "ipconfig". Confirm IPv4 Address is being assigned. If no address is assigned, have local IT check router/switch settings.
Remote Webserver Access	1) Test local webserver connection and proceed through local webpage troubleshooting 2) Confirm port 443 is open	1) Refer to Local Webserver Access Troubleshooting Steps 2) Consult local IT	1) Go to Next Step	1) -

Blue Steps: Requires some basic network troubleshooting skills - may require local IT assistance

iWC CONNECTION TROUBLESHOOTING

The following table is to be used for troubleshooting of local and remote internet connections if the IntelliGen Webserver Card (iWC).

Compatible firmware versions:

IntelliGen Refrigeration Card (iRC): 01.02.0242 and later

IntelliGen Webserver Card (iWC): 01.02.0219 and later

Both the iRC and iWC must be running a compatible firmware version in order to access this troubleshooting feature.

The table provides the details of the issue, and what can be done to resolve the issue. Some issues will resolve automatically after a period of time. For these issues, the typical amount of time required for resolution is included in the Status Description.

The table also lists the messages in the order in which they are expected to be seen. If an error with lower Priority Number is seen, then the higher numbered errors/messages are not expected to be seen until this error is resolved.

The messages without an exclamation symbol (!) in the beginning are status messages. Any message with this symbol is an error message and that needs to be addressed.

If an error is encountered, the error message will remain there until it is resolved. The issue could be resolved on its own, but if it is static for longer than expected duration then manual intervention is needed.

Priority Number	Status Displayed on Local UI	Issue	Probable Cause	Fix
1.	"iWC connected"	-	-	-
2.	"! iWC not connected"	The iWC is not detecting a connected iWC.	Check the iWC and see if the iWC card is getting powered on by observing the green LED on the iWC.	Confirm the iWC has all six connection pins fully inserted into the iWC. The iWC can be swapped out only after the system is powered OFF.
3.	"iWC running"	-	-	-
4.	"ethernet connected"	-	-	-
5.	"! no ethernet cable"	Ethernet cable not detected by the iWC.	1. Make sure Ethernet cable is plugged in correctly. 2. Check if the cable is faulty.	Check the connection to the iWC port and see if replacing a cable with a new one will resolve the issue.
6.	"ip addr assigned"	-	-	-
7.	"! no ip addr set"	<p>Check if the system is connected to a network. The network is either using DHCP or if using static IP address, an IP address is assigned to this system.</p> <ul style="list-style-type: none"> - In case of DHCP make sure an IP address is assigned to this system. - In case of Static IP address assignment, the IP address need to be set on the UI. <p>The IP address can be set or verified under General Settings -> IP Address & Submask menu</p>	Network connectivity and/or network configuration of the network provider.	Check with the IT team to make sure the configuration is correct. Check if the right MAC address of the iWC card (the label on the iWC has the MAC address) is used in the network configuration if static IP address allocation is used.
8.	"internet available"	-	-	-
9.	"! ping failure"	<p>Usually this is a transient message. When the network connection takes longer, this message can appear for a couple of minutes.</p> <p>If this message does not go away after 5 minutes, it indicates some network connectivity issue to external internet.</p>	This could be because of network connectivity issue, where the network is down from the ISP side.	If the other devices on the same network can connect to the internet, then check the connectivity and make sure there are no faulty cables and connections.

iWC CONNECTION TROUBLESHOOTING (CONT.)

Priority Number	Status Displayed on Local UI	Issue	Probable Cause	Fix
10.	"remote server online"	-	-	-
11.	"! cannot reslov srvr"	The intelliGen server is not reachable.	-	-
12.	"tunnel ip addr"	-	-	-
13.	"! open vpn fail"	If the VPN connection is failing, then this message is shown.	<ol style="list-style-type: none"> 1. Make sure the port 443 for OPEN VPN tunnel is open. 2. Ensure the date/time are correctly set on the system. 	Talk to IT to make sure that this port is not blocked in their configuration. Or the OPEN VPN protocol is not blocked.
14.	"system id assigned"	-	-	-
15.	"! interrogate fail"	This should not be shown for more than 5 minutes. If the message stays longer than that, then there is an issue with configuration and iRC and iWC cards used.		<p>Make sure the cards used in this system are not taken from a pre-existing system which was at some point connected to the remote webserver.</p> <p>If any such swapping of the cards was done, both the systems need to be factory reset to correct the configuration mismatch at the server.</p>
16.	"system registered"	Everything is working as expected between the system and the server.	-	-

iIC- intelliGen INTEGRATION CARD

Installation

- If an iWC (webserver card) is used in the system, be sure to connect the iIC (integration card) to the same evaporator board. If no iWC is present in the system, the iIC may be connected to ANY evaporator board.
- While system is powered down, align & insert iIC's pins into iRC board's plug, insert card into board.
- Secure with mounting screws. For proper mounting, use #6-32x1 inch stainless machine screws.
- Wiring to the pluggable terminal block must be in accordance to the wiring prescribed by your BAS connection protocol. RS-485, 22 or 24 AWG shielded twisted pair cables, such as Belden 9841 or equivalent, is recommended.
- iIC can be used with an existing building management system.

