STULZ

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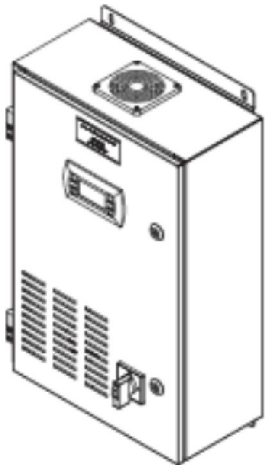

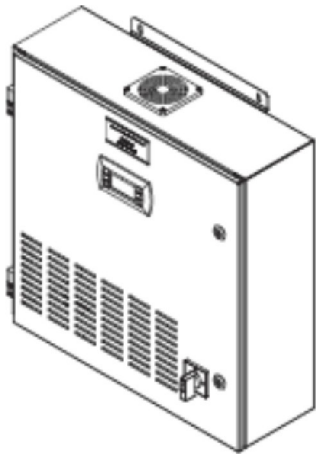

STULZ Ultra Series Controller

For STULZ Ultrasonic Humidifiers
Installation, Operation and Maintenance Manual

Notice

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1 GENERAL INFORMATION

1.1 Forward

Congratulations, this microprocessor based, Ultra-Series Humidifier controller is designed and manufactured by STULZ Air Technology Systems, Inc. (STULZ) utilizing the latest, state-of-the-art control technology. Recognized as a world leader, STULZ provides humidification systems and controllers manufactured with the highest quality craftsmanship using the finest materials available in the industry.

The controller will provide years of trouble free service if it is installed, operated and maintained in accordance with this manual. Damage to the unit from improper installation, operation or maintenance is not covered by the warranty.

This manual contains information for the installation, operation, troubleshooting, maintenance and repair of the controller. STUDY the instructions contained in this manual. They must be followed to ensure proper operation of the equipment.

Spare parts are available from STULZ to ensure continuous operation. Using substitute parts or bypassing electrical components in order to continue operation is not recommended and will VOID THE WARRANTY.

Ultra-series controllers are designed primarily to precisely operate, control and monitor STULZ Ultrasonic humidification systems. Any use beyond this is deemed to be not intended. STULZ is not liable for any damage resulting from improper use. All Ultra-series controllers are designed for indoor use.

1.2 Safety Summary

Read and understand all instructions in this manual relating to the specific function prior to starting the task. Carefully read and understand all notes, cautions and warnings contained in this manual that pertain to the task to be performed. Warnings indicate potential threat to personnel safety. Cautions indicate potential threat of damage to equipment.

Carefully read and understand all WARNING and/or CAUTION plates located on the unit.

1.3 Warnings & Cautions

STULZ uses **NOTES** along with **CAUTION** and **WARNING** symbols throughout this manual to draw attention to important operational and safety information.

A bold text **NOTE** marks a short message in the information alerting to an important detail.

A bold text **CAUTION** safety alert appears with information that is important for protecting of the equipment and performance. Be especially careful to read and follow all cautions that apply to your application.

A bold text **WARNING** safety alert appears with information that is important for protecting personnel from harm and the equipment from damage. Pay very close attention to all warnings that apply to the particular application.

A safety alert symbol accompanies a general **WARNING** or **CAUTION** safety statement.

A safety alert symbol accompanies an electrical shock hazard **WARNING** or **CAUTION** safety statement.

CAUTIONS

Prior to performing any installation, operation, maintenance or troubleshooting procedure read and understand all instructions, recommendations and guidelines contained within this manual.

All maintenance and/or repairs must be performed by a qualified technician.

NOTE: We recommend consulting the STULZ customer service department for the adjustment and maintenance of the controller or the humidification system.

WARNINGS

Never operate the unit with any cover, guard, screen, panel, etc., removed unless the instructions specifically state otherwise, then do so with extreme caution to avoid personal injury.

Always disconnect the main power supply to the equipment at the main power disconnect switch before beginning work on the equipment. A lockout tag-out procedure should be followed to ensure that power is not inadvertently reconnected.

CAUTION

Air vent openings must be completely free of obstructions.

2 DESCRIPTION

2.1 General

The microprocessor based Ultra-Series controller is a highly versatile and flexible humidification controller. It is designed for STULZ Ultrasonic Humidifiers with variable humidity output. The controller is equipped with factory configured software designed to precisely control the operation of these Ultrasonic Humidifiers.

The Ultra-Series controller is factory programmed therefore most applications will require no additional field setup except for the addressing of the humidifiers. However, the set points and their ranges are easily adjusted from the user interface display panel. The program and operating parameters are permanently stored in FLASH-MEMORY in case of power failure. The Ultra-Series controller may be configured to monitor and control a complete humidification system consisting of multiple ultrasonic humidification units.

Depending on the Humidifier capacity, a full size Ultra-Series controller may hold output power supplies for up to 8 STULZ Ultrasonic Humidifiers. When controlling groups of Humidifiers, auxiliary control boxes, containing additional Humidifier output power supplies, may be utilized to achieve up to 16 humidifiers on a system. Auxiliary control boxes contain no controller or interface display panel. They are powered independently of the controller allowing them to be installed near the Humidifiers they operate, resulting in reduced wire lengths and wire size.

Figure 1 - Ultra-Series Control Box

A smaller space saving "Trim" control box is also available for powering smaller groups of humidifiers consisting of four units or less. The Ultra-Series control box and auxiliary control box are provided with a door interlocked, main power disconnect switch with a lockable handle. The switch must be turned "Off" to open the door of the box. The disconnect switch isolates power only from the Humidifiers connected to that box.

The Ultra-Series controller is designed to manage humidity or dew point levels to a user defined set point via proportionally controlled output signals to the Humidifier(s). Control set points are established to maintain the necessary level of humidification needed to achieve the room's design conditions. The controller has the ability to monitor the conditions (such as humidity, temperature, supply air velocity) via sensors or BMS control inputs. The internal logic determines if the room conditions require humidification. The controller communicates with the Humidifiers the percentage output they need to be delivering in response to the demand for humidification. The controller responds accordingly to changes in conditions and proportionally varies the output(s) controlling humidity production to maintain humidity levels to the control set point.

