Reference Guide for the Network Interface Controller

Please read and save these instructions. Read carefully before attempting to operate or maintain the product described. Protect yourself and others by observing all safety practices. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

BMS v1.10
Version Date: 5/1/2017

Table of Contents

Introduction

Program Features

The network interface controller is a device that acts as a communication link between the BMS (Building Management System) and the unit. The network interface controller will transform the communication into an action within the unit and will provide monitoring status of various functions and temperatures. The controller has the ability to communicate with a BMS through protocols such as LonWorks®, BACnet® MSTP, BACnet® IP or Modbus. See Points List at end of document for a complete list of BMS points.

Input/Output Points

Standard Input/Output points are Supply Air Temp, Outside Air Temp and Fan Proving Status. The following are optional I/O points. See Network Interface unit diagram to see job specific I/O.

Input Points (Max 5)	Output Points Digital (Max 5)	Output Points Analog (Max 3)
Cold Coil Temp	Call for Heat Stage 1	Heat Output
Return Air Temp	Call for Cool Stage 1	Cool Output
Exhaust Discharge Temp	Call for Cool Stage 2	Supply VFD
Outdoor Air After Wheel Temp	Occupied Unoccupied	Exhaust VFD
Dirty Filter Status	Remote Exhaust Fan	Energy Wheel VFD
Rotation Status	Call for HGRH	Return Air Damper
CO_2 Sensor	Alarm	User Defined
Supply VFD Monitor Signal	User Defined	
Exhaust VFD Monitor Signal		
User Defined		
Room Temp		
Frost Status		
Econ Status		

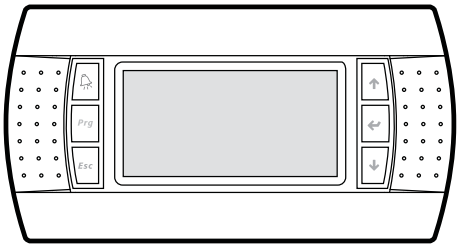
Alarms

The network interface controller will monitor the unit conditions for alarm conditions. Upon detecting an alarm, the controller will record the alarm description, time, date and available temperatures for user review. An optional digital output is available for remote alarm indication. Alarms are also communicated via BMS.

- **Temperature Sensor Alarm:** Network interface controller will send an alarm in the case of a failed air temperature sensor.
- **Supply Air Low Limit:** If the supply air temperature drops below the supply air low limit (35°F), the network interface controller can do one of the following based on user setup.
  - Alarm Only: Sends alarm via BMS.
  - Alarm and Open NO3: Sends an alarm and turns the unit run command off, even if BMS run command is active.
  - Disable: Disables the supply air low limit function.

Remote Display Panel (Optional)

A display panel allows for remote monitoring and adjustment of parameters, allowing ease of control access without going outdoors.



A remote mounted display is also available, which connects via the J4 port. A six-wire patch cable is needed.

Display Use

The network interface controller is located in the unit control panel. The face of the controller has six keys, allowing the user to view unit conditions and alter parameters. The network interface controller is pre-programmed with easy-to-use menus.

Keypad Description		
or	Alarm	Button will blink red, indicating an alarm condition. Press to review current alarms. To review previous alarms, access the DATA LOGGER through the main menu.
	Down Arrow	The arrow keys allow the user to scroll through different screens and adjust parameters.
	Up Arrow	
	Enter	A. In screens with adjustable parameters, pressing the Enter key moves the cursor from the upper left corner of the screen to the parameter. The arrow keys can then be used to adjust the parameter. B. To move to the next parameter on the same screen, press the Enter button. C. To save the change, press the Enter button until the cursor moves back to the upper left corner of the screen.
Esc or	Escape	Allows the user to exit the current menu, jumping to the Main Menu.
Prg or	Program	Pressing the Prg (Program) button allows the user to enter the Main Program Menu. See below for Main Program Menu description.

Example of Parameter Adjustment

Supply air low limit

Alarm when supply is below: 35.0° F
Alarm delay: 300s

The cursor always begins in the upper left corner of the display and will be blinking. Press the key to move the cursor down for parameter adjustment.

Supply air low limit

Alarm when supply is below: 32.0° F
Alarm delay: 300s

Once the cursor has reached the desired parameter, press the keys to adjust the value.

Supply air low limit

Alarm when supply is below: 32.0° F
Alarm delay: 300s

When satisfied with the adjustment, press the key to save the parameter. When finished, make certain the cursor is in the upper left corner. If the cursor is not in the upper left corner, the changes will not be saved. The cursor must be in the upper left corner to enable screen advancement.

Examples of Alarms

If an alarm occurs, the status line will state !PRESS ALARM BUTTON! and the or button will glow red on the controller and the remote display (if installed).

Alarms

Press DOWN to review current alarm(s).
Press ESC to exit.
Press ALARM to reset.

To view alarm, press the or button once. This will display the most recent alarm. Press the or button again to reset the alarm. If the alarm cannot be cleared, the cause of the alarm has not been fixed. Press the buttons to view any additional occurring alarms.

B3-Outdoor Temp
Sensor B03 Failure

This is an example of an outdoor air sensor failure.

Alarms

No active alarm

Press ENTER
to DATA LOGGER

This screen appears if there are no active alarms.

To view all saved alarms, press the button to enter the DATA LOGGER. For more information, see the Data Logger menu.

List of Possible Alarms		
Temperature Sensor Failure	Failure of temperature sensor.	Alarm only
System has exceeded the set number of run hours	The unit has been operating for a period longer than the maintenance set point.	Alarm only
Supply temperature low limit alarm	Indicates a supply air temperature lower than the supply low limit set point.	Alarm & Open NO3 or Alarm Only
pCOe Offline	Indicates communication with pCOe auxiliary I/O has failed.	Alarm only
pCOe - Analog input probe on channel # disconnected or broken	Indicates an analog probe failure on the pCOe. Check integrity of auxiliary I/O analog probes.	Alarm only

Main Menu Overview

The remote interface controller will revert to a default main menu loop. This loop includes several screens to view the operating conditions of the unit. Scroll through the menu screens by using the ↓ ↑ keys. **Screens with a dashed line border are dependent upon an optional accessory and may not always appear.**

```
TIME      DATE      UNIT##
GREENHECK
Building Value in Air.
v1.10 GXXXXX00XX100b
STATUS LINE
```

The initial menu screen displays the program version, unit code and Status Line. The Status Line will display "!Manual Override!" if the override screen is active or "!Press Alarm Button!" if there is an alarm condition.

```
TIME      DATE      UNIT##
        Inputs
B1-
B2-
B3-OutsideAir: 80.0ºF
B4-SupplyAir: 65.0ºF
B5-
B6-
```

Inputs

This screen displays real-time conditions from the input sensors located in the unit.

```
TIME      DATE      UNIT##
        Digital Inputs
ID1-Fan Proving: Open
ID2-DirtyFilter: Open
```

Digital Inputs

This screen displays real-time digital input open/closed status from the selected components.

```
TIME      DATE      UNIT##
        Analog Ouput
Y2-VFD Supply: 100%
Y3-
Y4-
```

Analog Outputs

This screen displays real-time analog output signals to the selected components.

```
TIME      DATE      UNIT##
        Digital Output
NO1-
NO2-
NO3- Unit OnOff: Open
NO4-
NO5-
NO6-
```

Digital Ouputs

This screen displays real-time digital output open/closed status.