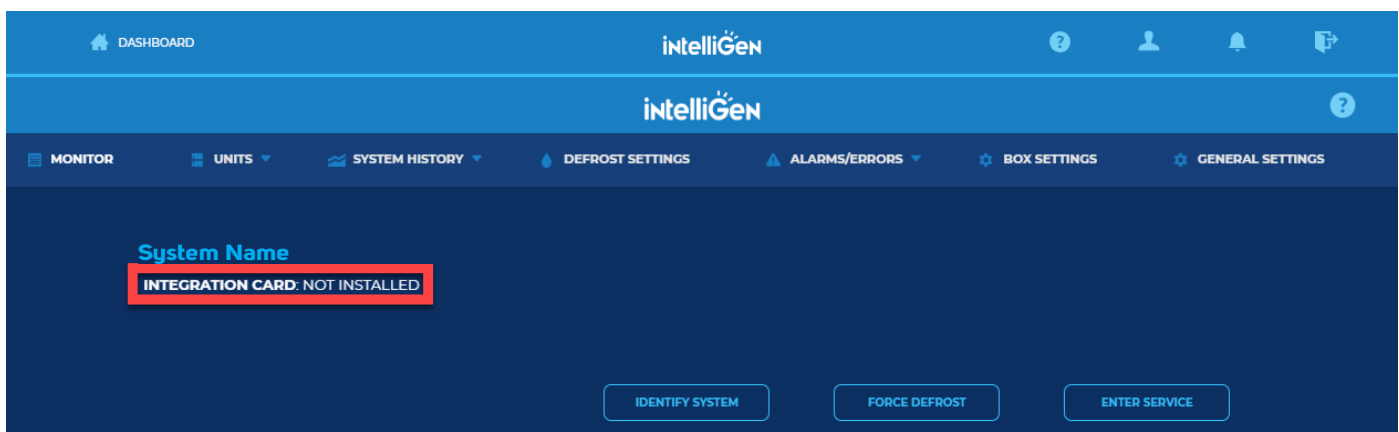
Configuration and Initial Setup

PROTOCOLS SUPPORTED

- BACnet MS/TP
- Modbus (RTU)

OPTION 1: CONFIGURE OVER WEB PAGE (IF IWC IS IN USE)

- Confirm iIC is installed by checking the status on the intelliGen Dashboard



- In **GENERAL SETTINGS** tab, under the **ADVANCED** section, select the protocol to be used. Either **MODBUS** or **BACnet**

If selecting BACnet protocol

- Enter the External Address ranging from 1 – 127
- Select BACnet Baud Rate (9600 or 38400)

If selecting MODBUS protocol

- Enter the External Address ranging from 1 – 246

OPTION 2: CONFIGURE THROUGH CONTROLLER USER INTERFACE AFTER QUICK CONFIGURATION

- Under **GENERAL SETTINGS** select the protocol to be used

If selecting BACnet protocol

- EXTERNAL MODBUS ADDR must be set to 0
- Enter the External Address ranging from 1 – 127
- Select BACnet Baud Rate (9600 or 38400)

If selecting MODBUS protocol

- EXTERNAL BACnet ADDR must be set to 0
- Enter the External Address ranging from 1 – 246

Integration Guide

BACnet SETTINGS

- Baud Rate (9600 or 38400)
- Set all BACnet devices on an MS/TP network to consecutive MAC addresses, starting at 1, so that there are no gaps between MAC address values.