2.2 Features

2.2.1 BMS Interface

The controller may incorporate a communication port that can be field connected through a serial interface to a Building Management System via Modbus, BACnet, SNMP or HTTP protocol.

2.2.2 Field Configurable

Ultra-Series controllers are field configurable, allowing the operator the capability of selecting control set points specific to the application. Operator interface for the controller is provided via an attractive, user interface display panel. The display panel has a backlit LCD display and function keys allowing the user to scroll through and enter various menu loops. The menu driven loop structure is user friendly with operator prompts making it easy to navigate through the various screens.

Monitoring of room conditions and system operation is allowed without entering a password. Modifications to the control set points may be made with the use of a password.

2.2.3 Password Protection

Access to the **Info**rmation menu and **Alarms** log is allowed without the use of a password. The controller is programmed to recognize predetermined security levels before allowing access to display screens containing critical variables. Only authorized personnel who possess a thorough understanding of the system should make changes to **Control** and **Service** menu settings. These screens must have accurate variables entered, otherwise erratic operation may occur. The secured menu levels

support unique passwords that must be entered to access the menu screens so only authorized personnel may perform modifications to the settings. See Password Authorization, Section 4.3.

2.2.4 Timed Drain Cycle

The Ultra-Series controller is programmed to enable timed drain cycles when the Humidifier(s) have been idle to help ensure proper water quality in the reservoir.

2.2.5 Restorable Set Points

Upon initial start-up the system operates using the set points programmed by the factory. The set points for the system may be re-adjusted in the Control menu at any time. The customer may enter new operating parameters in the Control>Set points and Control>Tuning menus and the system will operate accordingly. If it becomes necessary, the customer may restore the set points back to saved customer parameters or to the original factory (primary) parameters.

2.3 User Interface Display Panel

Figure 2 - User Interface Display Panel

The user interface panel is a terminal that features an easy to read, backlit liquid-crystal alphanumeric display giving a quick-glance operational overview of the humidification system. The display is equipped with LED illuminated function keys allowing the operator complete control and monitoring capability of the humidification system.

The screens available on the interface display panel present data that originates from the controller. The controller is operated via a 6-key menu-driven windows type loop structure providing the ability to scroll through and enter various menus (*Information, Control,* and *Service)*. These menus permit the user to easily view, control and adjust operating parameters for the humidification system. (See Menu Selections, Figure 13.)

2.3.1 Function Keys

KEY	FUNCTION
	Accesses active alarm screens Silences audible alarms Resets active alarms
Prg	Displays the main menu
Esc	Returns to the next menu level up Cancels a changed entry
	Steps back to the previous screen in a menu loop Increases the value of a modifiable numeric field
	"Enter Key"- Accesses the menu loops Moves the cursor into a modifiable field Accepts the current value of a modifiable field
	Steps to the next menu screen in a menu loop Decreases the value of a modifiable numeric field

2.3.2 Contrast Adjustment

Press and hold the Alarm ( ) and (***Prg)*** keys; then repeatedly press the Up ( ) and Down( ) keys to adjust the contrast.

2.3.3 Alarms

Alarm conditions activate a red LED indicator that backlights the alarm function key. As an option, an alarm condition may also be enunciated by an audible alarm signal. An alarm is acknowledged by pressing the alarm key. This calls up alarm display screen(s) that provide a text message detailing the alarm condition(s). After an alarm condition is corrected, the alarm may be cleared by pressing the alarm ( )key.

2.3.4 Alarm Log

The alarm log provides a history of the alarms in sequential order with a time and date stamp. To access the alarm log, press the (***Prg***) key, then press the Down ( ) arrow key until the "**ALARM LOG**" screen is reached.

Press the Enter ( ) key to access the loop. When access is gained to the Alarm Log, use the Up ( ) and Down ( ) keys to scroll through the log for additional alarm messages.

2.4 Controller Nomenclature

The Ultra-Series controller box contains the main operating components. The control box layout, shown in Figure 3, is a typical layout showing power supplies for up to eight individual Humidifiers. One power supply is provided for each Humidifier to be controlled. The higher the Humidifier capacity is, the larger the power supply for it must be. Depending on the number of Humidifiers that need to be controlled (up to 16), the number of power supplies required may not fit inside the Ultra-Series enclosure. In that case auxiliary control boxes are utilized to house additional power supplies as needed.

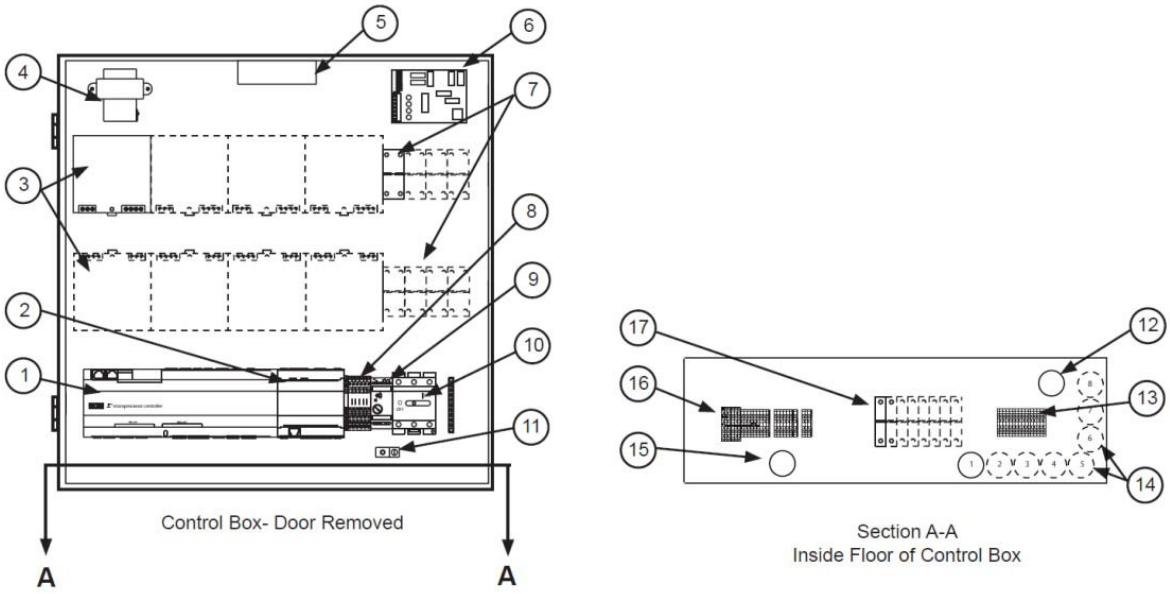


Figure 3 - Control Box Internal Layout

The item numbers below coincide with the call outs in Figure 3.

