PURE Humidifier

READ AND SAVE THESE INSTRUCTIONS

INTAC® PLC

Programmable Logic Controller

Installation Instructions

Operation and Maintenance Manual

Our results are comforting

Form No: INOM 4-17-2023

PURE™ Humidifier

Table of Contents

Specifications

PLC IO Specifications:

Supply Voltage: 24VAC ± 10% at 50/60 Hz, ± 1HZ, 23VA, 12W max.

Current Input Impedance: < 150 Ohms

Voltage Input Impedance: >10,000 Ohms

Minimum Output Voltage Impedance: 700 Ohm

Maximum Output Current Impedance: 450 Ohm

Termination: Removable screw terminal block

Screw Termination Wire Size: 16-gauge maximum

Ambient Temperature Range: -40ºF to 130ºF

Relative Humidity: 5 to 95% RH, non-condensing.

Vibration: 2g., 10 to 150 HZ., applied in any one of three axes.

Storage Temperature: -40ºF to 158ºF

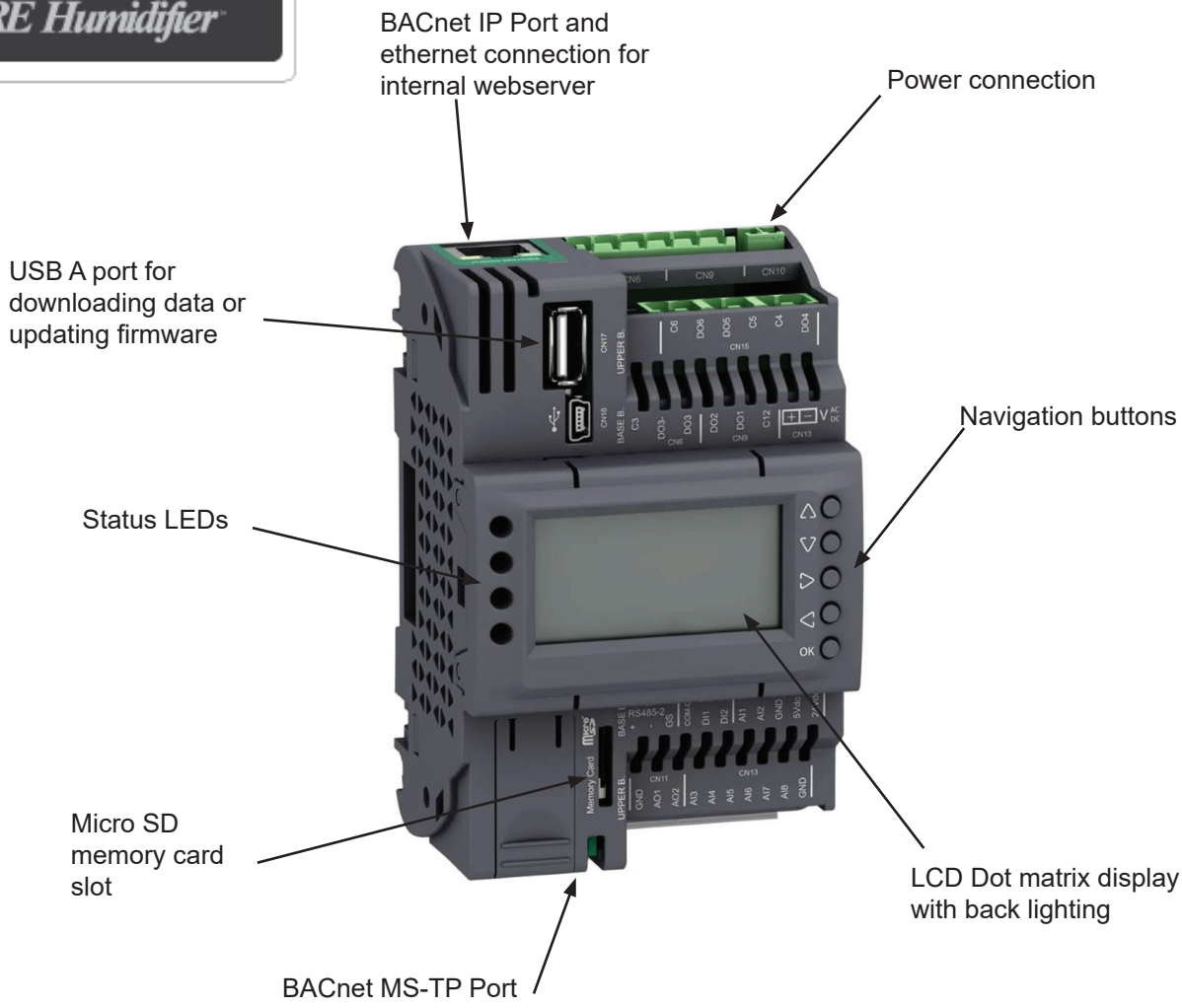
Limits, Ranges, Accuracy: Calibration accuracy and sensor conformity: ± 1% of Span, ± 1 LSD at 77ºF ±5ºF at rated line voltage ± 10 %

Touchscreen Specifications:

Supply Voltage: 24VAC ± 15% at 50/60 Hz, ± 1HZ, 3.2VA, 1.3W max.

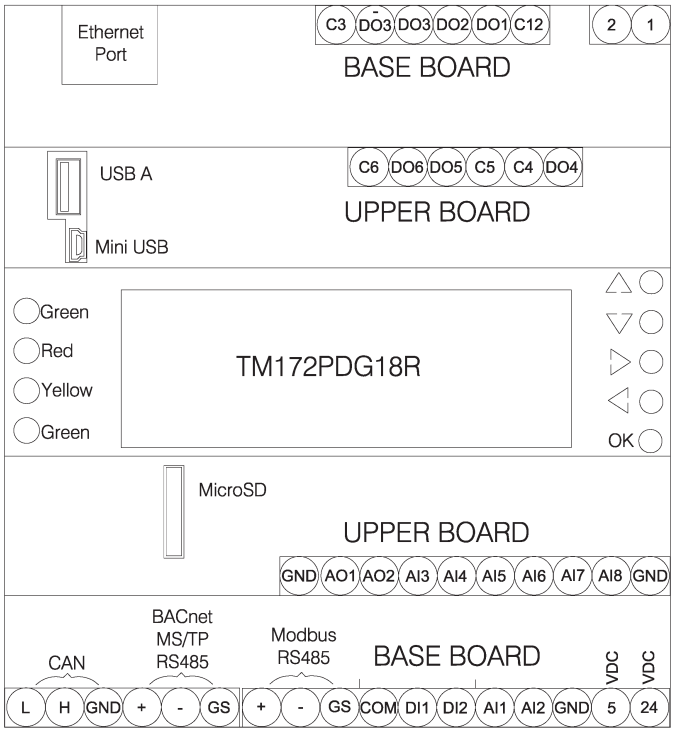
Controller Overview

The INTAC® PLC touchscreen (pictured left), is mounted externally, working in conjunction with the PLC (pictured below).