MODBUS SETTINGS

- Baud Rate- 38400 (Fixed)
- 8 Data Bits
- 1 Stop Bit
- Even Parity

TO READ/WRITE PARAMETERS OVER BACnet:

- Baud rate must be set to 38400/9600
- All temperature values to be read according to the parameter value “Temperature Units” either °F or °C

BACnet Mapping – “Global Settings Object Type”

OBJECT ID – 129

S.No	Property Name	Property ID	Type	Service Mode	RW/RO/WO
1	Date/Time	513	BACnet date-time Time in UTC	Yes	RW
2	Defrost Type	514	AIR -0 MTEL-1 LTEL-2	Yes	RW
3	Defrost Style	515	TIMED-0, SMART-1, DEMAND-2	Yes	RW*
4	Refrigerant	516	R404A - 0, R507A - 1, R407A - 2, R407C - 3, R407F - 4, R22 - 5, R448A - 6, R449A - 7	Yes	RW
5	Box Temperature Setpoint	517	Real	No	RW
6	Box Temperature Setpoint Differential	518	Real	No	RW
7	Box Load Mode Time Delay	519	Integer	No	RW
8	Low Superheat Setpoint	521	Real	No	RW
9	Box Load Mode Maximum Override Time	520	Integer	No	RW
10	Minimum Runtime	522	Integer	No	RW
11	Minimum Off Time	523	Integer	No	RW
12	Temperature Units	524	CELSIUS - 1, FAHRENHEIT - 0	No	RW
13	Pressure Units	525	PSIG - 0, KPA -1, BAR - 2	No	RW
14	Drain Down Period	526	Integer	No	RW
15	Dual Coil Termination	527	Boolean	Yes	RW
17	Number of Defrosts	529	Integer	No	RW
18	Defrost 1 Schedule	530	Integer	No	RW*
19	Defrost 2 Schedule	531	Integer	No	RW*
20	Defrost 3 Schedule	532	Integer	No	RW*
21	Defrost 4 Schedule	533	Integer	No	RW*
22	Defrost 5 Schedule	534	Integer	No	RW*
23	Defrost 6 Schedule	535	Integer	No	RW*
24	Defrost 7 Schedule	536	Integer	No	RW*
25	Defrost 8 Schedule	537	Integer	No	RW*
26	Defrost 9 Schedule	538	Integer	No	RW*
27	Defrost 10 Schedule	539	Integer	No	RW*
28	Defrost 11 Schedule	540	Integer	No	RW*
29	Defrost 12 Schedule	541	Integer	No	RW*
30	Defrost Failsafe Time	542	Integer	No	RW

* Refer to Read Write Special Cases section

BACnet Mapping – “Global Settings Object Type”

S.No	Property Name	Property ID	Type	Service Mode	RW/RO/WO
31	Defrost End Temperature Setpoint	543	Real	No	RW
32	Refreeze Time Safety	544	Integer	No	RW*
33	Refreeze Suction Setpoint	545	Real	No	RW*
34	Alarm High Box Temperature Setpoint	546	Real	No	RW
35	Alarm Low Box Temperature Setpoint	547	Real	No	RW
36	Alarm Delay Time	548	Integer	No	RW
37	Alarm Door Open Time	549	Integer	No	RW
38	Country	550	USA-0, CANADA-1	Yes	RW
39	Time Zone	551	MST-0, NST-1, AST-2, EST-3, CST-4, MST-5, PST-6, AKST-7, HAST-8, SST-9, CHST-10, WAKT-11	Yes	RW*
40	UTC Offset	552	Real	Yes	RW*
41	Follow DST	553	Boolean	Yes	RW
42	Operation Mode	554	OP_OFF-0, OP_COOLING-1, OP_PUMPDOWN-2, OP_DEFROST-3, OP_DRAIN-4, OP_DELAY-5, OP_BOXLOAD-6, OP_FACTORY_TEST-9, OP_REFREEZE-10, OP_SERVICE-11	No	RO
43	Box Temperature	555	Real	No	RO (Box temp thermistor value of the iRC iLC is attached with)
44	Force Defrost	559	Boolean	No	WO
45	Alarm System Startup Failure	562	Boolean	No	RO
46	Alarm Door Open	565	Boolean	No	RO
48	Number Of Unit Records	557	Integer	No	RO
49	System Custom Name	558	String	No	RW (Max 20 character allowed)
50	Alarm High Box Temperature	560	Boolean	No	RO
51	Alarm Low Box Temperature	561	Boolean	No	RO
52	Alarm High Liquid Pressure	564	Boolean	No	RO

* Refer to Read Write Special Cases section

BACnet Mapping – “Global Settings Object Type”

S.No	Property Name	Property ID	Type	Service Mode	RW/RO/WO
53	Light Bar Enable	650	Integer	No	RW
54	External Modbus Address	651	Integer	No	RW
55	External BACnet Address	652	Integer	No	RW
56	Condenser Wired Address	654	Integer	Yes	RW
57	12/24 Hour Clock	656	Integer	Yes	RW
58	BACnet Baudrate	658	Integer	No	RW
59	Service Mode	659	Integer	No	RW
60	Primary EV Address	660	Integer	Yes	RW*

* Refer to Read Write Special Cases section

BACnet Mapping – “Unit Local Settings Object Type”