1. Controller (Figure 4)
2. Expansion module (for conductivity sensor)
3. Humidifier power supplies (8 maximum)
4. Controller transformer
5. Vent Fan
6. Sensor averaging board (optional)
7. Power supply circuit breakers (8 maximum)
8. Humidifier output relays
9. Water detector control module (optional)
10. Service disconnect switch (*see note)
11. Cabinet ground lug
12. Knock-out for power cable
13. Humidifier(s) output terminal block
14. Knock-outs for Humidifier cables (8 max)
15. Knock-out for control wires
16. Control interface terminal blocks
17. Humidifier circuit breakers (8 maximum)

*Note: The service disconnect switch removes power from the Ultra-Series controller and only the Humidifiers connected directly to it. Auxiliary boxes power the Humidifiers they are connected to, but the Humidifiers will time out and shutdown if the control signal is interrupted by turning off the Control Box disconnect switch or if the control signal is lost over the Modbus. Auxiliary Boxes must have their service disconnect switch turned off to stop the operation of the Humidifiers connected to them while other Humidifiers are continuing to run off the Control Box and other Auxiliary Boxes.

2.5 Controller

The Ultra-Series controller is a microprocessor-based controller (see Figure 4). The controller contains the software that manages the operating parameters of the humidification system.

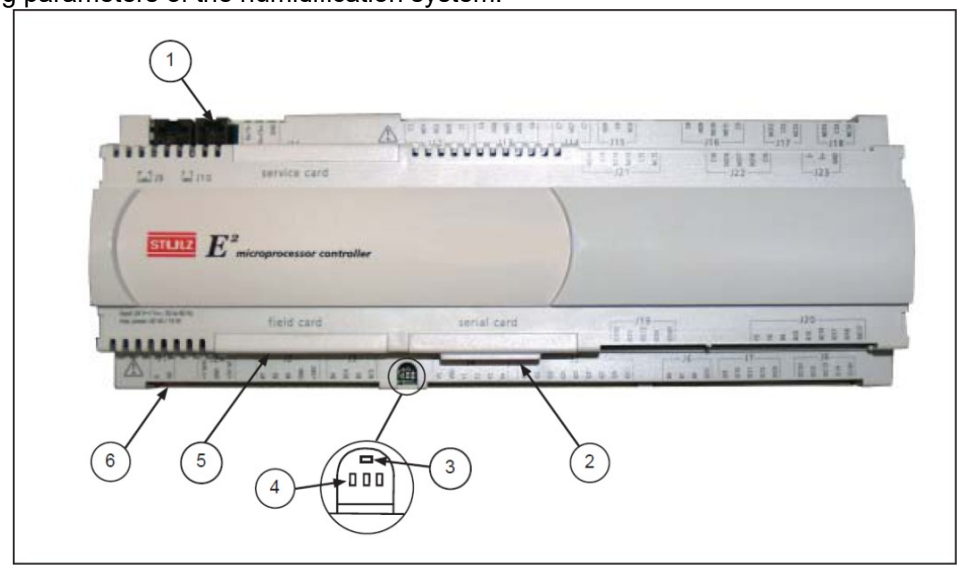


Figure 4 – Controller

2.5.1 Controller Layout

Figure 4 for details controller layout. The item numbers below coincide with the call-outs in Figure 4.

1. RJ11 Telephone connector (J10) for display
2. Hatch for BMS serial interface port
3. Power on LED (1- yellow)
4. Signal LED's (3- red, yellow, and green)
5. Hatch for RS485 connector for network control bus
6. Power connector (J1)

2.6 Auxiliary Terminals

The Ultra-Series controller is equipped with customer interface positions on terminal blocks located in the control box. For auxiliary device wiring connections, refer to the electrical drawing(s) provided with the unit.

2.6.1 Control Sensors

The controller is equipped with terminal positions for the connection of sensors (temperature, or relative humidity). If customer supplied, the sensor(s) may be a 4 to 20mA, a 0-1V, a 0-10V or a 0-5V signal to the system controller. Parameters inside the controller need to be set appropriately before connecting the sensors. Sensor(s) may be duct mounted to monitor return or supply air and/or wall mounted to monitor the room air to determine the humidification demand against the control set points for automatic control of humidity production. A wall mounted sensor or return duct mounted sensor is typically used to control room conditions. A duct mounted supply humidity sensor is typically used as a high humidity limit sensor.

2.6.2 Alarm Contacts

Dry relay contacts (N/O or N.C.), are available for remote monitoring of alarm conditions. The alarm contacts are rated for a resistive load at 250VAC/ 8 Amps.

2.6.3 Summary Alarm

A summary alarm dry-contact is provided for remote notification of an alarm condition. As programmed into the system controller, an alarm condition activates the summary alarm logic which energizes a summary alarm relay and audible alarm if enabled.

2.6.4 Custom Alarm

In addition to the summary alarm, dry contact relays may be optionally provided for remote annunciation of customer selected alarm condition(s). Any alarm may be programmed in the controller to activate the user configurable custom alarm logic.

2.6.5 Water Conductivity Probe

To ensure proper demineralized water supply quality, the controller is equipped with terminal positions for the

connection of a conductivity probe. The conductivity probe is shipped loose with a 10 ft. long cable. The conductivity of the demineralized water is monitored via the sensor (probe) mounted in the pipe supplying water to the Humidifier (see Section 3.3.5). The controller alerts the operator with a "High Conductivity Pre-alarm" if the water conductivity rises to between 5 and 20 microSiemens. Above 20 microSiemens, the controller shuts down Humidifier operation following a 5 minute time delay and signals a "High Conductivity" alarm.