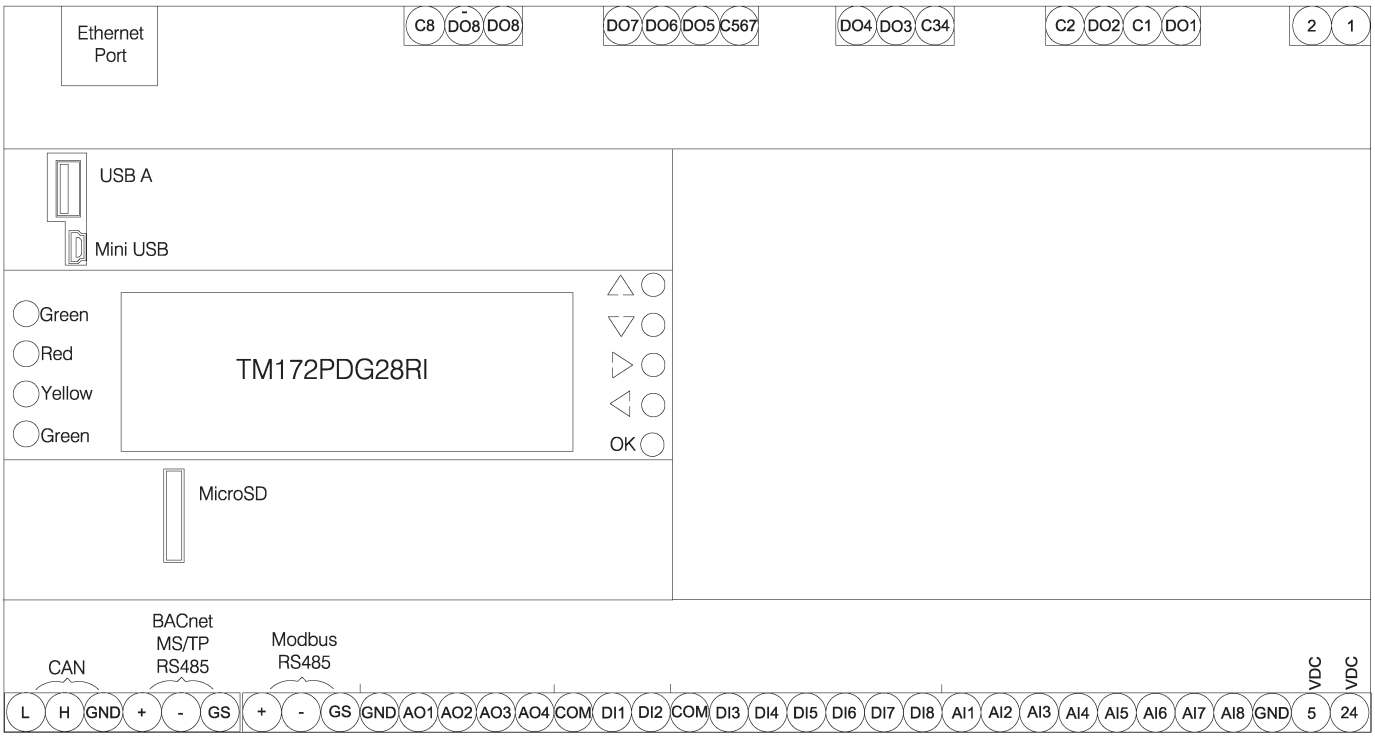


Terminal Layout

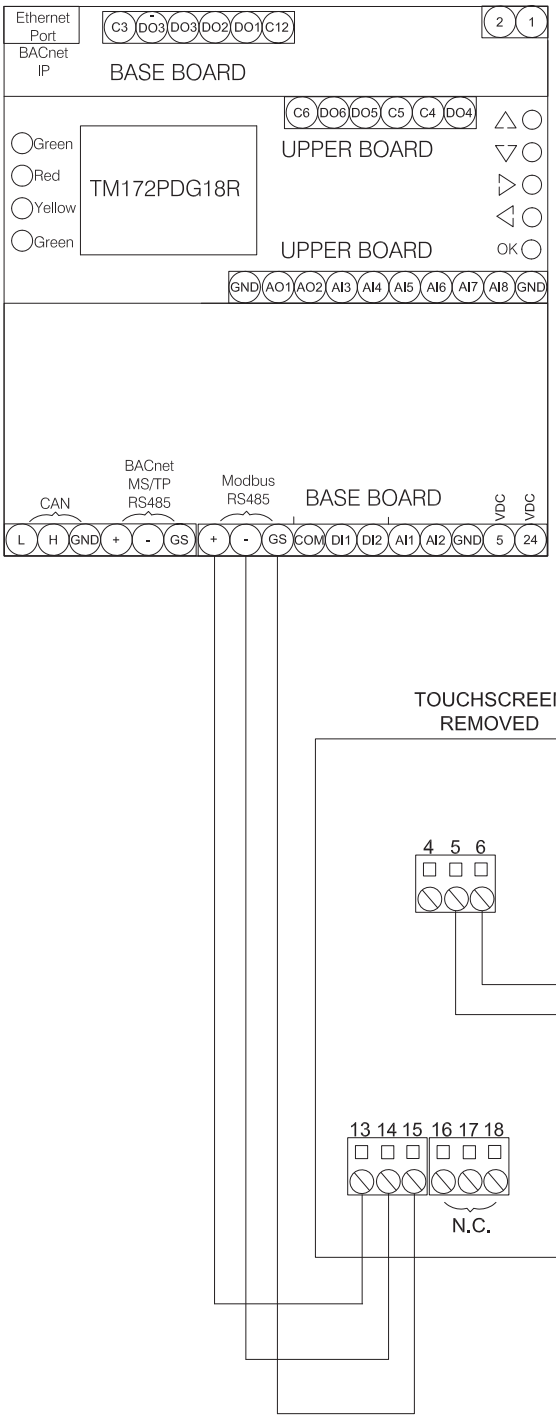
Standard control used on most units



Only used on GX/DDR-8s & 12s

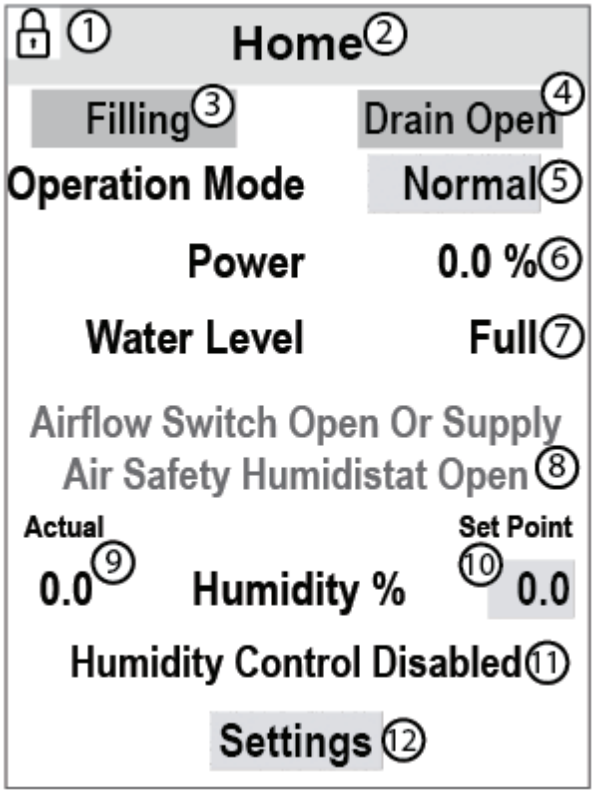


Touchscreen Wiring

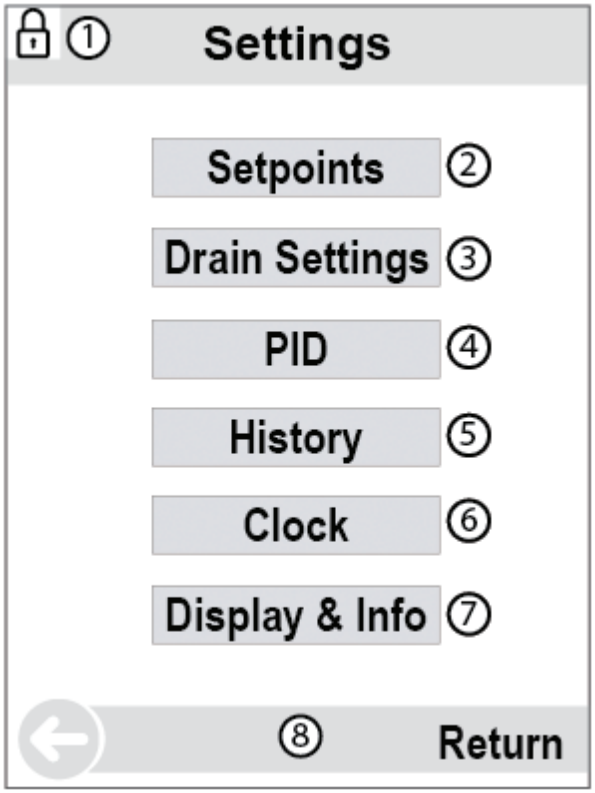


Touchscreen Navigation & Parameter Descriptions

Numbered images correspond to lists at right



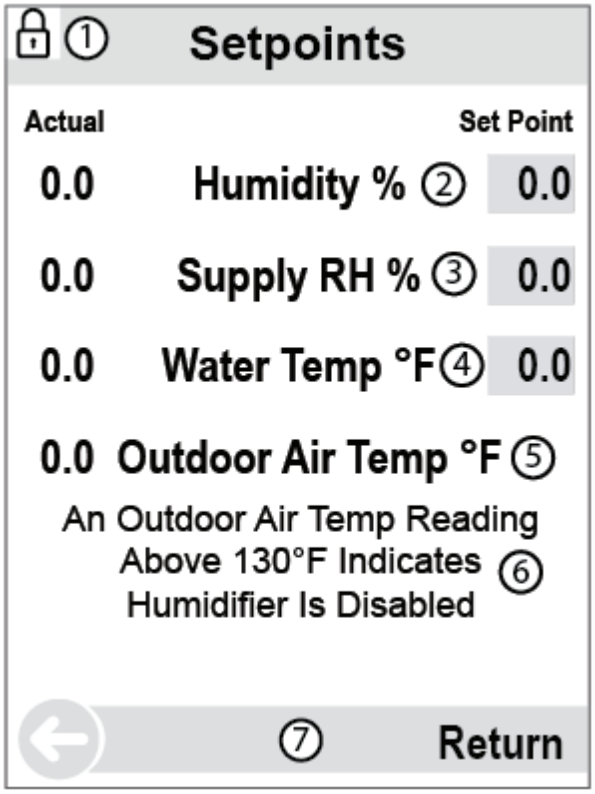
1. When visible, adjustable parameters cannot be changed.
2. Screen name
3. Visible when the fill valve is energized
4. Visible when the drain valve is energized
5. Adjustable:
   Standby—All outputs are turned off
   Normal—Humidifier is allowed to operate
   Flush—Fill valve is opened
   Drain—Drain valve is opened
6. Current commanded output % of steam generator
7. Full, Normal, Refill, Low, or Bad
8. Visible when safety circuit is open
9. Visible when humidifier is programmed to be used with humidity sensor
10. Adjustable and visible only when programmed for sensor mode. 0.0-100% when a sensor is used.
11. Visible when disable input is closed. Only humidity control is disabled. Tank temperature control and draining functions are still active.
12. Selectable—Navigates to Settings screen



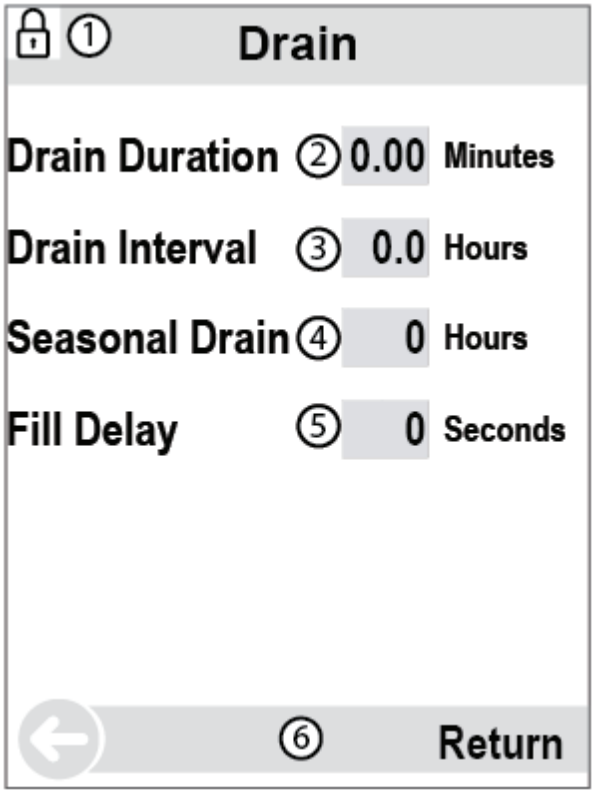
1. When visible, adjustable parameters cannot be changed.
2. Selectable—Navigates to Setpoints screen
3. Selectable—Navigates to Drain Settings screen
4. Selectable—Navigates to PID screen
5. Selectable—Navigates to History screen
6. Selectable—Navigates to Clock screen
7. Selectable—Navigates to Display & Info screen
8. Selectable—Returns to Home screen

Touchscreen Navigation & Parameter Descriptions

Numbered images correspond to lists at right



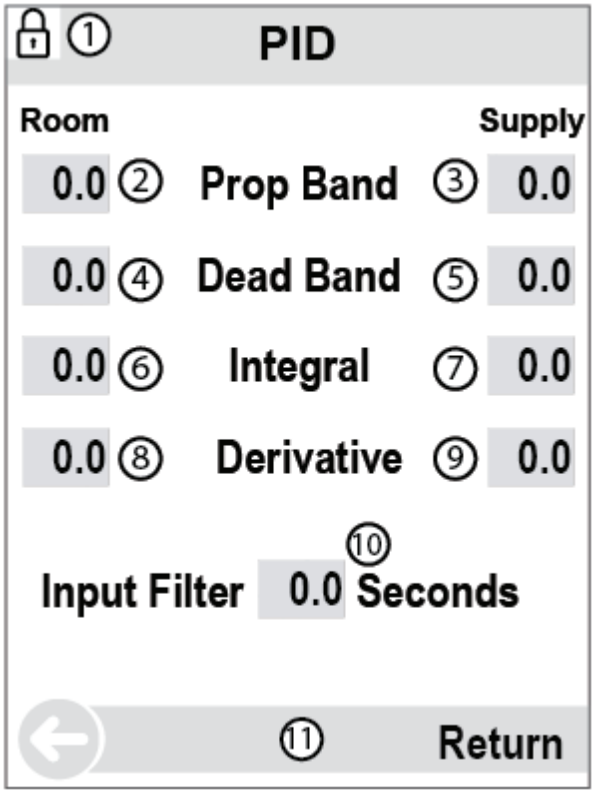
1. When visible, adjustable parameters cannot be changed.
2. Adjustable and visible only when programmed for sensor mode 0.0-100% RH when a sensor is used.
3. Adjustable— 0.0-100% RH this is an optional sensor. If actual reading is 0.0 then there is no sensor used. Typically this should be set to around 85% even if no sensor is connected.
4. Adjustable— 40-200°F Primarily used for freeze protection this should be kept at the lower end of the range to reduce operation wear on the humidifier. Setting above 140°F can cause steam production/evaporation when there is no call for humidity.
5. Visible when the outdoor air temp option is turned on
6. Visible when humidifier disable input is closed
7. Selectable—Returns to Settings screen