S.No	Property Name	Property ID	Type	RW/RO/WO
1	Low superheat setpoint	566	Real	RO
2	Short unit name	594	String	RO
3	EV Fan Control Style	596	Integer	RW
4	EV Fan Stir Enable	597	Integer	RW*
5	EV Fan Stir Cycle Frequency	598	Integer	RW*
6	EV Fan Stir Duty Cycle	599	Integer	RW*
7	EV Fan Speed Off Cycle	600	Integer	RW*
8	Box Temperature Sensor Calibration	603	Real	RO
9	Box Suction Temperature Sensor Calibration	604	Real	RO
10	Box Suction Pressure Sensor Calibration	605	Real	RO
11	EV Auxiliary Temperature Sensor Calibration	606	Real	RO
12	EV Coil Temperature Sensor Calibration	607	Real	RO
13	EXV Step Position	609	Integer	RO
14	EV Suction Temperature	615	Real	RO
15	EV SST	616	Real	RO
16	EV Suction Pressure	617	Real	RO
17	EV Superheat Temperature	618	Real	RO
18	EV Primary Temperature Sensor	619	Real	RO
19	EV Auxiliary Temperature Sensor	620	Real	RO
20	EV Coil Temperature Sensor	621	Real	RO
21	Error 1 box temperature	571	Boolean	RO
22	Error 2 coil temperature	572	Boolean	RO
23	Error 3 evaporator suction temperature sensor	573	Boolean	RO
24	Error 4 evaporator suction pressure sensor	574	Boolean	RO
25	Error 11 Control circuit open	581	Boolean	RO
26	Error 12 Comm wiring	582	Boolean	RO
27	Error 14 power supply low	584	Boolean	RO
28	Error 15 power supply high	585	Boolean	RO
29	Error 16 low superheat	586	Boolean	RO

* Refer to Read Write Special Cases section

BACnet Mapping – “Unit Local Settings Object Type”

S.No	Property Name	Property ID	Type	RW/RO/WO
30	Error 18 evaporator auxiliary temperature sensor	588	Boolean	RO
31	Error 19 replace battery	589	Boolean	RO
32	Error 20 log disrupted	590	Boolean	RO
33	Error 22 RCBUI failure	592	Boolean	RO
34	Alarm input fault	563	Boolean	RO
35	Object Installed	595	Boolean	RO
36	Error 26 EV Connection Lost	622	Boolean	RO
37	EV Length of Last Defrost	623	Integer	RO
38	EV RCB Control Voltage	624	Real	RO

* Refer to Read Write Special Cases section

ERRORS FOR READ/WRITE PROPERTIES:

- ERROR_CODE_UNKNOWN_PROPERTY– If the property address does not exist in the system.
- ERROR_CODE_WRITE_ACCESS_DENIED – Invalid Value (i.e. within the range some intermediate values are not valid).
- ERROR_CODE_VALUE_OUT_OF_RANGE - If the values are not in the specified range.

Modbus Register Mapping

TO READ/WRITE PARAMETERS OVER EXTERNAL MODBUS:

- Required Baud rate fixed to 38400
- Function codes
 - Read Holding Registers – 0x03
 - Write Holding Registers – 0x06
- All temperature values to be read according to the parameter value “Temperature Units” either °F or °C

Field Name	Data Address	Type	Quantity of Registers	Decoding Method	RO/RW?
System Custom Name	0x4000	String	10	ASCII characters sent in data bytes	RW (write Multiple register)
Operation Mode	0x400A	Integer	1	OP_OFF-0, OP_COOLING-1, OP_PUMPDOWN-2, OP_DEFROST-3, OP_DRAIN-4, OP_DELAY-5, OP_BOXLOAD-6, OP_FACTORY_TEST-9, OP_REFREEZE-10, OP_SERVICE-11	RO
Date/Time Type	0x400B	Integer	1	Always 2	RO
Date/Time	0x400C	Integer	4	Time in UTC, Byte 1 – Year MSB, Byte 2 – Year LSB, Byte 3 – Month, Byte 4 – Day, Byte 5 – Hour, Byte 6 – Minutes, Byte 7 – Seconds, Byte 8 – Week Day (0-4)	RW
Defrost Type	0x4010	Integer	1	AIR -0, MTEL-1, LTEL-2	RW
Defrost Style	0x4011	Integer	1	TIMED - 0, SMART - 1, DEMAND - 2	RW
Refrigerant	0x4012	Integer	1	R404A - 0, R507A - 1, R407A - 2, R407C - 3, R407F - 4, R22 - 5, R448A - 6, R449A - 7	RW
Box Temperature Setpoint	0x4013	Signed Integer	1	Real number multiplied by 10; Example: Byte 1 – 0x01, Byte 2 – 0x5E, To be read as 35.0 F	RW
Box Temperature Setpoint Differential	0x4014	Integer	1	Real number multiplied by 10	RW
Box Load Mode Time Delay	0x4015	Integer	1	Unit – Minutes	RW
Box Load Mode Maximum Override Time	0x4016	Integer	1	Unit – Minutes	RW

Modbus Register Mapping

TO READ/WRITE PARAMETERS OVER EXTERNAL MODBUS (cont.)