2.6.6 Air Velocity Sensor

This controller is equipped with terminal positions for the connection of an optional Air Velocity Sensor/Transmitter to allow monitoring of the air flow in ductwork. The system controller displays a “Low Airflow” or a "High Airflow" alarm when the measured air velocity is outside the established range (too high or too low). The system controller is programmed to recognize an "Air Velocity" alarm condition as a *Non-Critical* alarm. This alerts the operator of the alarm condition but allows the Humidifier(s) to continue operating.

2.6.7 Air Proving Switch

The controller is equipped with terminal positions for the connection of an optional Air Proving Switch for use as a safety feature. The switch contacts close when there is sufficient airflow in the ductwork. The contacts open upon loss of Airflow, triggering an alarm. The controller displays a “Loss of Airflow” alarm when this occurs. Additionally, the system controller is programmed to provide a “Summary Alarm” indication. The system controller is programmed to recognize a “Loss of Airflow” alarm condition as a “*Critical Alarm*” and shut the Humidifier(s) down. The system will automatically resume operation when airflow is restored.

2.6.8 Water Leak Detector

The controller is equipped with terminal positions for the connection of optional Water Leak Detector(s). The water leak detector(s) may be a spot or cable (20 ft.) type sensor. The system controller is programmed to recognize a "Water Leak" alarm condition as a *critical alarm*. Upon sensing a water leak, the system controller shuts down Humidifier operations and displays a “Water" alarm message. It remains shut down until the cause has been determined and corrected. Once corrected, the alarm can be reset.

2.6.9 Remote On/Off

If the controller is configured for the Remote On/Off option, terminal positions are provided to connect a remotely located, On/Off switching control device. If the Humidifier is turned on and the Ultra-Series controller receives a remote input signal to turn it off, the controller disables all controller outputs and provides a status message "Off by Remote Shutdown". The humidification system is automatically re-enabled when the remote On/Off signal calls for the unit to turn back on.

2.6.10 Multiple Humidifier Grouping

The Ultra-Series controller can be configured to operate two individual groups of Humidifiers (Figure 5) via a common Modbus.

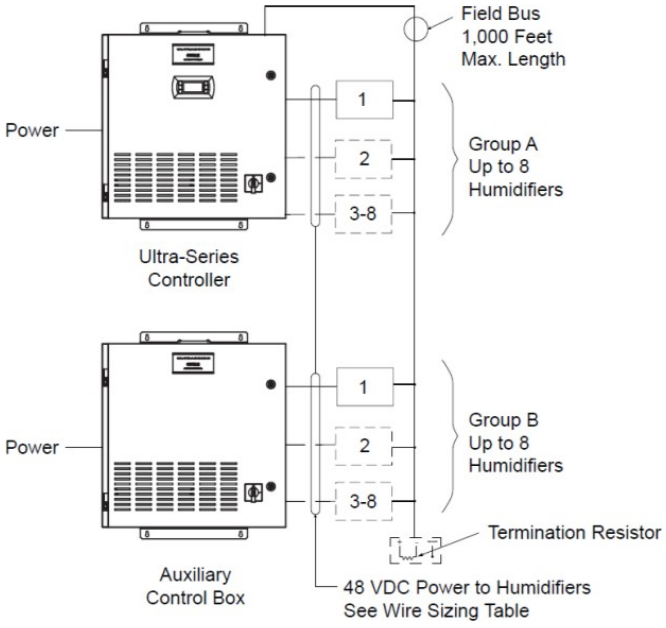


Figure 5 - Multiple Humidifier Groups

The 2 groups can be configured with duty assignments: Rotating, Capacity-Assist, and Bank Select.

2.6.11 Group Rotation

In Rotating mode, controller will rotate duty between the Humidifier groups to promote equal run time. The rotation time period is typically 1 week, however it may be set by the user via the Factory menu. Call STULZ Product Support for assistance when accessing the Factory menu.

2.6.12 Capacity Assist

In Capacity Assist mode, the system can be used to maximize efficiency for conservation of energy and to allow more precise control of humidity production during periods of low demand. The Capacity-Assist option enables one group of Humidifiers to proportionally handle the demand for humidification up to their maximum capacity. If the output of the first group of Humidifiers reaches 100% capacity and they are unable to satisfy the demand, the controller enables the second group of Humidifiers to operate, controlling their output proportionally while the first group continues to operate at 100% capacity. As humidity conditions approach set point, the controller scales back the proportional output control signal to the second group accordingly until they

second group are turned off and the Humidifiers in the first group return to proportional control.
Rotation of which group is the lead group occurs as in the Rotate mode.

2.6.13 Bank Select

Bank select is controlled by a digital input from an external source. It selects which group will operate. The other group does not assist. If customer provided, the bank select control contacts must be sized appropriately. The contacts must have a minimal rating of 24 VAC.

2.6.14 Proportional Humidifier/Duct Limitation

The Proportional Limitation option limits humidity production of a group of Humidifiers based on humidity or dew point to prevent condensation from forming on cold surfaces. For example, Humidifiers that may be positioned near the ceiling or floor of an AHU, where condensation may occur, can be configured as a group with a threshold applied to limit humidity production. In this case, the limited Humidifiers will be in Group A (see Figure 6) and limited by the Limit Sensors. Group A would be selected to be limited. The Humidifiers in Group A and B operate up to their full rated output capacity based on the demand for humidification.

As the user selected limit humidity or limit dew point temperature limit set point is reached, the Humidifiers in Group A start scaling output back humidity output proportionally until it is zero output. Limitation can be set for either Group but based on only one limit sensor. The enables for Proportional limitation are set in the Service Option Loop>Startup Menu.