Press Prg or ◉ to enter menus.

Main Menu

- Main Status
- Inputs
- Digital Inputs
- Analog Output
- Digital Output Status

Setpoint

- Supply Air Low Limit
- CO2 Sensor Setup

Clock

- Clock
- Daylight Savings Time

Input/Output

- Analog Input
- Digital Input
- Relay Output
- Analog Output

Data Logger

- Alarm Description

Service

Information
- Information

Overrides
- Service Password
- Testing Overrides

BMS Config
- Service Password
- BMS Configuration
- Modbus Setup
- MSTP Setup
- TCP/IP Setup
- BACnet ReadWrite

Service Setting
- Service Password
- Working hour set
  - Maintenance Hours
- Probe Adjustment
  - Analog Inputs
  - Probe Adjust
- Password/Defaults
  - User Default
  - User Default settings

Manufacturer

Configuration
- Unit Code
- Expansion I/O
- Controller pLAN Setup

I/O Configuration
- Analog Input
- Digital Input
- Relay Output
- Analog Output Config

Factory Setting
- Factory Setup
- Temperature Scale
- Display Buzzer

Initialization
- Factory Settings
- New Password
- Initialization

Menus

The controller is equipped with several menus to help guide users with altering program parameters. The following menus can be accessed by pressing the Prg or ⊙ key. To enter the desired menu, press the ↵ key.

A. Setpoint

The **Setpoint** menu allows the user to view and adjust temperature related parameters.

Supply air low limit	
Alarm when supply is below	35.0°F
Alarm delay:	300s
Alarm Function:	Alarm Only

THIS SCREEN DISPLAYS THE LOW SUPPLY AIR TEMPERATURE LIMIT.

If the unit supply air temperature falls below Supply Air Low Limit for a period of Alarm Delay, the unit will do one of the following based on the Alarm Function.

- *Alarm Only: Sends alarm via BMS.*
- *Alarm and Open NO3: Sends an alarm and opens NO3 (Unit Start/Stop command) even if the BMS start/stop command is active.*
- *Disable: Disables the supply air low limit function.*

The purpose of the supply low limit is to protect the building and contents from cold supply air. It is NOT designed to protect the air handling unit.

If the unit does not have cold or hot water coils, it should not need additional protection from freezing. If the unit does have cold or hot water coils, field provided coil freeze protection may be necessary.

CO2 Sensor Setup	
CO2 Output Scaling:	2-10VDC
2vdc	500 ppm
10vdc	1500 ppm

THIS SCREEN DISPLAYS CO_2 SENSOR SETUP.

This screen only appears if the unit is equipped with a CO_2 sensor.

This screen is used to match the settings of the CO_2 sensor to the network interface controller.

B. Clock

The **Clock** menu allows the user to view and alter the time and date.

Set Date & Time	
Day:	Monday
Date:	01/31/10
Hour:	15:30

The Clock screen allows the user to adjust the time and date.

Clock	
Daylight Savings Time	
DST:	ENABLE
Transition Time:	60min
Start:	SECOND SUNDAY in MARCH at 2:00
End:	FIRST SUNDAY in NOVEMBER at 2:00

THIS SCREEN ALLOWS THE USER TO MODIFY THE DAYLIGHT SAVINGS TIME FUNCTION.

This internal clock is set by default to adjust for daylight savings time. On this screen the user can enable, disable, or change when the unit compensates for daylight savings time.

C. Input/Output

The **Input/Output** menu allows the user to quickly view the status of the controller inputs and outputs.

Analog Input	
B4-Supply Air Temp	
Input B04:	70.0°F

To manually control I/O values, go to the **Service menu > Overrides.**

Similar screens appear for all controller inputs and outputs.

D. Data Logger

The **Data Logger** menu allows the user to view past alarms.

13:21:04	10/05/10
OA Sensor	
Outside Air T:	-623.3
Supply Air T:	70.0

This screen is an example of a recorded alarm.

The unit conditions are displayed for past alarm events. The date, time, temperatures and unit status are recorded.

To clear recorded alarms, press Prg or ◉ and Esc or ↩ simultaneously.

E. Service

The **Service** menu allows the user to access several sub-menus regarding controller information, controller overrides, operating hours, BMS configuration, I/O manual management and Probe Adjustment. The user can also change the default Service Password (Default=1000) by accessing the **Service Settings** sub-menu. By accessing the **BMS Config** sub-menu, the user can adjust BMS protocol settings (BACnet, LonWorks, Modbus).

E. Service
a. Information

Entering the Information sub-menu will display information about the controller and the program loaded on the controller.

Information		
Greenheck Fan Corp.		
Code:GXXXXX00XX100b		
Ver.: 1.10		05/1/17
Manual:		476811
Bios:	5.18	11/17/10
Boot:	4.07	12/18/11

Code: Controller setup code determines functionality of program. When contacting the factory, please reference this code.

Manual: Reference this Installation and Operation Manual, available at www.greenheck.com

E. Service
b. Overrides

The **Overrides** menu is for start-up, commissioning and troubleshooting. This menu allows the user to override the control loops. If further control is required, the user can also manually control the controller inputs and outputs. To access the **Overrides** sub-menu, enter the service password (Default=1000).

Testing Overrides

To resume normal operation, cycle unit power.

To manually override an output, in each respective screen, change the override from No to Yes, then change the Position to open or closed or adjust the vdc output setting.

To resume normal operation after overriding the controller, simply cycle power to the unit.

This menu allows the user to manually control the outputs of the controller. The user can manually control the analog outputs and digital outputs. EXTREME CAUTION should be used when manually controlling the outputs and should only be used as a troubleshooting feature. If the controller is powered down, overrides are reset to off. Therefore, if using this troubleshooting feature, the best way to clear manually input values is to power down the controller.

Testing Overrides

Override: No Position
NO1-
NO2-
NO3- Unit On/Off: Open
NO4-
NO5-
NO6-

This screen allows the user to override the digital outputs.

This screen only appears if the unit is equipped with a digital output option.

Testing Overrides

Override: No
Y2- VFD Supply: 10.0vdc
Y3-
Y4-

This screen allows the user to override the analog outputs.

This screen only appears if the unit is equipped with an analog output option.

E. Service
c. BMS Config

The **BMS Config** menu allows the user to view and alter BMS protocol settings. If the BMS protocol is BACnet or Modbus, additional screens allow further configuration. See below for details. To access the BMS Config sub-menu, enter the service password (Default=1000).

BMS Configuration	
Protocol:	BACnet MSTP
BACnet Plugin?	YES

This screen allows the user to select the BMS protocol. All BMS protocols require a communications card installed in the SERIAL CARD port, located on the face of the controller.

If the protocol is BACnet MSTP or BACnet IP/Eth, the user can change common BACnet parameters via the controller. The BACnet Plugin must be set to YES.

MODBUS SETUP	
Address:	1
Baudrate	9600

This screen allows the user to adjust Modbus parameters.

This screen only appears if the selected BMS protocol is set to Modbus.

The address is the Modbus address of the card installed in the SERIAL CARD port located on the face of the controller. (Factory Default Address = 1). The Baud Rate should be set to the BMS baud rate. (Factory Default Baud Rate is 9600).