Field Name	Data Address	Type	Quantity of Registers	Decoding Method	RO/RW?
Low Superheat Setpoint	0x4017	Signed Integer	1	Real number multiplied by 10	RW
Minimum Runtime	0x4018	Integer	1	Unit – Minutes	RW
Minimum Off Time	0x4019	Integer	1	Unit – Minutes	RW
Temperature Units	0x401A	Integer	1	CELSIUS – 1 FAHRENHEIT – 0	RW
Pressure Units	0x401B	Integer	1	PSIG – 0 KPA -1 BAR – 2	RW
Drain Down Period	0x401C	Integer	1	Unit – Minutes	RW
Dual Coil Termination	0x401D	Integer	1	1-Yes/ 0-No	RW
Number of Defrosts	0x401F	Integer	1	1 to 12	RW
Defrost 1 Schedule	0x4020	Integer	1	Time in minutes since 12 am; Example- Byte 1 – 02 Byte 2 – D0 720 minutes in decimal for 12 pm	RW*
Defrost 2 Schedule	0x4021	Integer	1	Same as Defrost 1 schedule	RW*
Defrost 3 Schedule	0x4022	Integer	1	Same as Defrost 1 schedule	RW*
Defrost 4 Schedule	0x4023	Integer	1	Same as Defrost 1 schedule	RW*
Defrost 5 Schedule	0x4024	Integer	1	Same as Defrost 1 schedule	RW*
Defrost 6 Schedule	0x4025	Integer	1	Same as Defrost 1 schedule	RW*
Defrost 7 Schedule	0x4026	Integer	1	Same as Defrost 1 schedule	RW*
Defrost 8 Schedule	0x4027	Integer	1	Same as Defrost 1 schedule	RW*
Defrost 9 Schedule	0x4028	Integer	1	Same as Defrost 1 schedule	RW*
Defrost 10 Schedule	0x4029	Integer	1	Same as Defrost 1 schedule	RW*

Modbus Register Mapping

TO READ/WRITE PARAMETERS OVER EXTERNAL MODBUS (cont.)

Field Name	Data Address	Type	Quantity of Registers	Decoding Method	RO/RW?
Defrost 11 Schedule	0x402A	Integer	1	Same as Defrost 1 schedule	RW*
Defrost 12 Schedule	0x402B	Integer	1	Same as Defrost 1 schedule	RW*
Defrost Failsafe Time	0x402C	Integer	1	Unit – Minutes	RW
Defrost End Temperature	0x402D	Integer	1	Real number multiplied by 10	RW
Refreeze Time Safety	0x402E	Integer	1	Unit – Minutes	RW*
Refreeze Suction Setpoint	0x402F	Signed Integer	1	Real number multiplied by 10	
Alarm High Box Temperature	0x4030	Signed Integer	1	Real number multiplied by 10	RW
Alarm Low Box Temperature	0x4031	Signed Integer	1	Real number multiplied by 10	RW
Alarm Delay Time	0x4032	Integer	1	Unit – Minutes	RW
Alarm Door Open Time	0x4033	Integer	1	Unit – Minutes	RW
Country	0x4034	Integer	1	USA-0 CANADA-1	RW
Time Zone	0x4035	Integer	1	MST-0, NST-1, AST-2, EST-3, CST-4, MST-5, PST-6, AKST-7, HAST-8, SST-9, CHST-10, WAKT-11	RW*
UTC Offset	0x4036	Signed Integer	1	Real number multiplied by 10	RW*
Follow DST	0x4037	Integer	1	1 – YES, 0 – NO	RW
12/24 Hour Clock	0x4038	Integer	1	0 – 12, 1 – 24	RW
Number of Units	0x403A	Integer	1		RO
Controller Address	0x403B	Integer	1		RO
Box Temperature	0x403C	Signed Integer	1	Real number multiplied by 10	RO (Box temp thermistor value of the iRC iIC is attached with)

Modbus Register Mapping

TO READ/WRITE PARAMETERS OVER EXTERNAL MODBUS (cont.)