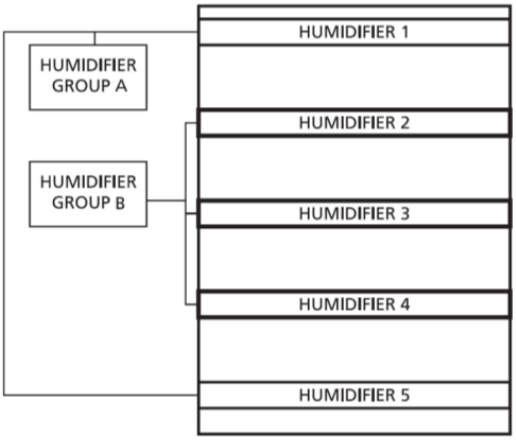


Figure 6- Humidifier Grouping

2.6.15 BMS Operation

The Ultra-Series controller may be equipped with a serial communication port (Figure 7) that can be interfaced to a Building Management System (BMS) via Modbus, BACnet, SNMP or HTTP protocol as configured by the factory. A controller interfaced to a network must be configured for BMS communication.

Multiple Humidifier controllers can be connected to a BMS or central control terminal allowing the communication of data and information to the BMS. Instead of sensors, control signals from an Ethernet interface may be used to mimic sensors used by the Ultra-Series controller to manage humidity levels. The controller develops and transmits control output signal(s) to the Humidifiers based on those input signals.

Modbus RTU

BACnet IP, BACnet Ethernet HTTP, SNMP & Modbus IP

BACnet MS/TP

Figure 7 - Serial Interface Ports

Each controller added to the network must be configured for BMS communication and assigned an address.

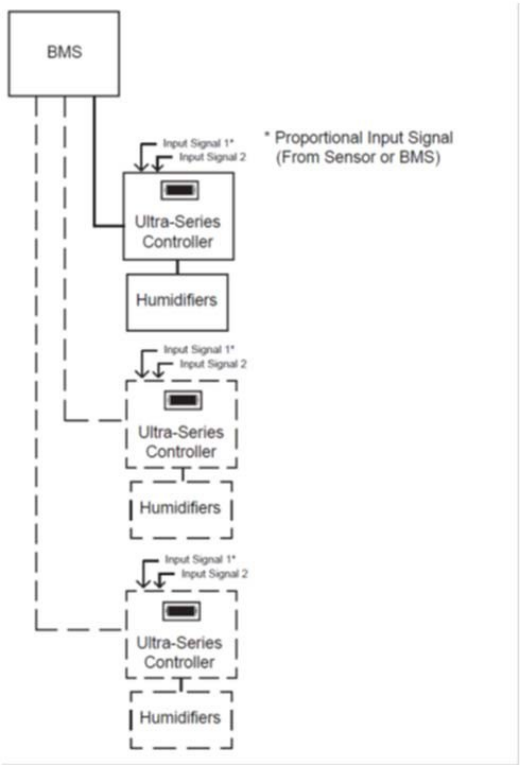


Figure 8 - Supervisory Control of Humidifiers

3 INSTALLATION

3.1 Uncrating and Inspection

The controller has been tested and inspected prior to shipment. Perform a visual inspection of the packaging immediately upon delivery to ensure the equipment has been delivered in excellent condition. If there is visible shipping damage, it must be noted on the freight carrier's delivery forms BEFORE signing for the equipment. Any freight claims MUST be done through the freight carrier.

STULZ ships all equipment FOB factory. STULZ can assist in the claim filing process with the freight carrier.

Carefully remove all protective packaging, open the controller access door and thoroughly inspect for any signs of transit-incurred damage. Should any such damage be present, notify STULZ prior to attempting any repairs. Refer to the last section of this manual for instructions.

NOTE: The controller should always be stored indoors in a dry location prior to installation. A Data Package has been sent with the unit. It contains this manual, an IOM for the Humidifier, system drawings and any other applicable instructions based on the configuration and options furnished with the unit. These documents should be kept with the unit for reference.

NOTE: Shipped loose items such as sensors are shipped separately unless specified otherwise by the customer. Remove and store these items in a safe place unless they are being installed immediately.

3.2 Mounting

The control box is designed for indoor installation only.

Mount the control box within 10 feet of the supply water source for the STULZ supplied water conductivity probe to reach. Avoid installing the controller in locations where ambient temperatures are above 90°F or where the relative humidity is above 90%.

Do not install the controller where it will be subjected to strong vibrations or bumps. Avoid mounting in areas exposed to direct sunlight or with wide and rapid temperature fluctuations. The control box may be mounted to an equipment rack, a wall or a flat surface. Secure the enclosure through the 4 mounting holes taking care not to damage the internal components.

Ensure the mounting surface is capable of supporting the total weight of the unit. Ensure that the areas around the enclosure vents are free of obstructions that may impede Airflow.

CAUTION

When the unit is operating, the enclosure vent openings must be completely free of obstructions.

3.3 Wiring Connections

The controller is provided with terminals for all required field-wiring connections. Refer to Figure 3 for the location of the interconnect terminals and see the electrical drawing(s) supplied with the unit for all field wired power and control connections. It is important to identify the options that were purchased with the unit in order to assure which field connections are required.

WARNING

Verify power is turned off before making connections to the equipment.

3.3.1 AC Input

It is important that the controller nameplate be examined to determine the operating voltage, frequency and phase of the system. The supply voltage measured at the unit must be within ±10% of the voltage specified on the system nameplate. The unit nameplate is located inside the controller enclosure.

The nameplate also provides the full load amps (FLA), the current that the unit will draw under full design load, the maximum fuse size for circuit protection, and the minimum circuit ampacity (MCA) for wire sizing.

When the main power wires are connected, the electric box has power to the main power non-fused service switch.

A separate equipment ground lug is provided within the electrical box for termination of an earth ground wire.

3.3.2 DC Output to Humidifier(s)

Consult the wire sizing table in the Humidifier IOM to determine the correct wire gauge, by Humidifier model, for the length of wire to be run. Insufficient wire gauge will result in excessive voltage drop between the controller and Humidifier(s). Distances over 75 feet are not recommended. STULZ recommends the use THHN or NTW, stranded conductor (not solid conductor) wire.