1. When visible, adjustable parameters cannot be changed
2. Adjustable—0.00-99.99 minutes: Length of time the drain valve is opened during an autodrain cycle. Default=10.00 minutes
3. Adjustable—0-1000 hours: After this amount of time with no call for humidity the tank will drain.
4. Adjustable—0-1800 seconds. Time the water level must continually read full before the fill valve is shut off. Used to adjust how much water is flushed down the overflow on each drain cycle typically set to 5 seconds.
5. Selectable—Returns to Settings screen

Touchscreen Navigation & Parameter Descriptions

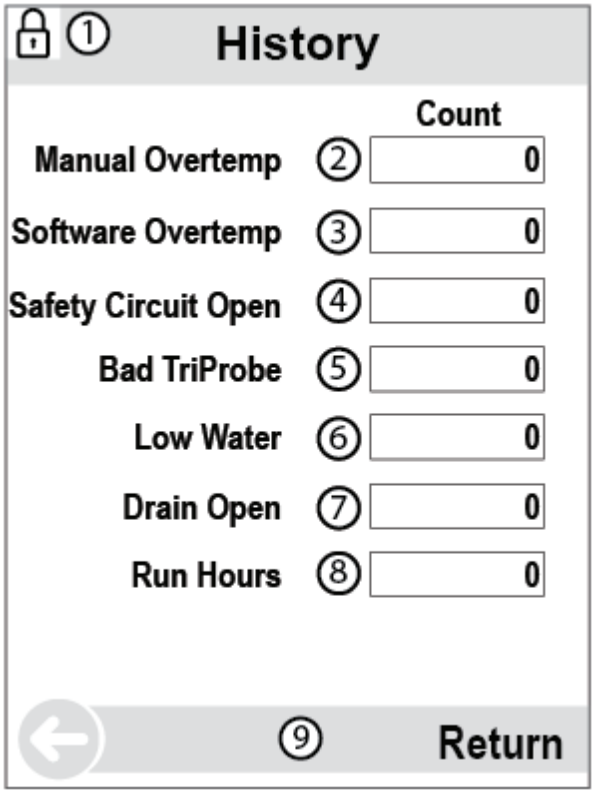
Numbered images correspond to lists at right



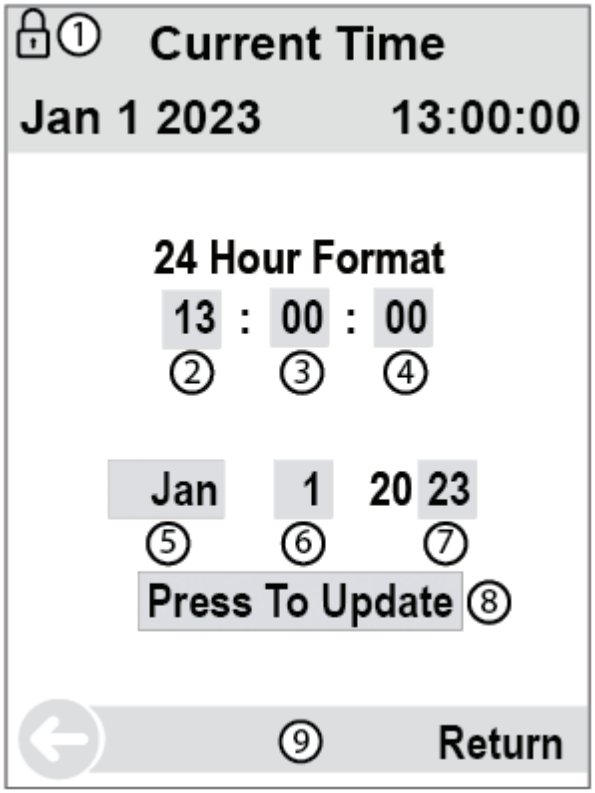
1. When visible adjustable parameters cannot be changed
2. Adjustable—Proportional band for room/return air control loop Range: 0.1-100.0% RH, Default: 25.0
3. Adjustable—Proportional band for supply air control loop Range: 0.1-100.0% RH, Default: 10.0
4. Adjustable—Dead Band for room/return air control loop. If RH setpoint minus actual RH is less than this value the integral term is paused. Range: 0.0-50.0% RH, Default: 0.0
5. Adjustable—Dead Band for supply air control loop. If RH setpoint minus actual RH is less than this value the integral term is paused. Range: 0.0-50.0% RH, Default: 0.0
6. Adjustable—Amount of time in seconds it will take the room/return air control loop output to be increased/decreased by an amount equal to the current proportional term. Range: 0.0-600.0s, Default: 300.0
7. Adjustable—It is recommended to keep this value at 0 since the supply air setpoint is a limit not to be exceeded Range: 0.0-600.0s, Default: 0.0
8. Adjustable—Should almost always be set to 0. The room/return air control loop output is increased/decreased by the rate of change of the RH value. Range: 0.0-600.0s, Default: 0.0.
9. Adjustable—Should almost always be set to 0. The supply air control loop output is increased/decreased by the rate of change of the RH value. Range: 0.0-600.0s, Default: 0.0.
10. Adjustable—This is the number of seconds over which the controller will average the room/return air relative humidity value Range: 0.0-600.0s, Default: 0.0
11. Selectable—Returns to Settings screen

Touchscreen Navigation & Parameter Descriptions

Numbered images correspond to lists at right



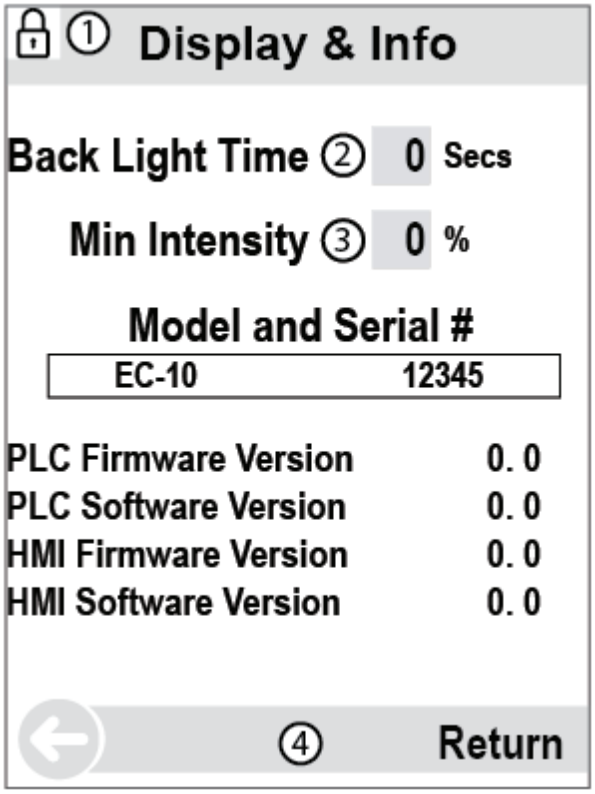
1. When visible, adjustable parameters cannot be changed
2. Number of times the manual overtemp switch/circuit has been opened
3. Number of times the software-based tank temperature sensor has read above 225°F
4. Number of times the safety circuit has opened
5. Number of times the Tri-Probe has had readings out of order
6. Number of times the tank water level has reached a low level
7. Number of times the drain valve has opened
8. Hours the humidifier has operated with a power level greater than 0%
9. Selectable—Returns to Settings screen



1. When visible, adjustable parameters cannot be changed
2. Adjustable—Range: 0-23 hours
3. Adjustable—Range: 0-59 minutes
4. Adjustable—Range: 0-59 seconds
5. Adjustable—Range: Jan-Dec
6. Adjustable—Range: 0-31
7. Adjustable—Range: 0-99
8. Selectable—Pressing this button will write the adjustable values to the current time
9. Selectable—Returns to Settings screen

Touchscreen Navigation & Parameter Descriptions

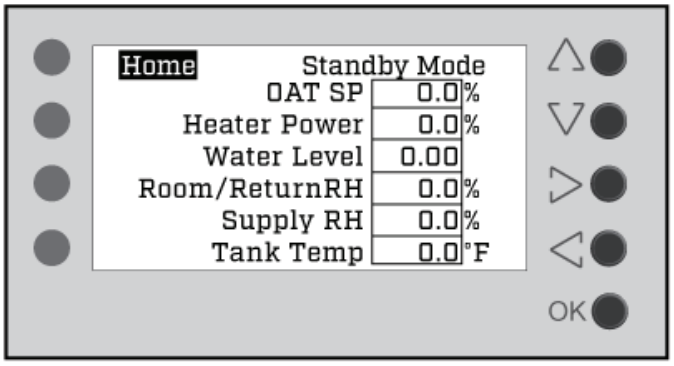
Numbered images correspond to lists at right



1. When visible, adjustable parameters cannot be changed
2. Adjustable—Time the backlight stays at 100% after touching screen. Range: 0-3600s, Default: 0
3. Adjustable—Brightness that the screen dims to after Back Light Time expires. Range: 0-100, Default: 0.0
4. Selectable—Returns to Settings screen

1. PLC & Touchscreen are not currently communicating. Check wiring, and verify PLC has power.

PLC HMI HOME



Up Arrow: *No function*

Down Arrow: *No function*

Right Arrow: *Go to Menus Screen*

Left Arrow: *No function*

OK Button: *Go to Menus Screen*

Top Right: Current status (*e.g. Standby Mode*)

OAT SP: Only visible when outside air temperature is below outside air temperature setback temperature. This is the adjusted setpoint.