Field Name	Data Address	Type	Quantity of Registers	Decoding Method	RO/RW?
Force Defrost	0x403D	Integer	1	Writing '1' would force defrost	WO
System Alarms	0x403E	Integer	2	Refer System Alarm Table	RO
Enable	0x4040 + (n * C)	Integer	1	0 – Disabled; 1 – Enabled . If Enabled is 0, below parameters should be ignored for that unit	RO
Unit Address	0x4040 + (n * C) + 1	Integer	1		RO
Unit Type	0x40 + (n * C) + 2	Integer	1		RO
EV Superheat Setpoint	0x4040 + (n * C) + 3	Signed Integer	1	Real number multiplied by 10	RW
Unit Alarms/Errors	0x4040 + (n * C) + 4		4	Refer Unit Alarms Table	RO
Short Unit Name	0x4040 + (n * C) + 8	Strings	2	ASCII characters sent in data bytes	RO

Note: * Refer Read Write Special Cases section. n is an index into number of unit records ranging from [0 to N-1] EV units where max N = 8.

TABLE 2

Field Name	Data Address	Type	Quantity of Registers	Decoding Method	RO/RW?
LED Bar Enable	0x5000	Integer	1	No-0, Yes-1	RW
External Modbus Address	0x5001	Integer	1	0 to 246	RW*
External BACnet Address	0x5002	Integer	1	0 to 127	RO
CU Wired Address	0x5007	Integer	1	RCB Address.	RW*
BACnet Baudrate	0x5008	Integer	1	0-9600, 2-38400	RO
Enter Service Mode	0x5009	Integer	1	Exit Service Mode-0, Enter Service Mode-1	RW
Primary EV Address	0x500A	Integer	1	RCB Address -- 0 - 7th bit. Prim/aux - 8th bit. Primary – 0 Auxiliary – 1	RW

* Refer to Read Write Special Cases section

TABLE 3

Field Name	Data Address	Type	Quantity of Registers	Decoding Method	RO/RW?
EV Fan Control Style	0x5500 + (n * 0x22)	Integer	1	FAN_CNTRL_STYLE_STANDARD-0, FAN_CNTRL_STYLE_TWO_SPEED-1, FAN_CNTRL_STYLE_VARIABLE-2	RW
EV Fan Stir Enable	0x5500 + (n * 0x22) + 1	Integer	1	STIR_ENABLE_OFF-0, STIR_ENABLE_ON -1	RW*
EV Fan Stir Cycle Frequency	0x5500 + (n * 0x22) + 2	Integer	1	Unit – Minutes	RW*
EV Fan Stir Duty Cycle	0x5500 + (n * 0x22) + 3	Integer	1	60, 70, 80	RW*
EV Fan Speed Off Cycle	0x5500 + (n * 0x22) + 4	Integer	1	Range 30 to 100 increment by 2	RW*
Box Temperature Sensor Calibration	0x5500 + (n * 0x22) + 0x07	Signed Integer	1	Real number multiplied by 10; Example: Byte 1 – 0x01 Byte 2 – 0x5E To be read as 35.0 F	RO
Box Suction Temperature Sensor Calibration	0x5500 + (n * 0x22) + 0x08	Signed Integer	1	Real number multiplied by 10	RO
Box Suction Pressure Sensor Calibration	0x5500 + (n * 0x22) + 0x09	Signed Integer	1	Real number multiplied by 10	RO
EV Auxiliary Temperature Sensor Calibration	0x5500 + (n * 0x22) + 0x0A	Signed Integer	1	Real number multiplied by 10	RO
EV Coil Temperature Sensor Calibration	0x5500 + (n * 0x22) + 0x0B	Signed Integer	1	Real number multiplied by 10	RO
EXV Step Position	0x5500 + (n * 0x22) + 0x0D	Integer	1		RO
EV Suction Temperature	0x5500 + (n * 0x22) + 0x13	Signed Integer	1	Real number multiplied by 10	RO
EV SST	0x5500 + (n * 0x22) + 0x14	Signed Integer	1	Real number multiplied by 10	RO
EV Suction Pressure	0x5500 + (n * 0x22) + 0x15	Signed Integer	1	Real number multiplied by 10	RO
EV Superheat Temperature	0x5500 + (n * 0x22) + 0x16	Signed Integer	1	Real number multiplied by 10	RO
EV Primary Temperature Sensor	0x5500 + (n * 0x22) + 0x17	Signed Integer	1	Real number multiplied by 10	RO
EV Auxiliary Temperature Sensor	0x5500 + (n * 0x22) + 0x18	Signed Integer	1	Real number multiplied by 10	RO
EV Coil Temperature Sensor	0x5500 + (n * 0x22) + 0x19	Integer	1	Real number multiplied by 10	RO
EV Length of Last Defrost	0x5500 + (n * 0x22) + 0x1A	Integer	1	Unit – Minutes	RO
EV RCB Current Voltage	0x5500 + (n * 0x22) + 0x1B	Real	1	Real number multiplied by 10	RO

Note: * Refer Read Write Special Cases section. n is an index into number of unit records ranging from [0 to N-1] EV units where max N = 8.