MSTP SETUP	
Instance:	77000
Baudrate	38400
MAC Addr:	0
MaxMasters:	127
MaxInfoFrames:	20

BACnet Read/Write	
Function:	Read
Update?	Yes
*Cycle unit power to confirm write command.	

This screen allows the user to adjust BACnet MSTP parameters.

This screen only appears if the selected BMS protocol is set to BACnet MSTP and BACnet Plugin = YES.

If a BACnet MSTP card has been installed, the default parameters can be changed via the controller display. Factory settings are shown in the screen to the left.

<u>To view current parameters:</u>

1. Power on controller and allow several minutes to initialize.
2. Go to **BMS Config** menu and view BACnet Read/Write screen.
3. Change *Function* to *Read* and *Update?* to *YES*.

Current BACnet MSTP parameters should now be displayed in the BACnet MSTP SETUP screen. If all values appear to be zeros, consult the factory. (Make sure you have allowed several minutes for the controller to initialize).
**Values may appear to be zero prior to setting the Function to READ.*

<u>To change BACnet MSTP parameters:</u>

1. Power on controller and allow several minutes to initialize.
2. Go to **BMS Config** menu and view MSTP SETUP screen.
3. Move cursor to desired parameter by pressing the ↓ ↑ buttons. Press ↵ to select the parameter to change. Press the ↓ ↑ buttons to adjust the parameter. Press ↵ to save adjusted value.
4. Once desired parameters have been entered, go to BACnet Read/Write screen. Change *Function* to *Write* and *Update?* to *YES*.
5. Reboot the controller by cycling power to the unit. Allow several minutes for the controller to initialize.
6. View MSTP parameters. If changed values did not save, contact the factory.

TCP/IP SETUP	
Instance:	77000
IP set by:	DHCP
IP:	128.2.104.134
Subnet:	255.255.000.000
Gatewy:	128.2.0.12

TCP/IP SETUP	
DNS 1:	193.168.001.001
DNS 2:	193.168.001.001
Type: IP	

BACnet Read/Write	
Function:	Read
Update?	Yes
*Cycle unit power to confirm write command.	

This screen allows the user to adjust BACnet IP parameters.

This screen only appears if the selected BMS protocol is set to BACnet IP/Eth and BACnet Plugin = YES.

If a BACnet IP card has been installed, the default parameters can be changed via the controller display. **The card is in DHCP mode from the factory.** Once communication is established, the user can enter static IP parameters.

To view current parameters:

1. Power on controller and allow several minutes to initialize.
2. Go to **BMS Config** menu and view BACnet Read/Write screen.
3. Change *Function* to *Read* and *Update?* to *YES*.

Current BACnet IP parameters should now be displayed in the BACnet TCP/IP SETUP screen. If all values appear to be zeros, consult the factory. (Make sure you have allowed several minutes for the controller to initialize).
**Values may appear to be zero prior to setting the Function to READ.*

To change BACnet TCP/IP parameters:

1. Power on the controller and allow several minutes to initialize.
2. Go to **BMS Config** menu and view TCP/IP SETUP screen.
3. Move cursor to desired parameter by pressing the ↓ ↑ buttons. Press ↵ to select the parameter to change. Press the ↓ ↑ buttons to adjust the parameter. Press ↵ to save adjusted value.
4. Once desired parameters have been entered, go to BACnet Read/Write screen. Change *Function* to *Write* and *Update?* to *YES*.
5. Reboot the controller by cycling power to the unit. Allow several minutes for the controller to initialize.
6. View TCP/IP parameters. If changed values did not save, contact the factory.

E. Service

- d. Service Settings
  - a. Working hour set
  - b. Probe adjustment
  - c. Password/Defaults

The **Service Settings** menu allows the user to change the default Service Password (1000), save and restore default parameters, and adjust probe values.

MAINTENANCE HOURS	
SYSTEM	
Run hours:	0000h
Set Point:	0000h
Reset to Zero?	No

This screen allows the user to view unit run hours, and alter set points for maintenance.

Run hours: The amount of time in hours that the unit has been powered.

Set Point: The amount of running time in hours before a maintenance alarm should occur.

Reset to Zero: Reset the measured amount of run time.

Analog Input	
Outside Temperature Input B3	
Offset:	0.0°F
Value:	70.5°F

The Probe Adjustment menu allows the user to calibrate sensor probes with an offset value.

Similar screens are available for remaining sensor probes.

User Default

Insert new service password (PW1):	1000

This screen allows the user to change the Service Level password (PW1)

User Default Settings	
Save?	No
Restore?	No

This screen allows the user to SAVE and RESTORE the default parameters stored in memory.

If the user would like to save their settings, move the cursor to the SAVE position and change to YES. This will save all of the current parameters into memory as Service Settings. If the user would like to restore to these values at some point in the future, moving the cursor to the RESTORE position, and selecting YES will restore the controller to the user saved defaults.

F. Manufacturer

a. Configuration

Configuration menu allows the user to change the setup code for the unit, enable Scheduling, Holidays, expansion I/O and change Field Card settings. Users are welcomed to enable Scheduling and Holidays. However, code changes and expansion I/O enabling are to be done under factory advice only!

Unit Code	
Select DDC configuration code here.	
Code:	GXXXXX000XX101b

This screen displays and allows adjustment of the Unit Code.

This code is set from the factory to operate the components selected with the unit. When troubleshooting, refer to the wiring diagram sent with the unit (located on the control center door) to verify the Unit Code is correct. The code will be listed on the wiring diagram.

Configuration	
Modbus settings	
Baudrate:	19200
Stop bit:	2
Parity mode:	None
Timeout:	300ms

This screen allows the user to alter the FIELD CARD Modbus settings.

The FIELD CARD is used for peripheral device control (pCOe Expansion Module).

The Modbus settings should only be changed with factory guidance.

Unit Expansion I/O	
Enable Expansion:	No

This screen allows the user to enable additional I/O points.

Unit I/O expansion requires the installation of a pCOe and Field Card. Please contact the factory for more information.

Enabling the I/O expansion allows the user to add the following points for monitoring:

- Four analog inputs (0/1vdc, 0/5vdc, 0/20mA, 4/20mA, NTC Temp)
- One analog output (0/10vdc)
- Four digital inputs
- Four digital outputs

The additional I/O points available on the pCOe expansion module allow the user to monitor and control the additional points over the BMS and user display.

Controller pLAN Setup	
Current pLAN Addr:	1
New pLAN Addr:	1

This screen allows the user to view and change the controller pLAN address.

A pLAN (pCO Local Area Network) is a Carel proprietary local area network, allowing the user to connect multiple controllers to one remote display panel. Each controller on a pLAN must have a unique address.

This address is only applicable for units connected on a pLAN. For BACnet, LonWorks or Modbus parameters, go to **Service > BMS Config**.

F. Manufacturer
b. I/O Configuration

The **I/O Configuration** menu allows adjustment of all controller inputs and outputs. This menu is similar to the **Probe Adjustment** menu, except that it additionally allows adjustment of the factory default 'normal' states of the digital inputs and the direction of the analog outputs. Additionally, it allows adjustment of the physical location of each I/O. ADJUSTMENT OF I/O PHYSICAL LOCATION MUST ONLY BE DONE UNDER FACTORY GUIDANCE! IMPROPER ADJUSTMENT MAY RESULT IN SYSTEM DAMAGE!