3.3.3 Control Wiring to Humidifiers

CAT 5e cable, with RJ45 connector terminations; connect the controller to the Humidifier(s) in a daisy chain fashion (See Figure 5). Do not exceed 1,000 feet in total length. Ensure the termination resistor (shipped

loose) is plugged on the last Humidifier in the string as shown in the electrical drawing(s). Older systems use shielded 3 conductor cable. Ask STULZ Product Support for instructions on wiring these systems.

EIA/TIA-568B wiring Standard shall be used. Figure 9 is the pin side of the connector (tab on the other side).

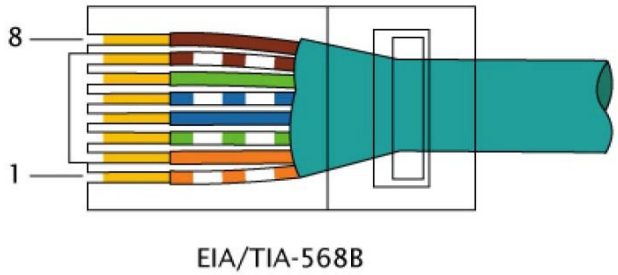


Figure 9 - RJ45 Connector

A Jack is mounted in the control box to connect to the humidifiers. The wires marked Shield are not connected to the humidifiers but passes through all units as a generic shield. It is connected to chassis ground in the Control Box.

Pin	Color	Name
1	Orange/White	DC Ground
2	Orange	DC Ground
3	Green/White	RS-485 +
4	Blue	RS-485-
5	Blue/White	RS-485+
6	Green	RS-485-
7	Brown/White	Shield
8	Brown	Shield

3.3.4 Sensors

The Ultra-Series control box is equipped with a terminal block for the connection of a humidity sensor and/or an optional temperature/humidity or dew point sensor. A sensor/transmitter is required regardless of the control mode selected. If provided by STULZ, sensors and transmitters are shipped loose for installation by the customer. Interconnecting field wiring should be installed in accordance with NFPA 70 of the National Electrical Code (N.E.C.). The wiring connections for sensors must be made using shielded cable with a minimum AWG 22 (0.5 mm^2 cross section) for each lead. Trim the length of the sensor cables where possible to minimize wire resistance and avoid wrapping the cable around power devices.

A remote sensor must be located so that it will properly sense the conditions to be controlled. Refer to Sections 3.3.4.1 or 3.3.4.2 when mounting sensor(s). Refer to Figure 3 for the location of the controller interface terminals and to the electrical drawing for wiring details.

NOTE: All wiring should conform to local and national electrical code requirements. Use of copper conductors only is required. Wiring terminations may become loose during transportation of the equipment. Therefore, it is required to verify that all wiring terminations are secure.

3.3.4.1 Room Temperature/Humidity Sensors

Mount a room control sensor/transmitter in the center of the room where air circulation is good. The sensor should not be mounted near a doorway or an area where it would be exposed to direct sunlight. Wall-mounted control devices should typically be mounted 4-5 feet up from the floor in the conditioned space. Care should be taken not to install the sensor in an area with excessive changes in humidity and temperature.

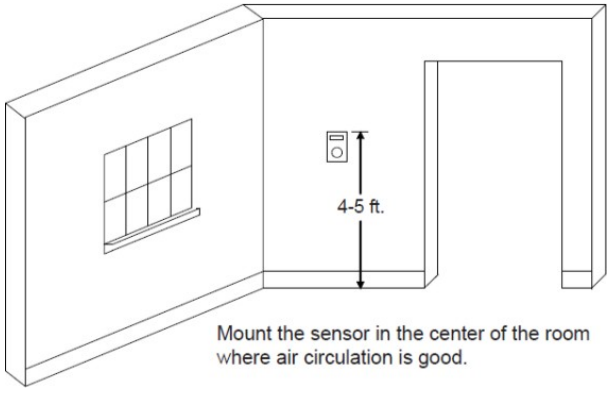


Figure 10 - Locating Wall Mount Sensor

Make the wiring connections to the controller interface terminal block as shown in the electrical drawing(s).

CAUTION

Do not damage the exposed temperature/humidity sensors on the PC board while screwing in the cover fastening screw. The circuitry can be damaged if handled improperly.

3.3.4.2 Duct Mounted Sensors

Cut a hole in the side of the duct and mount the sensor, (temperature, humidity and or air velocity) to the duct using the screws provided. Position the supply air sensors approximately 10 feet down stream of the Humidifier outlet. Each supply air sensor is to be field connected to the controller at the terminal positions designated in the electrical drawing.

3.3.5 Water Conductivity Probe

The Ultra-Series control box monitors water quality via a probe (sensor) shipped loose. It is to be field installed in the demineralized water supply piping to sense water quality entering the Humidifier. The length of control cable provided is 10 feet long. Do not cut the control cable or add to its length because a change in wire resistance will affect the sensor's calibration.

Because the conductivity circuit is sensitive to electromagnetic interference, the control cable should not be run near high voltage wires. Connect the leads from the conductivity sensor to the designated terminal positions in the controller as shown in the electrical drawing.

3.3.6 Remote On/Off

A remote on/off control device may be an On/Off switch, thermostat or a humidistat. If customer provided, the remote On/Off control contacts must be sized appropriately. The Remote On/Off contacts must have a minimal rating of 24 VAC. Refer to the electrical drawing(s) included with the unit for wiring details.

3.3.7 Remote Alarm Signal Contacts

The Summary Alarm and Custom (user configured) Alarm(s) have dry contact relay interface terminals inside the controller. The customer may connect a 2 conductor, alarm signal cable to each relay for remote annunciation of alarm conditions. The alarm contact positions are NO/C/NC, rated at 250VAC / 8 Amps.

3.3.8 Water Leak Detector

Optional remote water detector(s) are normally placed on the floor or in a customer supplied drain pan located beneath the Humidifier(s). The detector(s) may be secured using double sided tape or cable ties with mounting pads. Prepare the surface before applying the tape. Apply tape to the bottom of the detector and secure it in place.