Alarm Tables

SYSTEM ALARMS TABLE

BYTE							
BIT 31	BIT 30	BIT 29	BIT 28	BIT 27	BIT 26	BIT 25	BIT 24
Spare							
BIT 23	BIT 22	BIT 21	BIT 20	BIT 19	BIT 18	BIT 17	BIT 16
BYTE							
BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9	BIT 8
Spare	Spare	Spare	Spare	Spare	Spare	Spare	Reserved (Future)
BYTE							
BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
Reserved (Future)	Reserved (Future)	Door Switch Open Alarm	Reserved (Future)	Input Fault (Sensor Errors Alarm)	System Startup Failure Alarm	Low Box Temperature Alarm	High Box Temperature Alarm

To Read System Alarms, send command **XX 03 40 3E 00 01 XX XX**

The read registers can be bit-mapped per the table above.

EX: If **00000000 00001001** is read, then there is an active high box temp alarm and an active input sensor fault.

Alarm Tables

UNIT ALARMS TABLE

BYTE							
BIT 63	BIT 62	BIT 61	BIT 60	BIT 59	BIT 58	BIT 57	BIT 56
Spare							
BIT 55	BIT 54	BIT 53	BIT 52	BIT 51	BIT 50	BIT 49	BIT 48
Spare							
BIT 47	BIT 46	BIT 45	BIT 44	BIT 43	BIT 42	BIT 41	BIT 40
Spare							
BIT 39	BIT 38	BIT 37	BIT 36	BIT 35	BIT 34	BIT 33	BIT 32
Spare							
BYTE							
BIT 31	BIT 30	BIT 29	BIT 28	BIT 27	BIT 26	BIT 25	BIT 24
Input Fault (Sensor Errors Alarm)	Spare	Spare	Spare	Spare	Spare	Spare	EV Connection Lost Error
BYTE							
BIT 23	BIT 22	BIT 21	BIT 20	BIT 19	BIT 18	BIT 17	BIT 16
System Connection Lost Error	Primary EV Temp Sensor Override Error	RCBUI to RCB Comm Failure Error	RCBUI Failure Error	Static Operation Error	Data Logging Disrupted Error	Replace RTC Backup Battery Error	Evap Auxiliary Temp Sensor Error
BYTE							
BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9	BIT 8
Reserved (Future)	Low Superheat During Cooling Error	24V Power Supply High Error	24V Power Supply Low Error	Spare Inputs Error	Reserved (Future)	Control Circuit Open Error	Reserved (Future)
BYTE							
BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
Reserved (Future)	Reserved (Future)	Reserved (Future)	Reserved (Future)	Evap Suction Pressure Transducer Error	Evap Suction Temp Sensor Error	Coil Temp Sensor Error	Box Temp Sensor Error

To Read Unit Alarms, send command **XX 03 40 3E 00 01 XX XX**

The read registers can be bit-mapped per the table above.

EX: If **00000000 00000000 00000000 00001001** is read, then there is an active box temp sensor error and an active evap suction transducer error.

MODBUS:

- ERR_INVALID_ADDR - If the property address does not exist in the system.
- ERR_INVALID_DATAVAL - If the values are not in the specified range.
- ERR_INVALID_EXEC – If the property does not have write permission.

Read Write Special Cases (*):

1. The Defrost style parameter write permission is depends on the Defrost type value.
 - If the Defrost type value is AIR, then the Defrost style is allowed to write only TIMED.
 - If the Defrost type value is MTEL or LTEL, then the Defrost style is allowed to write TIMED or SMART or DEMAND.
2. The Refreeze time safety and Refreeze suction set point parameter write permissions are depends on the Defrost type value.
 - If the Defrost type value is MTEL or LTEL, then the Refreeze time safety and Refreeze suction set Point parameters are allowed to write valid values.
3. The Defrost schedules (1 to 12) properties are allowed to write depends on Number of defrost cycle count value. Same schedule time for more than one defrosts is not allowed. Ex: Defrost1 (2:00) and Defrost2 (2:00) schedule should not have same time.
4. The UTC offset property is writable only on NON-STANDARD Time zone value.
5. The Time zone parameter value is depending on the country parameter value.
 - If the country value is 0 (US) then the time zone parameter is not allowed to write NST-Newfoundland (1).
 - If the country value is 1 (CA) then the time zone parameter is allowed to write till 5 (0-NONSTD, 1-NST, 2-AST, 3-EST, 4-CST, and 5-MST).
6. The Fan stir cycle frequency and Fan stir duty cycle parameters allowed to write depends on the Fan control style, Fan stir enable parameters.
 - If the Fan control style property is STANDARD and Fan stir enable property value is ON or OFF, then the Fan stir cycle frequency and Fan stir duty cycle properties are allowed to write valid values.
7. The Fan speed property value is allowed to write only on Fan control style property value is VARIABLE.
8. The Primary Evap address property value should be segregated in to two parts.
 - Primary EV Address - 1 to 246 (0 to 7th bit).
 - Primary or Auxiliary sensor selection 0 or 1 (8th bit).