Analog Input

Outside Temperature
Channel:B3 Normal
Type: NTC

Offset: 0.0°F
Value: 70.5°F

This is an example of an analog input configuration screen.

In the I/O configuration screens, the user can alter the physical location and type of each point.

Similar configuration screens appear for the remaining I/O.

Alarm Time Delay

Outside Temperature
Input B03: 72.0°F

Out of Range Alarm

Power Delay: 30s
Run Delay: 30s

Digital Input

ID1- Fan Proving
Channel: ID1
Action: CLOSED
Delay 0s
CLOSED

Relay Output

NO3- Unit ON
Channel: 3

Status: OFF

Analog Output Config

Y2-Heat Output
Channel: Y2
Action: DIRECT

Minimum: 0.0vdc
Maximum: 10.0vdc

F. Manufacturer
c. Factory Settings

The **Factory Settings** menu allows adjustment of parameters that are critical for proper unit operation. Adjustment of these parameters is only recommended with factory guidance. To access the **Factory Settings** menu, enter the manufacturer password (Default=1000).

Temperature Scale

Select: Fahrenheit

Display Buzzer

Select: Disable

This screen allows the user to adjust what temperature units the controller should display and whether the display buzzer should be enabled or disabled.

The temperature unit of measurement can either be Fahrenheit or Celsius. If using Celsius, the user will need to manually convert the factory default parameters in the **Factory Settings** menu.

The display buzzer is only applicable when a remote interface panel is attached to the controller. If an alarm were to occur, the remote display panel would begin buzzing loudly (if the buzzer was enabled) and would show the alarm status.

F. Manufacturer
d. Initialization

The **Initialization Menu** allows the user to save and restore the controllers default parameters. The controller can be restored with either the Manufacturer's default parameters from shipment, or an unconfigured factory default.

Factory Settings

Save? No
Restore? No

This screen allows the user to SAVE and RESTORE the factory default parameters stored in memory.

The Factory Settings include the Factory default parameters and the unit setup code. If the user would like to restore to these parameters, move the cursor to the Restore position and change to YES.

New Password

Insert new manufacturer
password (PW2): 0000

This screen allows the user to change the Manufacturer Password (PW2)

Initialization

DEFAULT INSTALLATION
Erase user settings and install
global default values: No

This screen allows the user to restore back to the original Factory default parameters.

Restoring to the original default parameters will result in a non-customized controller. The user should not restore to these settings unless instructed by the factory.

Points List • LonWorks®					
Type	NV_Index	Name NV	Type NV	Read (Unit to BMS) Write (BMS to Unit)	Description
Analog	23	nvoOutsideTemp	105	Read	Outdoor Air Temp (###.#°F)
Analog	24	nvoSupplyAirTemp	105	Read	Supply Air Temp (###.#°F)
Analog	25	nvoColdCoilDisch	105	Read	Cold Coil Temp (###.#°F)
Analog	26	nvoReturnTemp	105	Read	Return AirTemp (###.#°F)
Analog	27	nvoExhDishTemp	105	Read	Exhaust Discharge Temp (###.#°F)
Analog	28	nvoOAAWTemp	105	Read	Outdoor Air After Wheel Temp (###.#°F)
Analog	29	nvoRoomTemp	105	Read	Room Temp (###.#°F)
Analog	3	nviHeatOutput	81	Write	Heater output (0-100%)
Analog	4	nviCoolOutput	81	Write	Cooling output (0-100%)
Analog	5	nviVFDSupply	81	Write	VFD Supply Fan Output (0-100%)
Analog	6	nviVFDExhaust	81	Write	VFD Exhaust Fan Output (0-100%)
Analog	7	nviVFDWheel	81	Write	VFD Wheel Output (0-100%)
Analog	8	nviRADamperOut	81	Write	RA Damper Output (0-100%)
Analog	30	nvoOutdoorRH	81	Read	Outdoor RH
Analog	31	nvoVFDSupSignal	44	Read	Supply VFD Monitor Signal (Vdc)
Analog	32	nvoVFDExhSignal	44	Read	Exhaust VFD Monitor Signal (Vdc)
Analog	33	nvoB1User	9	Read	User Define B1 Analog Input
Analog	34	nvoB2User	9	Read	User Define B2 Analog Input
Analog	35	nvoB5UserAI	9	Read	User Define B5 Analog Input
Analog	36	nvoB6UserAI	9	Read	User Define B6 Analog Input
Analog	10	nviY4UserOut	81	Write	User Define Y4 Analog Output
Integer	41	nvoCO2Output	29	Read	CO2 Levels (ppm)
pCOe Analog Variables					
Analog	37	nvoAux_AI1	9	Read	pCOe Analog Input Probe Value 1
Analog	38	nvoAux_AI2	9	Read	pCOe Analog Input Probe Value 2
Analog	39	nvoAux_AI3	9	Read	pCOe Analog Input Probe Value 3
Analog	40	nvoAux_AI4	9	Read	pCOe Analog Input Probe Value 4
Analog	9	nviAux_AO1	81	Write	pCOe Auxillary Analog Out (0-10V)
Digital	11	nviUnitOnOff	95	Write	Unit start/stop command
Digital	12	nviResetAlarms	95	Write	Reset alarms command
Digital	13	nviStg1Cooling	95	Write	Cooling Stage 1 Command
Digital	14	nviStg2Cooling	95	Write	Cooling Stage 2 Command
Digital	15	nviStg1Heat	95	Write	Heating Stage 1 Command
Digital	16	nviOccUnocc	95	Write	Occupied/unoccupied Command
Digital	17	nviRemoteExhFan	95	Write	Remote Exhaust Fan Command
Digital	18	nviHGRH	95	Write	Hot Gas Reheat Command
Digital	42	nvoGlobalAlarm	95	Read	Global alarm indication (active when there is at least one alarm)
Digital	43	nvoFrostStatus	95	Read	Frost Status
Digital	44	nvoEconStatus	95	Read	Econ Status
Digital	45	nvoFanStatus	95	Read	Fan Proving status
Digital	46	nvoFilterStatus	95	Read	Dirty filter status
Digital	47	nvoWheelStatus	95	Read	Wheel status-Not Ok=Wheel not running when commanded on
	48	nvoAlarm	83		
Digital	bit0	nvoSupplyTempAlm		Read	Supply air temperature low limit alarm
Digital	bit1	nvoB1Alarm		Read	Sensor B1 out of range
Digital	bit2	nvoB2Alarm		Read	Sensor B2 out of range
Digital	bit3	nvoB3Alarm		Read	Sensor B3 out of range
Digital	bit4	nvoB4Alarm		Read	Sensor B4 out of range
Digital	bit5	nvoB5Alarm		Read	Sensor B5 out of range
Digital	bit6	nvoB6Alarm		Read	Sensor B6 out of range
Digital	bit7	nvoB5UserAlarm		Read	B5 User Input Alarm
Digital	bit8	nvoB6UserAlarm		Read	B6 User Input Alarm
Digital	49	nvoB5UserDI	95	Read	User Define B5 Digital Input
Digital	50	nvoB6UserDI	95	Read	User Define B6 Digital Input
Digital	19	nviNO1UserDO	95	Write	User Define NO1 Digital Output
Digital	20	nviNO2UserDO	95	Write	User Define NO2 Digital Output
Digital	51	nvoID2UserDI	95	Read	User Define ID2 Digital Input
pCOe Digital Variables					
Digital	52	nvoAux_DI1	95	Read	pCOe Auxillary Digital Input1
Digital	53	nvoAux_DI2	95	Read	pCOe Auxillary Digital Input2
Digital	54	nvoAux_DI3	95	Read	pCOe Auxillary Digital Input3
Digital	55	nvoAux_DI4	95	Read	pCOe Auxillary Digital Input4
Digital	21	nviAux_DO1	95	Read/Write	pCOe Auxillary Digital Output1
Digital	22	nviAux_DO2	95	Read/Write	pCOe Auxillary Digital Output2