Heater Power: Current power output of steam generator

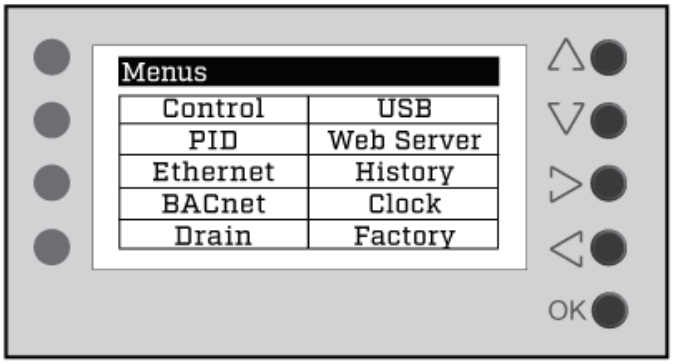
Water Level: Average water level 4=Full, 3=Normal, 2=Refill, 1=Low, 0=Bad Tri-Probe

Room/Return RH: Relative humidity reading Analog Input 1. Visible only when configured for sensor

Supply RH: Relative humidity reading of Analog Input 2. This is an optional sensor.

Tank Temp: Current temperature of the tank water. This is visible when the sensor is connected.

MENUS



Up Arrow: *Moves up through available menus*

Down Arrow: *Moves down through available menus*

Right Arrow: *No function*

Left Arrow: *Goes back to Home screen*

OK Button: *When a menu is highlighted, pressing the OK button will navigate to that menu*

Control: Operation Mode, Setpoints, I/O configurations and calibration settings

PID: Proportion, Integral and Derivative values for room and supply sensor control loops

Ethernet: Network settings for the ethernet port

BACnet: BACnet settings for MS/TP or IP networks

Drain: Autodrain and seasonal drain settings

USB: Download data to external thumb drive

Webserver: Choose location of webserver and turn on data logging

History: Run time and fault count

Clock: Set the current time

Factory: Password controlled parameters

CONTROL MENU

Up Arrow: *Moves up through available settings including back to the previous page. When a setting is activated, Up Arrow changes the value up the list of possible settings.*

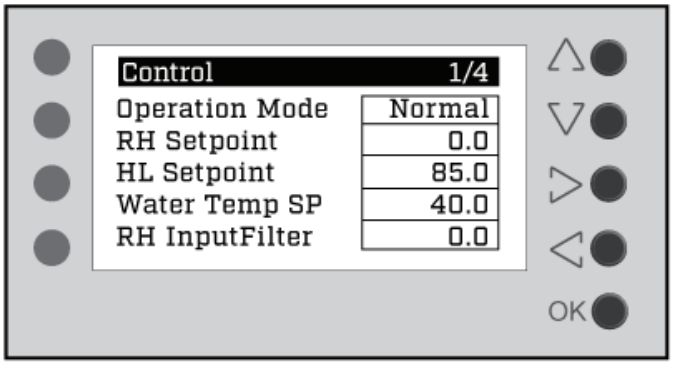
Down Arrow: *Moves down through available menus including moving to the next page. When a setting is activated, Down Arrow changes the value down the list of possible settings.*

Right Arrow: *No function when a setting is not activated. When a setting is activated, Right Arrow moves the cursor to the right.*

Left Arrow: *Goes back to Menus screen. When a setting is activated, Left Arrow moves the cursor to the left.*

OK Button: *When a parameter is highlighted, pressing the OK button will activate that parameter. When a parameter is activated, pressing OK will confirm/save the current selection.*

Control Page 1



Operation Mode: Standby, Normal, Drain, or Flush

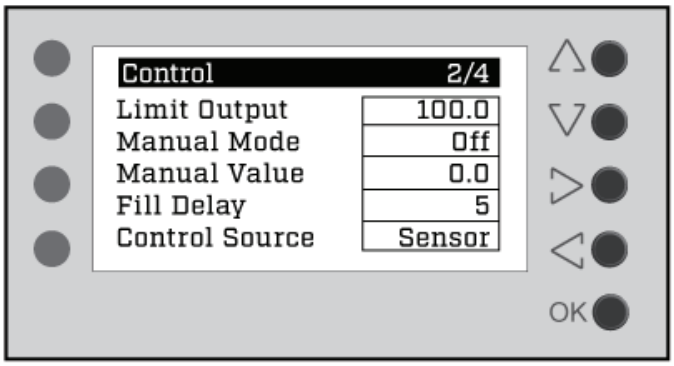
RH Setpoint: Room or return air relative humidity setpoint.

HL Setpoint: Supply air relative humidity setpoint.

Water Temp Setpoint: Tank temperature setpoint.

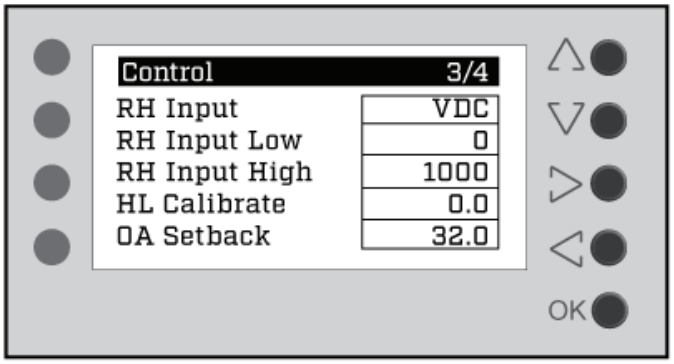
RH Input Filter: This is the number of seconds the controller will average the signal over

Control Page 2



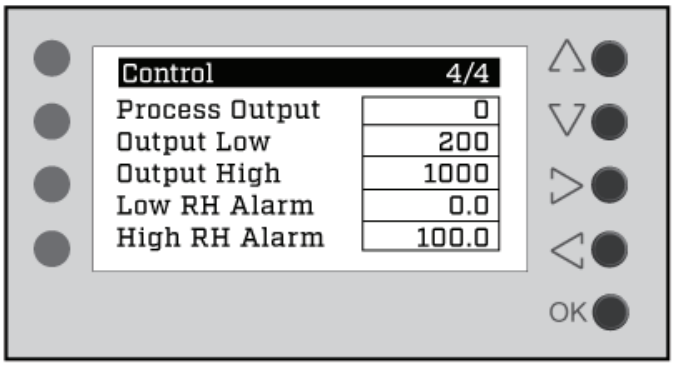
Limit Output:	Maximum power the controller is allowed achieve.
Manual Mode:	When turned on the output will be forced to the Manual Value.
Manual Value:	Humidifier output will be forced to this power level.
Fill Delay:	Number of seconds the water level must read full continuously before the fill valve is turned off.
Control Source:	Choose what type of device is connected to Analog Input 1, sensor or controller.

Control Page 3



RH Input:	Select Volts DC or mA as the type of analog input for both analog input 1 and 2.
RH Input Low:	Can be used to calibrate Analog Input 1. For 0-10 VDC this is normally 0. For 4-20 mA this should be set to 200.
RH Input High:	Can be used to calibrate Analog Input 1.
HL Calibrate:	Adjust supply RH value displayed up or down.
OA Setback:	When outside air temperature is below this value the room RH setpoint is reduced linearly.

Control Page 4



Process Output:	Analog output 1 setting for SX or GX models. 0 = Volts DC, 1 = 4-20 mA
Output Low:	When in Volts DC mode this is the output when Power = 0% *e.g. 200 = 2.00 VDC* When in 4-20 mA mode this is the output when Power = 0% *e.g. 200 = 4.00 mA*
Output High:	When in Volts DC mode this is the output when Power = 100% *e.g. 1000 = 10.00 VDC* When in 4-20 mA mode this the output when Power = 100% *e.g. 1000 = 20.00 mA*
Low RH Alarm:	Room/Return RH values below this value will cause alarm output to close.
High RH Alarm:	Room/Return RH values below this value will cause alarm output to close.

PID MENU

Up Arrow: *Moves up through available settings including back to the previous page. When a setting is activated, Up Arrow changes the value up the list of possible settings.*

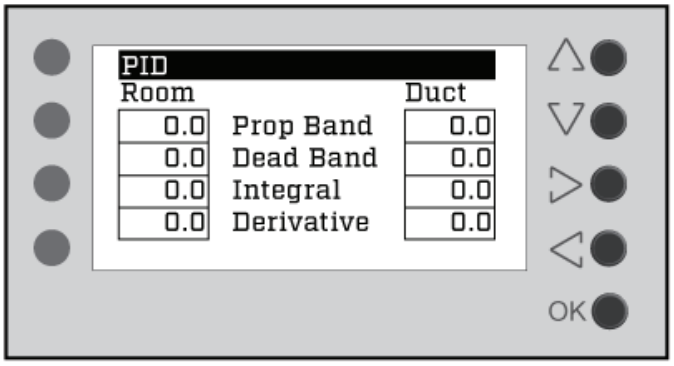
Down Arrow: *Moves down through available menus including moving to the next page. When a setting is activated, Down Arrow changes the value down the list of possible settings.*

Right Arrow: *No function when a setting is not activated. When a setting is activated, Right Arrow moves the cursor to the right.*

Left Arrow: *Goes back to Menus screen. When a setting is activated, Left Arrow moves the cursor to the left.*

OK Button: *When a parameter is highlighted, pressing the OK button will activate that parameter. When a parameter is activated, pressing OK will confirm/save the current selection.*

PID Settings



Prop Band: Proportional band for each control loop. 0.1-100.0% RH

Dead Band: If RH setpoint- actual RH is less than this value the integral term is paused.

Integral: Amount of time in seconds it will take the control loop output to be increased/decreased by an amount equal to the current proportional term. 0.0-600.0 s

Derivative: Should almost always be set to 0. The control loop output is increased/ decreased by the rate of change of the RH value. 0.0-600.0 s

ETHERNET MENU

Up Arrow: *Moves up through available settings including back to the previous page. When a setting is activated, Up Arrow changes the value up the list of possible settings.*

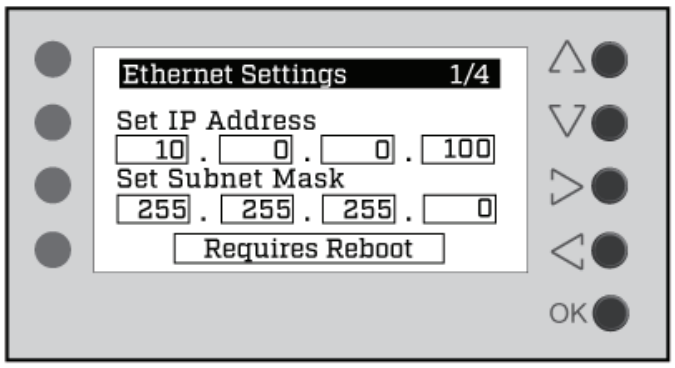
Down Arrow: *Moves down through available menus including moving to the next page. When a setting is activated, Down Arrow changes the value down the list of possible settings.*

Right Arrow: *No function when a setting is not activated. When a setting is activated, Right Arrow moves the cursor to the right.*

Left Arrow: *Goes back to Menus screen. When a setting is activated, Left Arrow moves the cursor to the left.*

OK Button: *When a parameter is highlighted, pressing the OK button will activate that parameter. When a parameter is activated, pressing OK will confirm/save the current selection.*

Ethernet Settings Page 1

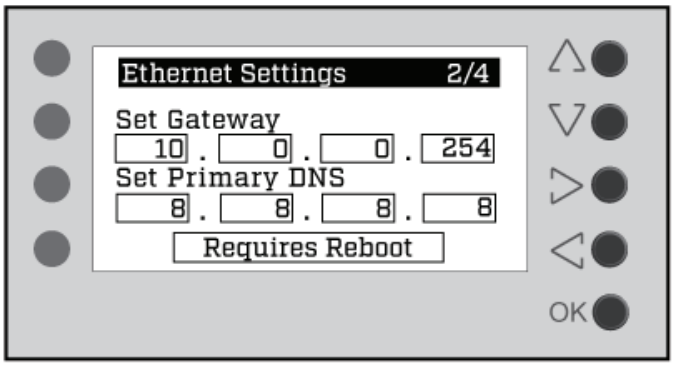


Set IP Address: Address the controller will have after reboot.