List of Write Property Range Restrictions:

1. Global Settings:

- defrost type: integer, [0 to 2]
- defrost style: integer, [0 to 2]
- refrigerant: integer, [0 to 7]
- box temperature setpoint: real, [-30.0 to +60.0] Fahrenheit, 1.0F/0.5C increments
- box temperature differential: integer, [+1 to +10] Fahrenheit, 1.0F/0.5C increments
- box load mode time delay: integer, [0 to 60] minutes
- box load mode max override time: integer: [5minutes to 24 hours] minutes, 5 minutes increment
- low superheat setpoint: real, [0 to +3] Fahrenheit, 1.0F/0.5C increments
- minimum runtime: integer, [1 to 4] minutes
- minimum offtime: integer, [2 to 10] minutes
- temperature unit: boolean, [0-Fahrenheit, 1-Celsius]

List of Write Property Range Restrictions: (cont.)

- pressure unit: integer, [0- PSIG, 1-KPA, 2-BAR]
- drain down period: integer, [1 to 10] minutes
- dual coil termination: Boolean, [1=yes, 0=no]
- number of defrost: integer, [1 to 12]
- defrost 1 schedule: integer, [0 to 1439] minutes, 5minutes increment
- defrost 2 schedule: integer, [0 to 1439] minutes, 5minutes increment
- defrost 3 schedule: integer, [0 to 1439] minutes, 5minutes increment
- defrost 4 schedule: integer, [0 to 1439] minutes, 5minutes increment
- defrost 5 schedule: integer, [0 to 1439] minutes, 5minutes increment
- defrost 6 schedule: integer, [0 to 1439] minutes, 5minutes increment
- defrost 7 schedule: integer, [0 to 1439] minutes, 5minutes increment
- defrost 8 schedule: integer, [0 to 1439] minutes, 5minutes increment
- defrost 9 schedule: integer, [0 to 1439] minutes, 5minutes increment
- defrost 10 schedule: integer, [0 to 1439] minutes, 5minutes increment
- defrost 11 schedule: integer, [0 to 1439] minutes, 5minutes increment
- defrost 12 schedule: integer, [0 to 1439] minutes, 5minutes increment
- defrost fail safe time: integer, [10 to 200] minutes
- defrost end setpoint: real, [+40 to +100] Fahrenheit
- refreeze time safety-point: integer, [1 to 10] minutes
- refreeze suction setpoint: real, [20 to 35] Fahrenheit
- alarm high box temperature setpoint: real, [-40, +90] Fahrenheit
- alarm low box temperature setpoint: real, [-40, +90] Fahrenheit
- alarm delay time: integer, [2 to 120] minutes
- alarm door open time: integer, [5 to 240] minutes
- country: integer, [0-USA, 1-CANADA]
- timezone: integer, [0 to 11]
- UTC offset: real, [-11 to 14] 0.5 unit increments
- follow DST: boolean, [yes, no]
- system custom name: string [20 characters]
- force defrost: : integer, [1]
- light bar enable: boolean, [on, off]
- external bacnet address: integer, [0 to 127]
- external modbus address: integer, [0 to 246]
- condensing unit wired address: integer, [0-not connected, 1 to 246-connected RCB address]
- 12/24 hour clock: integer [0-12H, 1-24H]
- baudrate: integer, [0-9800, 2-38400]
- service mode: boolean, [0, 1]
- primary EV address: integer, [1 to 246]

2. Local Settings

- EV fan control style: integer, [0 to 2]
- EV fan stir enable: boolean, [1-on, 0-off]
- EV fan stir cycle frequency: integer, [12 to 30] minutes
- EV fan stir duty cycle: integer, [60, 70, 80] percentage
- EV fan speed (off cycle): integer, [30 to 100] percentage, 2% increments

Notes:

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