Points List • Modbus/BACnet®

Type	Modbus-RTU/TCP/IP Network Address: 1	BACnet IP/Ethernet BACnet MSTP Device Instance: 77000(default)			Read Write	Description
	Address	Address	Name	Units		
Analog	40002	1	Outside_Air_Temp	°F	R	Outdoor Air Temp (###.#°F)
Analog	40003	2	Supply_Air_Temp	°F	R	Supply Air Temp (###.#°F)
Analog	40004	3	Cold_Coil_Leaving_Temp	°F	R	Cold Coil Temp (###.#°F)
Analog	40005	4	Return_Air_Temp	°F	R	Return AirTemp (###.#°F)
Analog	40006	5	Exhaust_Discharge_Temp	°F	R	Exhaust Discharge Temp (###.#°F)
Analog	40007	6	OA_After_Wheel_Temp	°F	R	Outdoor Air After Wheel Temp (###.#°F)
Analog	40008	7	Room_Temp	°F	R	Room Temp (###.#°F)
Analog	40011	10	Heat_Output	percent	R/W	Heater output (0-100%)
Analog	40012	11	Cool_Output	percent	R/W	Cooling output (0-100%)
Analog	40013	12	VFD_Supply_Output	percent	R/W	VFD Supply Fan Output (0-100%)
Analog	40014	13	VFD_Exhaust_Output	percent	R/W	VFD Exhaust Fan Output (0-100%)
Analog	40015	14	VFD_Wheel_Output	percent	R/W	VFD Wheel Output (0-100%)
Analog	40016	15	RA_Damper_Output	percent	R/W	Return Air Damper Output (0-100%)
Analog	40017	16	Outdoor RH	percent relative humidity	R	Outdoor RH
Analog	40018	17	Supply_VFD_Mointor	volts	R	Supply VFD Monitor Signal (Vdc)
Analog	40019	18	Exhaust_VFD_Monitor	volts	R	Exhaust VFD Monitor Signal (Vdc)
Analog	40027	26	User_Define_B1_Analog_Input	no-units	R	User Define B1 Analog Input
Analog	40028	27	User_Define_B2_Analog_Input	no-units	R	User Define B2 Analog Input
Analog	40029	28	User_Define_B5_Analog_Input	no-units	R	User Define B5 Analog Input
Analog	40030	29	User_Define_B6_Analog_Input	no-units	R	User Define B6 Analog Input
Analog	40031	30	User_Define_Y4_Analog_Output	no-units	R/W	User Define Y4 Analog Output
Integer	40216	1007	CO2_Level	ppm	R	CO2 Levels (ppm)
pCOe Analog Variables						
Analog	40022	21	pCOe_Analog_Input_Probe_Value_1	°F or Percent	R	pCOe Analog Input Probe Value 1
Analog	40023	22	pCOe_Analog_Input_Probe_Value_2	°F or Percent	R	pCOe Analog Input Probe Value 2
Analog	40024	23	pCOe_Analog_Input_Probe_Value_3	°F or Percent	R	pCOe Analog Input Probe Value 3
Analog	40025	24	pCOe_Analog_Input_Probe_Value_4	°F or Percent	R	pCOe Analog Input Probe Value 4
Analog	40026	25	pCOe_Analog_Out	percent	R/W	pCOe Auxillary Analog Out (0-10V)

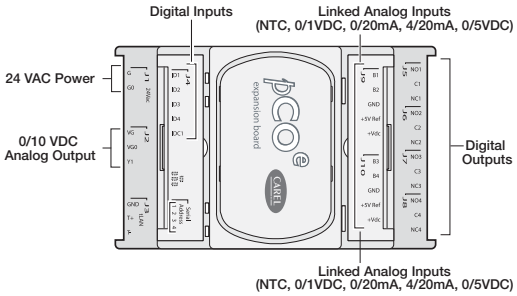
Type	Address	Address	Name	Inactive_Text	Active_Text	Read Write	Description
Digital	10011	10	Unit_Start_Stop	Stop	Start	R/W	Unit start/stop command
Digital	10012	11	Reset_Alarms	Don't Reset	Reset Alarms	R/W	Reset alarms command
Digital	10015	14	Cooling_Stg1_Command	Off	On	R/W	Cooling Stage 1 Command
Digital	10016	15	Cooling_Stg2_Command	Off	On	R/W	Cooling Stage 2 Command
Digital	10017	16	Heat_Stg1_Command	Off	On	R/W	Heating Stage 1 Command
Digital	10018	17	Occ_Unocc_Command	Off	On	R/W	Occupied/unoccupied Command
Digital	10019	18	Exh_Fan_Command	Off	On	R/W	Exhaust Fan Command
Digital	10020	19	HGRH_Command	Off	On	R/W	Hot Gas Reheat Command
Digital	10021	20	Global_Alarm	Off	Alarm	R	Global alarm indication (active when there is at least one alarm)
Digital	10022	21	Frost_Status	Off	On	R	Frost Status
Digital	10023	22	Econ_Status	Off	On	R	Econ Status
Digital	10024	23	Fan_Proving_Status	Off	On	R	Fan Proving status
Digital	10026	25	Dirty_filter_Status	Clean	Dirty	R	Dirty filter status
Digital	10027	26	Wheel_Status	Ok	Not Ok	R	Wheel status-Not Ok=Wheel not running when commanded on
Digital	10028	27	Supply_air_low_limit	Off	Alarm	R	Supply air temperature low limit alarm
Digital	10029	28	Sensor_B1_out_of_range	Off	Alarm	R	Sensor B1 out of range
Digital	10030	29	Sensor_B2_out_of_range	Off	Alarm	R	Sensor B2 out of range
Digital	10031	30	Sensor_B3_out_of_range	Off	Alarm	R	Sensor B3 out of range
Digital	10032	31	Sensor_B4_out_of_range	Off	Alarm	R	Sensor B4 out of range
Digital	10033	32	Sensor_B5_out_of_range	Off	Alarm	R	Sensor B5 out of range
Digital	10034	33	Sensor_B6_out_of_range	Off	Alarm	R	Sensor B6 out of range
Digital	10035	34	B5 _User_Alarm	No Alarm	Alarm	R	B5 User Input Alarm
Digital	10036	35	B6_User_Alarm	No Alarm	Alarm	R	B6 User Input Alarm
Digital	10039	38	User_Define_B5_DI	Open	Closed	R	User Define B5 Digital Input
Digital	10040	39	User_Define_B6_DI	Open	Closed	R	User Define B6 Digital Input
Digital	10041	40	User_Define_NO1_DO	Off	On	R/W	User Define NO1 Digital Output
Digital	10042	41	User_Define_NO2_DO	Off	On	R/W	User Define NO2 Digital Output
Digital	10043	42	User_Define_ID2_DI	Open	Closed	R	User Define ID2 Digital Input
pCOe Analog Variables							
Digital	10052	51	pCOe_Auxiliary_Digital_Input_1	Off	On	R	pCOe Auxillary Digital Input1
Digital	10053	52	pCOe_Auxiliary_Digital_Input_2	Off	On	R	pCOe Auxillary Digital Input2
Digital	10054	53	pCOe_Auxiliary_Digital_Input_3	Off	On	R	pCOe Auxillary Digital Input3
Digital	10055	54	pCOe_Auxiliary_Digital_Input_4	Off	On	R	pCOe Auxillary Digital Input4
Digital	10056	55	pCOe Auxillary Digital Output1	Off	On	R/W	pCOe Auxillary Digital Output1
Digital	10057	56	pCOe Auxillary Digital Output2	Off	On	R/W	pCOe Auxillary Digital Output2
Digital	10058	57	pCOe Auxillary Digital Output3	Off	On	R/W	pCOe Auxillary Digital Output3
Digital	10059	58	pCOe Auxillary Digital Output4	Off	On	R/W	pCOe Auxillary Digital Output4