Set Subnet Mask: Subnet mask controller will have after reboot.

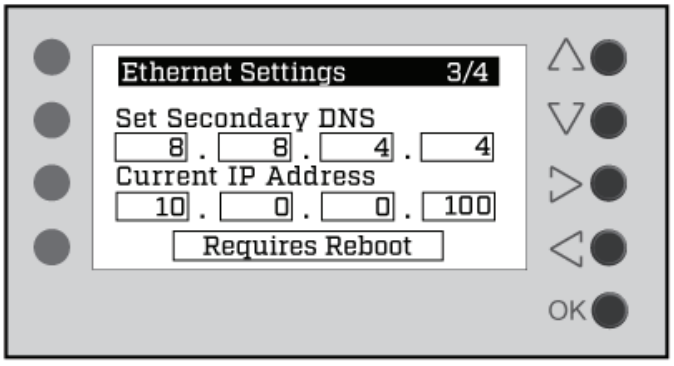
Requires Reboot: Selecting this, pressing down arrow and then hitting OK will reboot the controller. These parameters won't take effect until the controller is rebooted.

Ethernet Settings Page 2



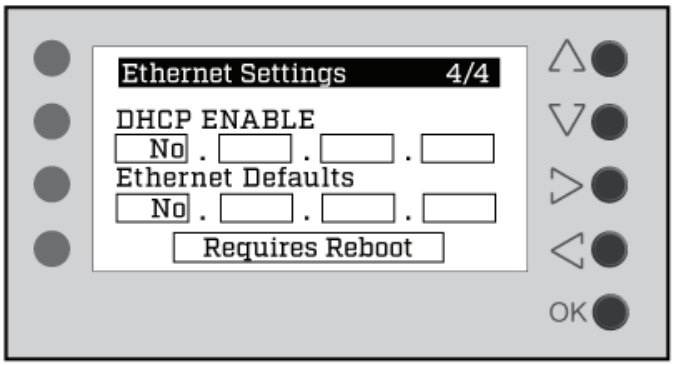
Set Gateway:	Gateway setting the controller will have after reboot.
Set Primary DNS:	Primary DNS setting the controller will have after reboot.
Requires Reboot:	Selecting this, pressing down arrow and then hitting OK will reboot the controller. These parameters won't take effect until the controller is rebooted.

Ethernet Settings Page 3



Set Secondary DNS:	Secondary DNS setting the controller will have after reboot.
Current IP Address:	This is the current IP address of the controller.
Requires Reboot:	Selecting this, pressing down arrow and then hitting OK will reboot the controller. These parameters won't take effect until the controller is rebooted.

Ethernet Settings Page 4



DHCP Enable:	Dynamic Host Configuration Protocol will set the IP address automatically.
Ethernet Defaults:	Resets all ethernet menu settings back to default and reboots controller
Requires Reboot:	Selecting this, pressing down arrow and then hitting OK will reboot the controller. These parameters won't take effect until the controller is rebooted.

BACNET MENU

Up Arrow: *Moves up through available settings including back to the previous page. When a setting is activated, Up Arrow changes the value up the list of possible settings.*

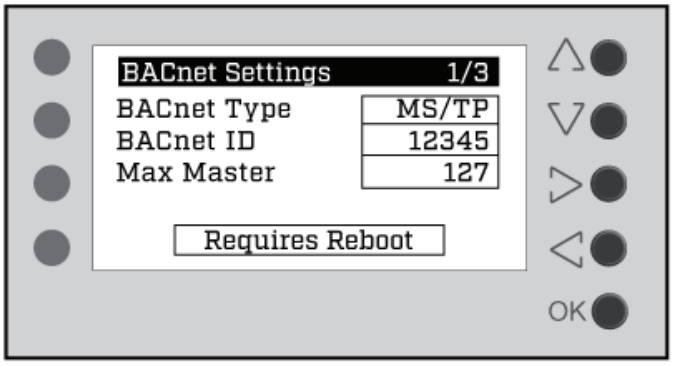
Down Arrow: *Moves down through available menus including moving to the next page. When a setting is activated, Down Arrow changes the value down the list of possible settings.*

Right Arrow: *No function when a setting is not activated. When a setting is activated, Right Arrow moves the cursor to the right.*

Left Arrow: *Goes back to Menus screen. When a setting is activated, Left Arrow moves the cursor to the left.*

OK Button: *When a parameter is highlighted, pressing the OK button will activate that parameter. When a parameter is activated, pressing OK will confirm/save the current selection.*

BACnet Settings Page 1



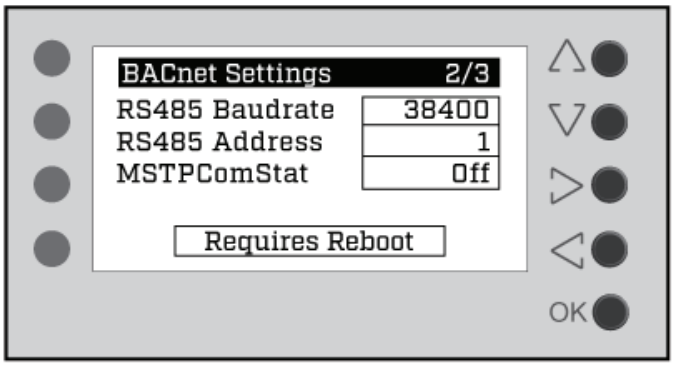
BACnet Type: Select MS/TP or IP BACnet network for the desired type.

BACnet ID: Instance ID of the Device

Max Master: For MS/TP Networks the highest master address on the network.

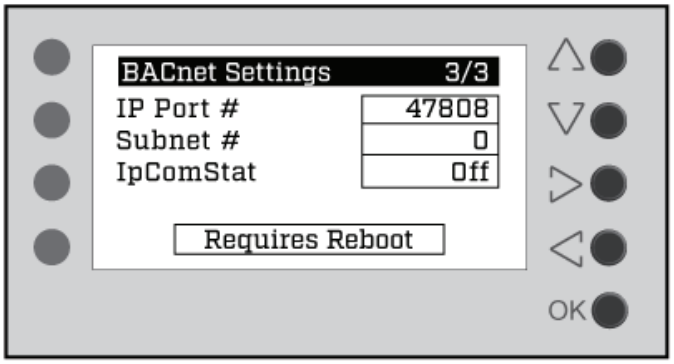
Requires Reboot: Selecting this, pressing down arrow and then hitting OK will reboot the controller. These parameters won't take effect until the controller is rebooted.

BACnet Settings Page 2



RS485 Baudrate:	MS/TP network baud rate.
RS485 Address:	MS/TP address of this device.
MSTPComStat:	Will show “On” if this Device has acknowledged a communication request on the MS/TP network within the last 10 seconds otherwise it will show “Off”.
Requires Reboot:	Selecting this, pressing down arrow and then hitting OK will reboot the controller. These parameters won’t take effect until the controller is rebooted.

BACnet Settings Page 3



IP Port #:	BACnet IP setting for the network.
Subnet #:	BACnet IP setting for identifying which Subnet this device is located.
IpComStat:	Will show “On” if this device has acknowledged a communication request on the IP network within the last 10 seconds otherwise it will show “Off”
Requires Reboot:	Selecting this, pressing down arrow and then hitting OK will reboot the controller. These parameters won’t take effect until the controller is rebooted.

DRAIN MENU

Up Arrow: *Moves up through available settings including back to the previous page. When a setting is activated, Up Arrow changes the value up the list of possible settings.*

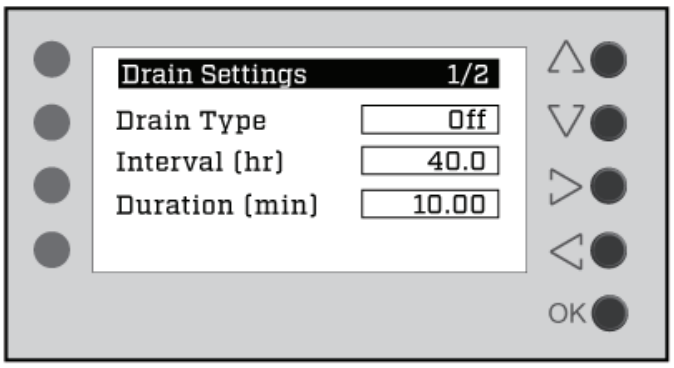
Down Arrow: *Moves down through available menus including moving to the next page. When a setting is activated, Down Arrow changes the value down the list of possible settings.*

Right Arrow: *No function when a setting is not activated. When a setting is activated, Right Arrow moves the cursor to the right.*

Left Arrow: *Goes back to Menus screen. When a setting is activated, Left Arrow moves the cursor to the left.*

OK Button: *When a parameter is highlighted, pressing the OK button will activate that parameter. When a parameter is activated, pressing OK will confirm/save the current selection.*

Drain Settings Page 1



Drain Type: Off = No Auto Drain

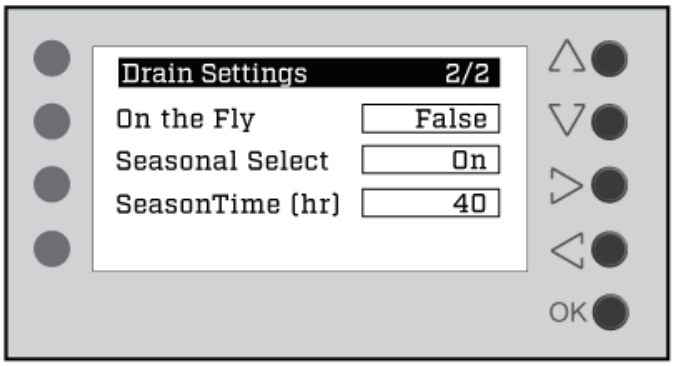
On = Auto Drain when the run time reaches the Interval Time

0-23 = Auto drain starts on this hour each day

Interval (hr): Number of run hours between the start of each auto drain.