4 OPERATION

4.1 General Theory of Operation

This Ultra-Series controller is designed to control the output of an ultrasonic humidification system in a space or process application to humidity levels as defined by the user. Humidified air is supplied to the conditioned space as needed to maintain the relative humidity or dew point control set point. The controller may also be networked with a group of Humidifiers to manage their outputs as a system.

The controller has the inputs and outputs depicted in Figure 11:

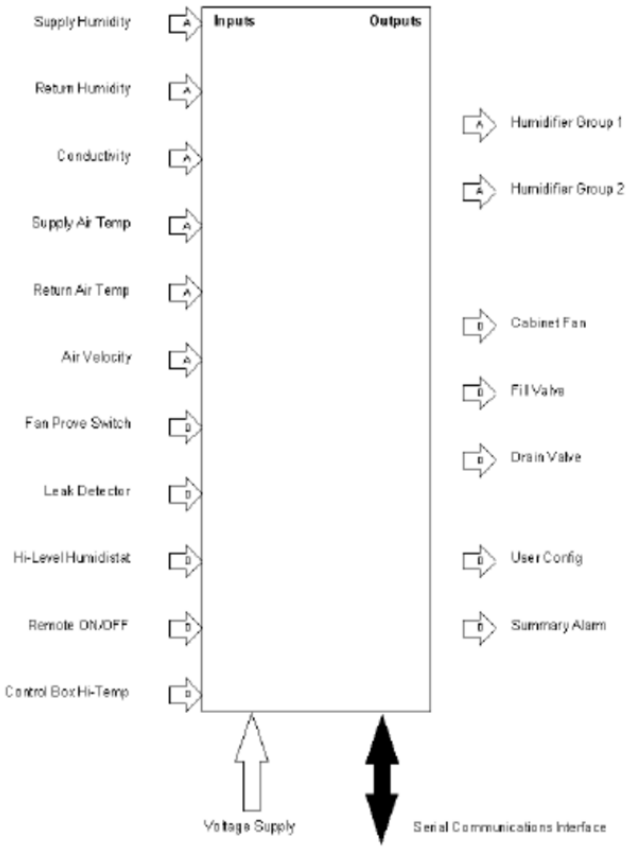


Figure 11 - Control Inputs and Outputs

4.1.1 Humidification Control

The method of operation depends on the controller's programmed operating mode. Control takes place by means of the controller analyzing signal inputs from sensor(s) and/or from an external supervising controller or Building Management System (BMS).

4.1.2 Humidity Control

The controller responds to relative humidity sensor signal input(s) to manage humidity production against a relative humidity control set point.

4.1.3 Dew Point Control

The controller calculates dew point based on signal inputs from temperature and humidity sensor(s) to manage humidity production against a dew point control set point.

4.1.4 Proportional Control

The controller uses an external input signal representing 0 to 100% output to control humidity production.

4.1.5 Operating Modes

There are 6 operating modes for the controller depending on how many and what types of inputs are used. The operating mode has been pre-set by the factory and should not require adjustment. BMS Signal indicates the input is sourced by the serial BMS interface. Sensor indicates the input is a physical signal and may originate from a sensor or a voltage/current generated by another control system.

Mode	Input 1 (Control)	Input 2 (Limit)	Function
1	BMS Signal	None	Room Control
2	Control Sensor	None	
3	BMS Signal	BMS Signal	Return duct monitoring with proportional high limit
4	Control Sensor	Limit Sensor	
5	BMS Signal	Limit Sensor	
6	Control Sensor	BMS Signal	

4.1.6 Room Control

The controller may be configured for room installations with only one control input. In room installations the controller maybe configured to manage humidity production based on a control signal from a return air humidity sensor or optionally from a relative humidity and temperature sensor for dew point control or, a signal from an external controller or BMS can be used (Modes 1 & 2).

4.1.7 Return Air Duct Monitoring (DAH Units)

When used for duct installed, DAH Humidifiers in air handling units, two inputs may be utilized. Input 1 is the control for the humidity in the return air duct and input 2 as a proportional high limit signal downstream of the Humidifier. The inputs may be from a BMS/external controller and/or remote sensors (Modes 3 - 6).

4.1.8 P/I- Proportional/Integral Control

The controller calculates proportional control output signal(s) based on the analysis of sensor input signals, which determines the amount of humidification needed (see Figure 12).

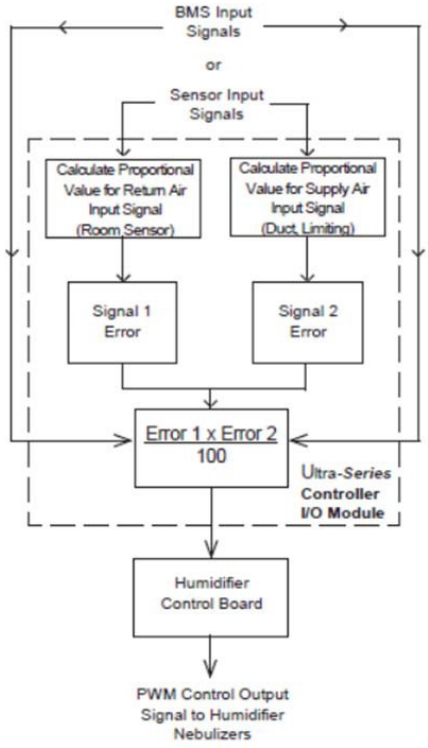


Figure 12 - Control Logic

Signal 1 represents the return air humidity and is calculated by the controller as a percentage value compared to the maximum control set point value for input 1, taking into account the prop band. Signal 1 is compared to the maximum control set point value for input 1 resulting in a control value that will be proportional to signal 1. Signal 2 represents the limit humidity and is calculated as a percentage value for input 2 taking into account the prop band.

Signal 2 is compared to the maximum control set point value for input 2 resulting in a control value that will be proportional to signal 2. The control output signal to the Humidifier(s) will be directly proportional to the combined input signals by the following process:

$$\frac{\text{Signal 1 x Signal 2}}{100}$$

If input 2 is not used, the controller only works with reference to signal 1. The effect of integral on the control signal (Signal 1) has been neglected from the above calculation for simplification. With integral control, the added element of time is factored into the Humidifier output algorithm.