I/O Expansion Board (pCOe)

The pCOe expansion board is an I/O module that can be used to monitor additional statuses within the unit or provide commands. The pCOe allows the user to view and control:

- 4 Digital Inputs
- 4 Digital Outputs
- 4 Analog Inputs
- 1 Analog Output

The inputs and outputs can be monitored and manually controlled either via the controller display or Building Management System. See Points List for detailed point information.



Setup

In order for the controller to communicate with the pCOe, several parameters must be adjusted. If you have a pCOe installed from the factory, the controller is already set up for communication with the main controller.

Unit Expansion I/O	
Enable Expansion	Yes

Enabling the pCOe in the Main Controller: To enable the pCOe expansion I/O module, go to **Manufacturer > Configuration**. You will have to enter the Manufacturer password (Default = 1000). Enabling the pCOe expansion module allows additional screens to appear in other menus (see below).

Analog Inputs	pCOe1
Aux AI Pair 1	
Channels: B1 & B2	
Type:	Carel NTC

Analog Input	pCOe1
Aux AI Pair 2	
Channels: B3 & B4	
Type:	4 . . 20 mA
B3 Min:	0.0
B3 Max:	10.0
B4 Min:	0.0
B4 Max:	10.0

Configuring the pCOe Analog Inputs: The analog inputs are grouped in pairs (Channels B1-B2 and Channels B3-B4). Each pair must be configured as the same analog input type (Carel NTC, 0/1 VDC, 0/20 mA, 4/20 mA or 0/5 VDC).

To setup the analog inputs:

1. Go to **Manufacturer > I/O Configuration > Analog Inputs**.
2. Find the pCOe Analog input screens.
3. Select desired channels and input type. If only one channel is to be used, select the desired channel to prevent nuisance sensor alarms.

If using a non-Carel NTC type, scale the input to match the probe range.

Digital Inputs	pCOe1
Channel ID1:	Closed
Channel ID2:	Closed
Channel ID3:	Closed
Channel ID4:	Closed

Viewing pCOe I/O Values: To view input values, go to the Input/Output menu.

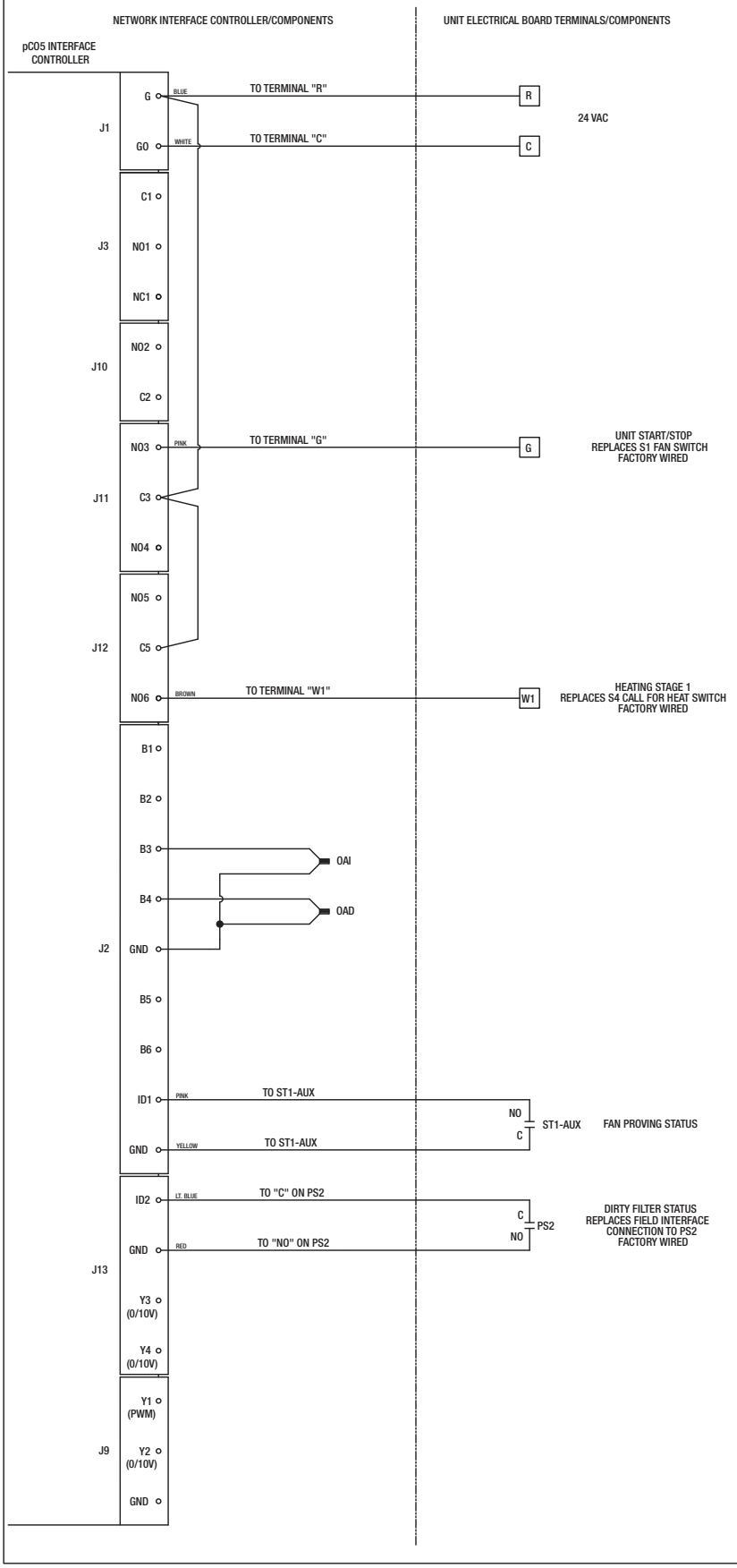
The pCOe I/O values can be viewed on the BMS. The digital and analog outputs can be changed through the BMS. See Points List for more details.