Duration (min): How long the drain valve is open during each auto drain.

Drain Settings Page 2



On the Fly:	When turned “On” this allows the humidifier heat to stay on as long as the water level is not low during an autodrain. This is meant to be used with a short drain Interval and a short Duration.
Seasonal Select:	Off = No seasonal drain. On = Seasonal drain keeps drain open and tank dry during non-use. Wet = Tank drains for ½ hour after non-use but immediately refills to be ready for a call for humidity sooner.
SeasonTime (hr):	A complete tank drain occurs after this many hours with no call for humidity

USB MENU

Up Arrow: *No function.*

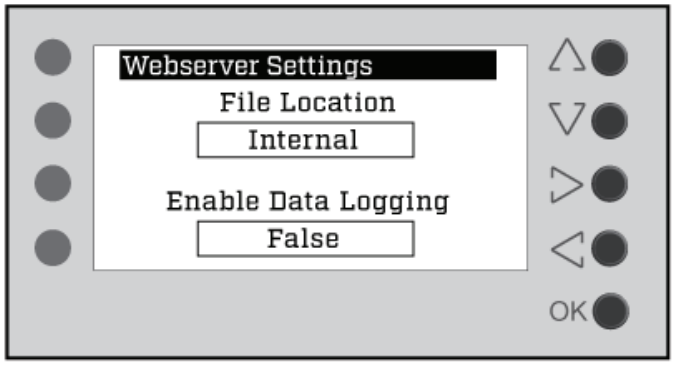
Down Arrow: *No function.*

Right Arrow: *No function.*

Left Arrow: *Goes back to Menus screen.*

OK Button: *Pressing the OK button will download files onto a USB thumb drive.*

WEBSERVER MENU



Up Arrow: *Moves up through available settings including back to the previous page. When a setting is activated, Up Arrow changes the value up the list of possible settings.*

Down Arrow: *Moves down through available menus including moving to the next page. When a setting is activated, Down Arrow changes the value down the list of possible settings.*

Right Arrow: *No function when a setting is not activated. When a setting is activated, Right Arrow moves the cursor to the right.*

Left Arrow: *Goes back to Menus screen. When a setting is activated, Left Arrow moves the cursor to the left.*

OK Button: *When a parameter is highlighted, pressing the OK button will activate that parameter. When a parameter is activated, pressing OK will confirm/save the current selection.*

WEBSERVER MENU

Up Arrow: *Moves up through available settings including back to the previous page. When a setting is activated, Up Arrow changes the value up the list of possible settings.*

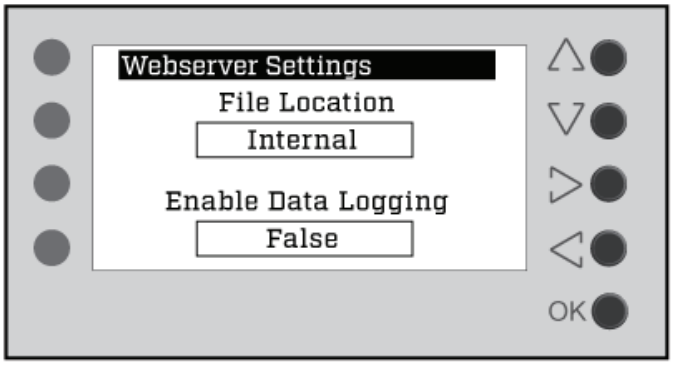
Down Arrow: *Moves down through available menus including moving to the next page. When a setting is activated, Down Arrow changes the value down the list of possible settings.*

Right Arrow: *No function when a setting is not activated. When a setting is activated, Right Arrow moves the cursor to the right.*

Left Arrow: *Goes back to Menus screen. When a setting is activated, Left Arrow moves the cursor to the left.*

OK Button: *When a parameter is highlighted, pressing the OK button will activate that parameter. When a parameter is activated, pressing OK will confirm/save the current selection.*

Webserver Settings



File Location: Internal or MicroSD. Before switching the setting to “MicroSD” the webserver files must be placed onto a microSD card before the card is inserted into the PLC. A zip file called “Web” can be found on the “Files” tab. Unzip that file to a microSD card before placing the card into the PLC microSD card slot. You can now change the file location to microSD.

Enable Data Logging: Should only be set to “True” after a max 32Gb microSD card is inserted into the PLC microSD card slot.

HISTORY MENU

Up Arrow: *Go to previous History page.*

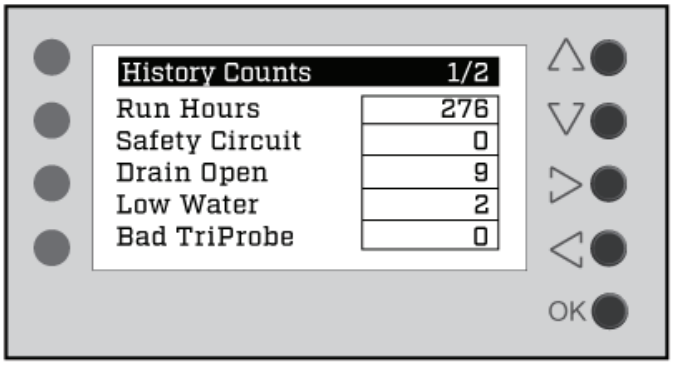
Down Arrow: *Go to next History page.*

Right Arrow: *No Function.*

Left Arrow: *Goes back to Menus screen.*

OK Button: *No function.*

History Counts Page 1



Run Hours: Hours the humidifier has operated with a power level greater than 0%.

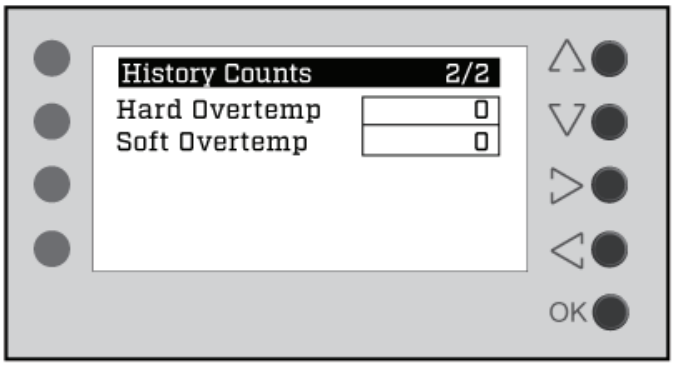
Safety Circuit: Number of times the safety circuit has opened.

Drain Open: Number of times the drain valve has been opened.

Low Water: Number of times the tank water level has reached a low level.

Bad TriProbe: Number of times the Tri-Probe has had readings out of order.

History Counts Page 2



Hard Overtemp: Number of times the manual overtemp switch/circuit has been opened.

Soft Overtemp: Number of times the software based tank temperature sensor has read above 225°F.

CLOCK MENU

Up Arrow: *Moves up through available settings including back to the previous page. When a setting is activated, Up Arrow changes the value up the list of possible settings.*

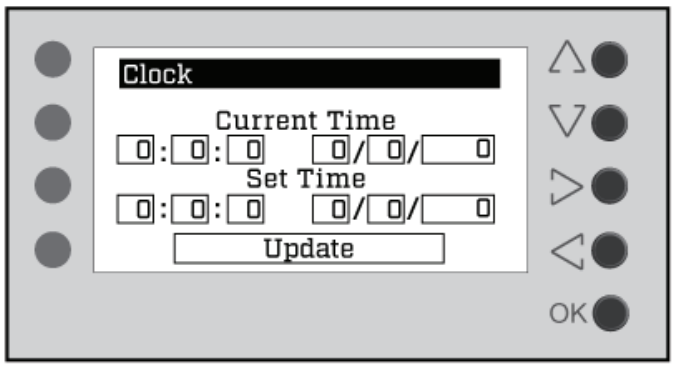
Down Arrow: *Moves down through available menus including moving to the next page. When a setting is activated, Down Arrow changes the value down the list of possible settings.*

Right Arrow: *No function when a setting is not activated. When a setting is activated, Right Arrow moves the cursor to the right.*

Left Arrow: *Goes back to Menus screen. When a setting is activated, Left Arrow moves the cursor to the left.*

OK Button: *When a parameter is highlighted, pressing the OK button will activate that parameter. When a parameter is activated, pressing OK will confirm/save the current selection.*

Clock Settings



Current Time: 24 hour clock

Hour:Minutes:Seconds

Month/Day/Year

Update: Select update and hit OK to write the values in Set Time to the Current Time fields.

FACTORY MENU

Up Arrow: *Moves up through available settings including back to the previous page. When a setting is activated, Up Arrow changes the value up the list of possible settings.*

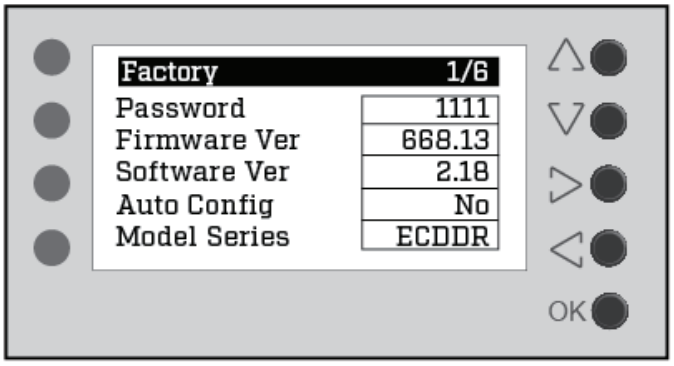
Down Arrow: *Moves down through available menus including moving to the next page. When a setting is activated, Down Arrow changes the value down the list of possible settings.*

Right Arrow: *No function when a setting is not activated. When a setting is activated, Right Arrow moves the cursor to the right.*

Left Arrow: *Goes back to Menus screen. When a setting is activated, Left Arrow moves the cursor to the left.*

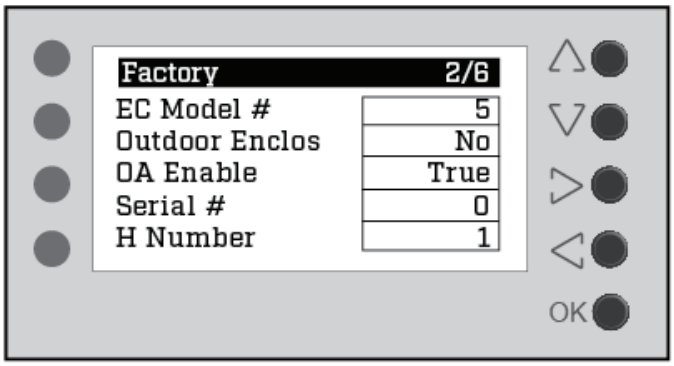
OK Button: *When a parameter is highlighted, pressing the OK button will activate that parameter. When a parameter is activated, pressing OK will confirm/save the current selection.*

Factory Page 1



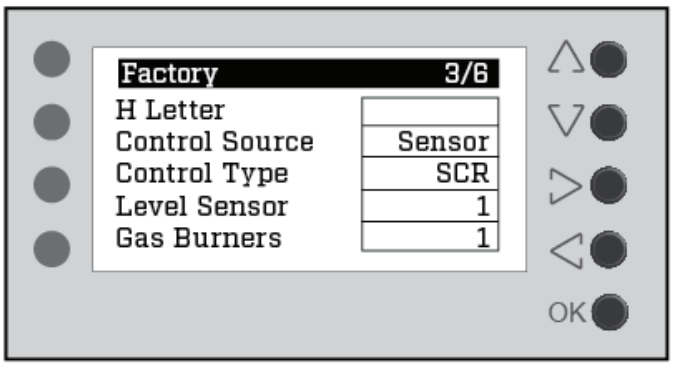
Password:	When it matches it will allow changes to parameters.
Firmware Ver:	PLC Firmware Version
Software Ver:	PLC Software Version
Auto Config:	When “On” Will automatically adjust values to the proper default parameters of the selected model series.
Model Series:	Steam generator model

Factory Page 2



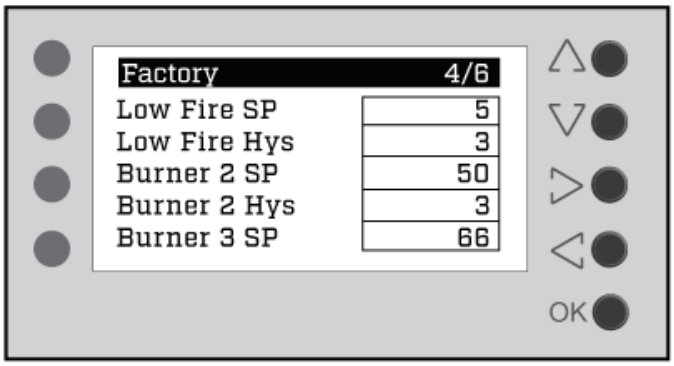
Model #:	Model number of humidifier.
Outdoor Enclos:	Humidifier is used in an outdoor enclosure.
OA Enable:	If “TRUE” a NTC thermistor is wired to the disable input and the humidifier can automatically reduce the room RH setpoint when the outside temp falls.
Serial #:	Serial number of the steam generator.
H Number:	Used with the serial number.

Factory Page 3



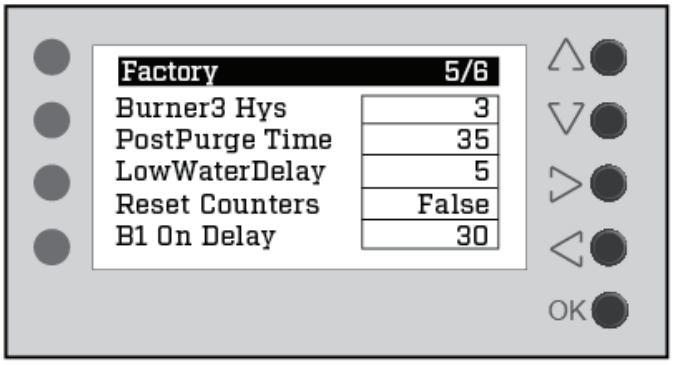
H Letter:	Used with the serial number.
Control Source:	A humidity sensor or controller is connected to Analog Input 1. This parameter is also in the Control Menu.
Control Type:	Type of humidifier; SCR = Electric, Gas = GX, Steam = SX.
Level Sensor:	0 = Tri-Probe, 1 = Float Switch
Gas Burners:	1,2 or 3 Burners for GX models

Factory Page 4



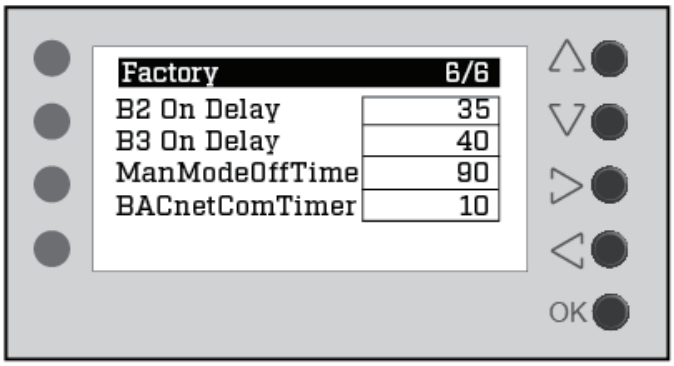
Low Fire SP:	%Power that will enable burner #1.
Low Fire Hys:	Low Fire SP; Low Fire Hys = %Power that disables burner #1.
Burner 2 SP:	%Power that will enable burner #2.
Burner 2 Hys:	Burner 2 SP; Burner 2 Hys = %Power that disables burner #2.
Burner 3 SP:	%Power that will enable burner #3.

Factory Page 5



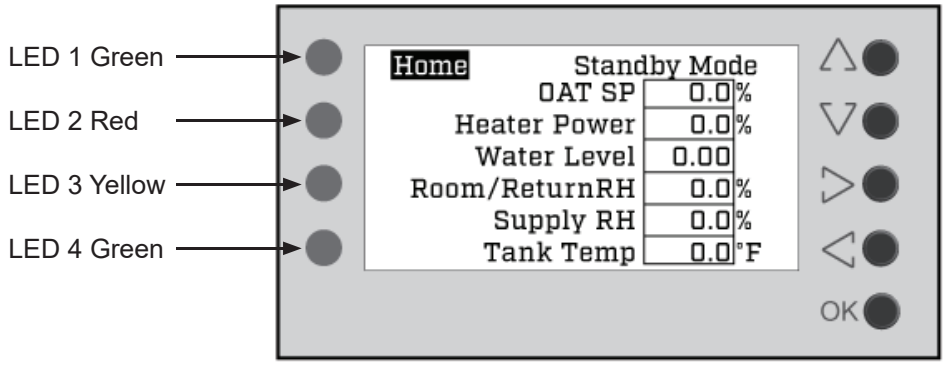
Burner3 Hys:	Burner 3 SP; Burner 3 Hys = %Power that disables burner #3.
PostPurge Time:	Time in seconds after burner #1 is disabled that the combustion fans will continue to run.
LowWaterDelay:	Time in seconds required for the water level to remain low before the heating source is disabled.
Reset Counters:	Set to “True” to reset counts in History Menu.
B1 On Delay:	Time in seconds burner #1 will be delayed before coming on when reset.

Factory Page 6



B2 On Delay:	Time in seconds burner #2 will be delayed before coming on when reset.
B3 On Delay:	Time in seconds burner #3 will be delayed before coming on when reset.
ManModeOffTime:	Time in minutes manual mode will be turned off if there is no BACnet communications.
BACnetComTimer:	Number of seconds after an acknowledged request is received which either MSTPComStat or IPComStat will revert back to “Off”.

LED GUIDE



LED 1 Green:	Indicates PLC is powered.
LED 3 Yellow:	When uploading new firmware with a thumb drive this LED stays on.
LED 4 Green:	When uploading new firmware with a thumb drive is complete this LED will blink twice.
All LEDs Blinking:	IP address conflict.

Modes of Operation

The INTAC® controller is preprogrammed at the factory for modulation control. The INTAC® will use up two analog inputs. Analog Input 1 can be programmed to receive a humidity sensor or a humidity controller. Optionally Analog Input 2 can be used with a modulating high-limit duct sensor. A 4-20mA or 0-10 signal can be used but both inputs must use the same type. The modulation of the different heating sources is explained below.

ELECTRIC

The fastest acting mode of modulation available is SCR control. SCR stands for silicon-controlled rectifier. Two SCRs are employed back-to-back in a device called a solid state relay (SSR). The SSRs are used to switch the power on and off to each heating element over a very short time period. The INTAC® will send a pulse to each SSR according to the control signal for a percentage of the cycle time of one second. For example at 50% power the SSR will be on for ½ second and off for ½ second. This type of modulation is designed to provide extremely accurate control of the humidifier output. Each set of heating elements within the humidifier steam generating tank will be modulated to provide 0-100% modulating control of the humidifier output (capacity).

STEAM

Steam mode is used when the INTAC® is used to control a steam-to-steam heat exchanger humidifier type. Low pressurized steam (15psig or less) is introduced through a steam control valve into a heat exchanger submerged in water. The valve modulation is controlled by an electric actuator. The INTAC® will control the electric actuator with an analog control signal to modulate the amount of steam entering the heat exchanger which will in turn control the amount of steam production on the outside of the heat exchanger. Up to 3 heat exchangers can be used in one humidifier. The control valves on multiple heat exchanger units are typically set to run in parallel. Steam mode can also be used for direct steam injection type humidifiers. The water tank related controls are disabled when used for direct steam injection applications.

GAS

Gas mode is used when the INTAC® is used to control a natural gas or propane burner that is fired into a heat exchanger submerged in water. The INTAC® will send a modulating analog signal to an actuator that is mechanically linked to dampers that control the fuel and air entering the gas burner. The amount of heat produced by the burner is modulated to control the amount of steam produced by the heat exchanger. Up to 3 heat exchangers can be used in one humidifier. In a multiple burner humidifier only burner #1 modulates while the second and/or third burners are staged on/off.

TRI-PROBE OPERATION

Humidifier models that run on tap water will use the dissolved mineral content and associated conductivity of the water to sense the water at discrete levels near the top of the tank. The Tri-Probe water sensor circuit measures the resistance at the probe tip to ground. If a probe is not in contact with the water then the circuit is not complete and the controller sees a high resistance. Similarly, when the water level being sensed is free of minerals, and therefore nonconductive, the controller will measure a large resistance and will not “see” the water level. The water in the tank must have a resistance of less than 13 kOhm/cm for the probes to sense the water properly.

The three probes are used to control the fill valve and heating source in the following manner:

1. The water level falls as steam is generated
2. The middle probe eventually loses contact with the water
3. The fill valve is energized
4. The water level rises to the top probe
5. After 5 continuous seconds (Fill Delay) of water contact with the top probe the fill valve closes
6. If the bottom probe is not sensing water the heating source is de-energized and will remain off
7. Humidifier models that use reverse osmosis or deionized water will use a float switch as a low water cutout and a mechanical float valve for controlling the makeup water.