Analog Inputs	pCOe1
Input B1:	32.0°F
Input B2:	32.0°F
Input B3:	0.0°F
Input B4:	0.0°F

Digital Outputs	pCOe1
Output NO1:	OFF
Output NO2:	OFF
Output NO3:	OFF
Output NO4:	OFF

Analog Outputs	pCOe1
Output Y1:	0.0vdc

NETWORK INTERFACE CONTROLLER TO UNIT CONNECTION WIRING DIAGRAM



GREENHECK
Building Value in Air

Wiring Diagram Code:

GEXXXXD000XX101BL01

CAUTION

UNIT SHALL BE GROUNDED IN ACCORDANCE WITH N.E.C.
POWER MUST BE OFF WHILE SERVICING.

NOTES

USE COPPER CONDUTORS ONLY
60° C FOR TERMINALS RATED LESS THAN 100 AMPS.
75° C FOR TERMINALS RATED 100 AMPS OR MORE.

FIELD CONTROL WIRING RESISTANCE SHOULD NOT EXCEED 0.75 OHM.

FIELD WIRED – – – – –
FACTORY SUPPLIED AND WIRED _____

WIRE COLOR CODE

BK	BLACK	BL	BLUE	BR	BROWN		
GY	GRAY	LT BL		LIGHT BLUE		O	ORANGE
PK	PINK	PR	PURPLE	R	RED		
W	WHITE	Y	YELLOW				

LEGEND

OAD OUTDOOR AIR DISCHARGE TEMP SENSOR
OAI OUTDOOR AIR INLET TEMP SENSOR

FOR MANUAL GO TO WWW.GREENHECK.COM
AND SEARCH "476811".

POINTS LIST

TYPE	ADDRESS	NAME
Analog	1	Outside_Air_Temp
Analog	2	Supply_Air_Temp
Digital	10	Unit_Start_Stop
Digital	11	Reset_Alarms
Digital	16	Heat_Stg1_Command
Digital	20	Global_Alarm
Digital	23	Fan_Proving_Status
Digital	25	Dirty_Filter_Status
Digital	27	Supply_Air_Low_Limit
Digital	30	Sensor_B3_Out_Of_Range
Digital	31	Sensor_B4_Out_Of_Range

DDC Code: Verison - BMS v 1.10

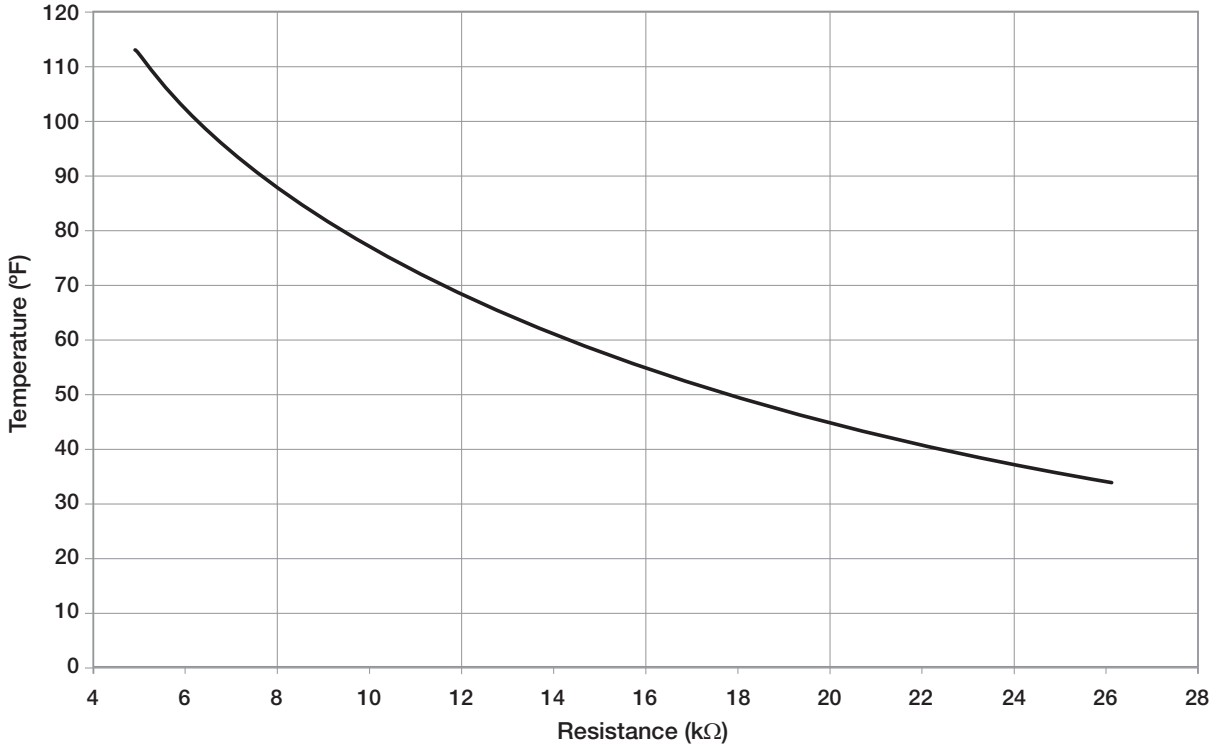
G XXXXD 000XX 101b

Wiring Template: L01

Troubleshooting

Display is hard to read.	Unit Controller Display: Hold Esc or ESC and ENTER at the same time, while pressing DOWN or UP to adjust display contrast. Remote Display: Hold or ALARM, Prg or PRG, and Esc or ESC at the same time, while pressing DOWN or UP to adjust display contrast.
Remote display panel displays “NO LINK” or is blank.	Hold DOWN, UP and ENTER for 4 seconds. Set the display address to 32. The display requires a standard 24 AWG six conductor phone cable connected to the unit controller.
Red alarm button is flashing.	Press the or ALARM button to review and clear unit alarms. Enter the DATA LOGGER menu to view previous alarms.
Controller resets itself or is not on.	Check the supply voltage to the controller at terminals G-G0. The board requires 24VAC. Check the 24VAC transformer in the unit control center.
Menus are locked with a password.	The factory default Manufacturer Password = 1000. The factory default Service Password = 1000.
Temperature sensor failure.	Check the analog input terminal block (labeled terminals B1, B2, B3, etc) for loose wires. Disconnect temperature sensors to check sensor resistance.

NTC Temperature Sensor Chart



The card is loaded with the following default BACnet MSTP parameters.

Parameter	Factory	Minimum	Maximum
Device Instance	77000	0	4194303
Station Address	0	0	127
Max Master	127	0	127
Max Info Frames	20	0	255
Baudrate	38400	9600-19200-38400-76800	

G. Service
c. BMS Config

To view the current parameters, go the **BMS Config** menu within the controller by pressing the Prg or key.

To access the **BMS Config** sub-menu, enter the service-password (Default=1000).

Protocol must be **BACnet MSTP** and **BACnet Plugin** must be **YES**.

Press the button arrow to view next screen.

Current BACnet MSTP parameters should be displayed. If values appear to be zero, follow the procedure below.

BMS Configuration

Protocol: BACnet MSTP
BACnet Plugin? YES

MSTP SETUP

Instance: 77000
Baudrate 38400
MAC Addr: 0
MaxMasters: 127
MaxInfoFrames: 20

BACnet Read/Write

Function: Read
Update? Yes
*Cycle unit power to confirm write command.

To read current settings:

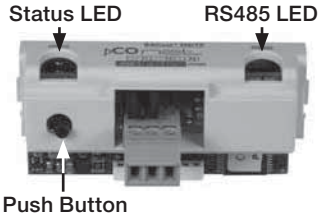
1. Power on controller and allow several minutes to initialize.
2. Go to **BMS Config** menu and view BACnet Read/Write screen.
3. Change *Function* to *Read* and *Update*? to *YES*.

Current BACnet MSTP parameters should now be displayed in the BACnet MSTP SETUP screen. If all values appear to be zeros, consult the factory. (Make sure you have allowed several minutes for the controller to initialize). **Values may appear to be zero prior to setting the Function to READ.*

To change BACnet MSTP parameters:

1. Power on the controller and allow several minutes to initialize.
2. Go to **BMS Config** menu and view MSTP SETUP screen.
3. Move cursor to desired parameter by pressing the buttons. Press to select the parameter to change. Press the buttons to adjust the parameter. Press to save adjusted value.
4. Once desired parameters have been entered, go to BACnet Read/Write screen. Change *Function* to *Write* and *Update?* to *YES*.
5. Reboot the controller by cycling power to the unit. Allow several minutes for the controller to initialize.
6. View MSTP parameters. If changed values did not save, contact the factory.

The communication card is located in the **Serial Card** port on the face of the controller. The card includes two sets of LED lights for communication troubleshooting.



Status LED: Indicates the status of communication between the card and controller.

- Quick green-off-green if communication with controller is ok.
- Slow red-off-red if communication is not established.

RS485 LED: Indicates the status of communication with the BACnet MSTP network. Wait for 40 seconds to determine status of communication.

- Green with occasional red, communication is OK.
- Green and red both on, communications is not established.

Communication Troubleshooting

See Carel Data sheet for more info.

If attempting to communicate with the controller over BACnet MSTP, refer to the card LEDs for system information.

Status LED slow red blink

- Confirm card is firmly plugged in.
- Confirm BMS Protocol is set to BACnet MSTP.

RS485 LED green and red both on

- Confirm system and card baudrate are the same.
- Confirm card Max Master is equal to or greater than the Station (MAC) Address of the Master with the highest address.

Recalling Factory Parameters

Follow this procedure to revert to factory parameters for one power cycle. When restarted, the card will resume using the previous user parameters.

1. With controller off, hold the push button located on the BACnet MSTP card, while powering the controller back on.
2. Continue to hold the button, while watching the **Status LEDs**. Wait for the Status LEDs to blink red slowly, and release before the third slow flash.
3. Wait for about one minute for the factory parameters to be loaded.

The BACnet IP/Eth card is configured for DHCP from the factory.

To view the current parameters, go the **BMS Config** menu within the controller by pressing the Prg or ⊙ key.

G. Service
c. BMS Config

To access the **BMS Config** sub-menu, enter the service password **(Default=1000).**

BMS Configuration

Protocol:	BACnet IP/Eth
BACnet Plugin?	YES

Protocol must be **BACnet IP/Eth** and **BACnet Plugin** must be **YES.**

Press ↓ arrow button to view next screen.

TCP/IP SETUP

Instance:	77000
IP set by:	DHCP
IP:	128.1.104.134
Subnet:	255.255.000.000
Gatewy:	128.1.0.12

Current BACnet IP parameters should be displayed. If values appear to be zero, follow the procedure below.

TCP/IP Setup

DNS 1:	193.168.001.001
DNS 2:	193.168.001.001
Type: IP	

To read current parameters:

1. Power on controller and allow several minutes to initialize.
2. Go to **BMS Config** menu and view BACnet Read/Write screen.
3. Change *Function* to *Read* and *Update*? to *YES*.

BACnet Read/Write

Function:	Read
Update?	Yes

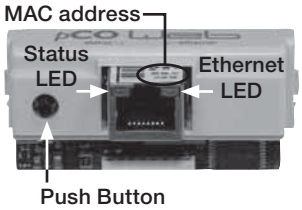
*Cycle unit power to confirm write command.

Current BACnet IP parameters should now be displayed in the BACnet TCP/IP SETUP screen. If all values appear to be zeros, consult the factory. (Make sure you have allowed several minutes for the controller to initialize). **Values may appear to be zero prior to setting the Function to READ.*

To change BACnet TCP/IP parameters:

1. Power on the controller and allow several minutes to initialize.
2. Go to **BMS Config** menu and view TCP/IP SETUP screen.
3. Move cursor to desired parameter by pressing the ↓ ↑ buttons. Press ↵ to select the parameter to change. Press the ↓ ↑ buttons to adjust the parameter. Press ↵ to save adjusted value.
4. Once desired parameters have been entered, go to BACnet Read/Write screen. Change *Function* to *Write* and *Update?* to *YES*.
5. Reboot the controller by cycling power to the unit. Allow several minutes for the controller to initialize.
6. View TCP/IP parameters. If changed values did not save, contact the factory.

The communication card is located in the **Serial Card** port on the face of the controller. The card includes two sets of LED lights for communication troubleshooting.



Status LED: Indicates the status of communication between the card and controller.

- Quick green-off-green if communication with controller is ok.
- Slow red-off-red if communication is not established.

Ethernet LED: Indicates the status of communication with the network. Wait for 40 seconds to determine status of communication.

- Flashing green, communication is OK.
- Steady red, communications is not established.

Communication Troubleshooting

See Carel Data sheet for more info.

If attempting to communicate with the controller over BACnet IP/Eth, refer to the card LEDs for system information.

Status LED slow red blink

- Confirm card is firmly plugged in.
- Confirm BMS Protocol is set to BACnet IP/Eth.

Ethernet LED red on

- Confirm card is connected to the network.

Recalling Factory Parameters

Follow this procedure to revert to factory parameters for one power cycle. When restarted, the card will resume using the previous user parameters.

Factory Default IP address: 172.016.000.001

1. With controller off, hold the push button located on the BACnet IP/Eth card, while powering the controller back on.
2. Continue to hold the button, while watching the **Status LED**. Wait for the Status LED to blink red slowly, and release before the third slow flash.
3. Wait for about one minute for the factory parameters to be loaded.
4. Follow the procedure to read the current parameters to confirm factory defaults have been loaded.

Maintenance Log

Date _____ Time _____ AM/PM
Notes:_____

Date _____ Time _____ AM/PM
Notes:_____

Date _____ Time _____ AM/PM
Notes:_____

Date _____ Time _____ AM/PM
Notes:_____

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Notes:_____

Date _____ Time _____ AM/PM
Notes:_____

Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Specific Greenheck product warranties are located on greenheck.com within the product area tabs and in the Library under Warranties.

AMCA Publication 410-96, Safety Practices for Users and Installers of Industrial and Commercial Fans, provides additional safety information. This publication can be obtained from AMCA International, Inc. at www.amca.org.

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