AUTOMATIC DRAIN CYCLE

Humidifier models that run on tap water will accumulate minerals in the water as the water is boiled away. Sometimes immediately but always eventually the dissolved minerals will reach saturation and begin to precipitate out of the water. For this reason it is necessary to drain the tank down periodically to reduce the accumulation of minerals and extend the time period between cleanings. The process the INTAC® goes through to accomplish this is called the Automatic Drain Cycle.

By default the humidifier begins counting run time whenever the humidifier output is greater than 0%. The time it must count up to before opening the drain is called the Drain Interval .

The drain valve is energized and will remain energized for the Drain Duration. When the Drain Duration time has expired, the drain valve will turn off and the fill valve will turn on until the tank is refilled. The Drain Duration should set to the amount of time it typically takes for the tank to completely drain down. The Drain Interval should be adjusted to minimize observed mineral accumulation.

Alternately the Automatic Drain Cycle can be set to drain down at a specific hour every day.

SEASONAL DRAIN CYCLE

When the humidifier has a period of time where there is no call for humidification the tank will drain down.

FREEZE PROTECTION/STANDBY WATER TEMP

Using a NTC thermistor probe the INTAC® senses the temperature of the tank water and will heat the tank if there is no call for humidity and the tank temperature is below the tank temperature setpoint.

Optional Features

MODULATING HIGH-LIMIT FOR VARIABLE AIR VOLUME AHUs (VAV)

A modulating high-limit humidity sensor may be used in conjunction with a room/return air humidity sensor or a control signal by others. This sensor should be placed in the supply air downstream of the steam injection tubes. It is used by the INTAC® to gradually reduce the humidifier output to limit the supply air relative humidity below saturation. It is typically set to a lower RH value than the on/off mechanical safety high-limit humidistat that is wired between terminals #7 and #8. The benefit to using the modulating sensor is that humidification is maintained without tripping the safety high-limit humidistat when the supply air temperature or volumetric flow are change abruptly. The INTAC® continually compares the room/return air humidity and the supply air humidity and chooses the control loop the results in the lowest power level. The setpoint of modulating high-limit should be above the corresponding dew point of the main room/return air sensor so that eventually the control power will revert back to being controlled by the room/return air. For example, with a 40%RH setpoint at 70°F room temp your supply air high-limit setpoint needs to be above 66%RH at 55° F. If not the INTAC® will control based on the supply air humidity resulting in poor control over the room/return air RH.

OUTDOOR AIR TEMPERATURE SETBACK OPTION

As outside air temperature decreases, it may be desirable to reduce the humidifier output proportionately to reduce the risk of wetting interior surfaces and windows within a structure. With the optional outdoor air temperature setback feature, the user selects a temperature at which the humidifier output will begin to decrease or setback. The factory default is 32°F and is user-adjustable from 0°F to 60°F. Locate the air temperature sensor outside.

PID CONTROL LOOP TUNING

For most humidification applications, the parameters in a humidifier control loop that are based on a room humidity sensor or return air humidity sensor should be set so that the % power signal changes relatively slowly. This is due to the high thermal inertia involved with boiling water. There is an appreciable lag between the moment heat is applied to water to the moment it reaches a steady state of steam production. Additionally, it typically takes 10-30 seconds for an increase or decrease of the steam injected in the duct to be sensed by the space or return air humidity sensor. In most applications the amount of outside air is not dramatically changed from one minute to the next. The ambient moisture of the outside air does not change radically either. All of these reasons lend to a relatively slow room control response.

Conversely, a supply air modulating high-limit sensor control loop should be set to react quickly to prevent the supply air from being saturated while still allowing reduced modulation of the humidifier. The supply air humidity sensor's purpose is to prevent wetting. The supply control loop is there to override the room/return air control until typical operating conditions return. This can happen on VAV systems where the amount of total airflow is changed abruptly. It can also happen when units are first turned on or when rotating units in redundant setups.

The PID (Proportion, Integral and Derivative) terms all affect the way a control signal will react to a change in the process variable, which in this case is the relative humidity. The actual analog (0-10 VDC or 4-20 mA) signal from a typical humidity sensor will vary at the 0.1% level even when the room temperature and relative humidity are held constant.

An example of this is that if one looked at a reading from a humidity sensor on a second-by-second basis in a stable environment, the readings would be 50.0, 50.1, 49.8, 50.1, etc. Unless the raw value of this signal is filtered (by time averaging with the RH Input Filter setting) the derivative term should remain 0 because it will add instability to the control loop. Similarly, the Room Proportion band should be wide enough (small proportion gain) so that the control signal does not bounce up and down due to this small fluctuation of the raw humidity reading. The proportion term will generally be between 10% to 25%. With the proportion band set the speed of the control loop can now be adjusted by increasing or decreasing the integral parameter. Increasing the integral parameter will slow down the rate the power increases when the humidity is below set point.

One final note about the room control loop and the supply air high-limit control loop is that the two loops have different functions and therefore should behave differently. The supply air high-limit is exactly as its name suggests, a limit type of control. It is trying to keep the relative humidity below a particular value. Conversely, the room/return control loop's goal is to maintain around a particular value.

PURE Humidifier

Points List

BACnet Analog Inputs	Title	BACnet Values	Modbus Register #	Modbus Values
0	Heater Power	0-1000	8980	0-1000
1	Actual Humidity	0-100	8984	0-1000, implied tenths
2	High Limit RH Actual	0-100	8985	0-1000
3	Water Temp Actual	-13 to 266	9689	-130- 2660, implied tenths
4	Air Temp Actual	-100 to 1000	8690	-1000-10,000 implied tenths
5	Water Level Error	0 = No error 1 = Bad tri-probe 2 = Fill fault 3 = Refill fault 4 = Low float 5 = Low 6 = Drain fault	9692	0 = No error 1 = Bad tri-probe 2 = Fill fault 3 = Refill fault 4 = Low float 5 = Low 6 = Drain fault
6	Actual Water Level	4 = Full 3 = Normal 2 = Refill 1 = Low 0 = Error	8981	4 = Full 3 = Normal 2 = Refill 1 = Low 0 = Error
7	Fill Status	0 = Off; 1 = On	9693	0 = Off; 1 = On
8	Drain Status	0 = Off; 1 = On	8986	0 = Off; 1 = On
9	Accumulated Run Time	0-1 Billion	9770	0 - 4,294,967,295 hours
10	Safety Interlock Status	0 = Safety circuit open (error) 1 = Safety circuit closed (satisfied)	8983	0 = Safety circuit open (error) 1 = Safety circuit closed (satisfied)
11	Disable Input Status	0 = Open contact 1 = Closed contact	9694	0 = Open contact 1 = Closed contact
12	Overtemp Input Status	0 = Overtemp is open (fault) 1 = Overtemp is closed (normal)	8988	0 = Overtemp is open (fault) 1 = Overtemp is closed (normal)
13	Total Overtemp Count	0 - 4,294,967,295	10322	1 - 4,294,967,295
14	Safety Circuit Open Count	0 - 4,294,967,295	9762	0 - 4,294,967,295
15	DrainOpen Count	0 - 4,294,967,295	9768	0 - 4,294,967,295
16	Low Water Count	0 - 4,294,967,295	9766	0 - 4,294,967,295
17	BadTriProbeCount	0 - 4,294,967,295	9764	0 - 4,294,967,295
18	Gas Blower %Power	0-100	9691	0-100
19	Burner#1 Status	0-100	10301	0-100
20	Burner#2 Status	0-100	10302	0-100
21	Burner#3 Status	0-100	10303	0-100
22	Burner Lockout	0 = No lockout 1 = At least 1 burner is locked out	10318	0 = No lockout 1 = At least 1 burner is locked out
23	Control Source	0 = Transmitter 1 = Process Signal	8961	0 = Transmitter 1 = Process Signal
24	Outdoor Air Setback	0 to 60.0 F *Temp at which RH setpoint is reduced*	16521	0 to 60.0 F *Temp at which RH setpoint is reduced*
25	OutdoorAirSetbackEnable	0 = Off; 1 = On	16527	0 = Off; 1 = On
26	Drain Type	0 = 12AM 1 = 1AM…23 = 11PM 24 = Automatic 25 = None	16529	0 = 12AM 1 = 1AM…23 = 11PM 24 = Automatic 25 = None
27	Seasonal Drain Select	0 = Off 1 = On 2 = Wet	16563	0 = Off 1 = On 2 = Wet
28	Mod Fill Enable	0 = Off; 1 = On	16543	0 = Off; 1 = On

Modbus Parameters: Holding register (16 bit), Signed, 38400 Baud Character format: 8 data, No Parity, One stop

PURE™ Humidifier

Points List

BACnet Analog Values	Title	BACnet Values	Modbus Register #	Modbus Values
0	RH Set Point	0 to 100.0	9739	0 to 1000
1	High Limit Set point	0 to 100.0	9740	0 to 1000
2	Operation Mode	0 = Standby 1 = Normal 2 = Flush 3 = Forced Drain	9741	0 = Standby 1 = Normal 2 = Flush 3 = Forced Drain
3	Drain Duration Timer	0 to 120.00 minutes	9742	0 to 12000
4	Drain Interval timer	1 to 1000.0 hours	9743	1 to 10000
5	Fill Delay Timer	0-1800 secs	9744	0-1800 secs
6	Water Temp Set Point	40.0-200.0°F	9745	400-2000°F
7	Water Temp Hysteresis	1.0-50.0°F	9746	10-500°F
8	End of Use Drain Timer	0-1000 hours	9747	0-1000 hours
9	Room Prop band	0.1 to 100.0	9749	0.1 to 100.0
10	Room hysteresis	0 to 50.0	9750	0 to 50.0
11	Room Integral	0 to 600.0 sec	9751	0 to 600.0 sec
12	Room Derivative	0 to 600.0 sec	9752	0 to 600.0 sec
13	Duct Prop Band	0.1 to 100.0	9753	0.1 to 100.0
14	Duct Hysteresis	0 to 50.0	9754	0 to 500
15	Duct Integral	0 to 600.0 sec	9755	0 to 6000
16	Duct Derivative	0 to 600.0 sec	9756	0 to 6000
17	RH Input filter	0-600	9757	0-600.0 sec
18	Manual Mode	0 = Off; 1 = On	9718	0 = Off; 1 = On
19	Manual Percent	0-100.0	9719	0-1000

Modbus Parameters: Holding register (16 bit), Signed, 38400 Baud Character format: 8 data, No Parity, One stop

DISCLAIMER

Product Changes: Changes in products may be required from time to time due to the need for continuing improvement of products and due to factors beyond PURE Humidifier Co.'s control. PURE Humidifier Co. reserves the right to make reasonable changes in products, specifications and performance of any kind without notice or liability. PURE Humidifier Co. also reserves the right to deliver revised designs or models of products against any order, unless this right is specifically waived in writing by PURE Humidifier Co. PURE Humidifier Co. shall have no responsibility whatsoever with respect to changes made by the manufacturer in products sold but not manufactured by PURE Humidifier Co.

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