The integral value is used to gradually adjust the proportional output when the calculated output does not move the process variable closer to set point in a given period of time. Decreasing the integral value decreases the interval for the output corrections (speeding the rate of adjustment).

Increasing the integral value increases the interval for corrections (slowing the rate of adjustment). The P/I control factors are hard coded in the controller and cannot be user adjusted.

4.2 Navigating Controller Screens

4.2.1 Menu Selection

The Ultra-Series controller provides five user selectable menus needed to view operating data and enter set points for the system (see Figure 13). These menus may be accessed by pressing the Program ***(Prg)*** key to reveal the Main Menu screens. Scroll between adjacent menu selections within the Main Menu by use of the Up (↑) and Down (↓) arrow keys.

When the desired menu is centered in the screen with bold capital letters and an arrow symbol pointing towards the Enter ↵) key, press the Enter (↵) key to access that menu loop. The user can access the menu loop screens located within the designated menu selection using the Up (↑) and Down (↓) arrow keys. Access to some menus may be protected by a built in security protocol and may require the use of a password to gain access (see Section 4.3).

4.2.2 Menu Loops

Press the Program ***(Prg)*** key from any screen to select from among the five menu loops shown in Figure 13.

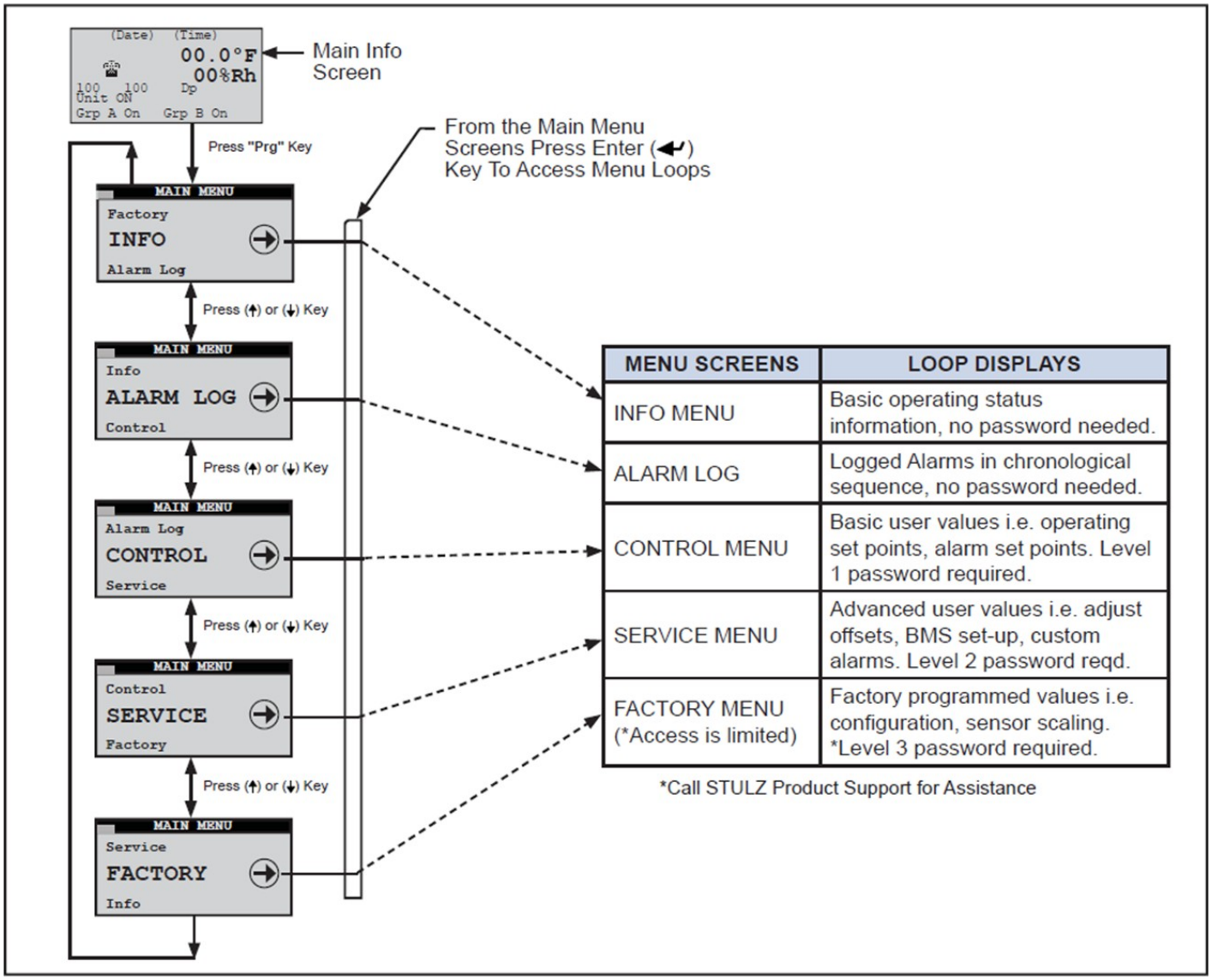


Figure 13 - Main Menu Selections

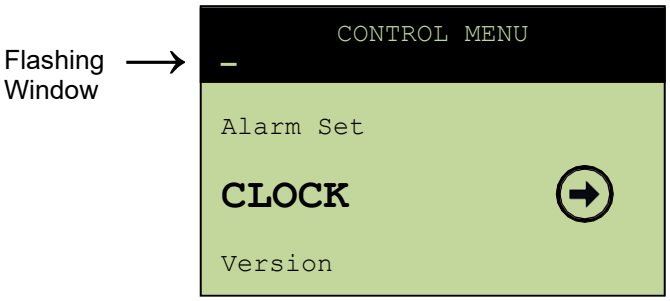
4.2.3 Display Variables

The user interface display panel provides screens with three (3) different forms of both the read only and the modifiable variables:

- **Numbers** are displayed as positive (+) or negative (-) integers.
- **Dual-State** can be toggled between two (2) values i.e. On/Off, Yes/No.
- **Word Variables** have a unique text message for each of the variable's possible choices.

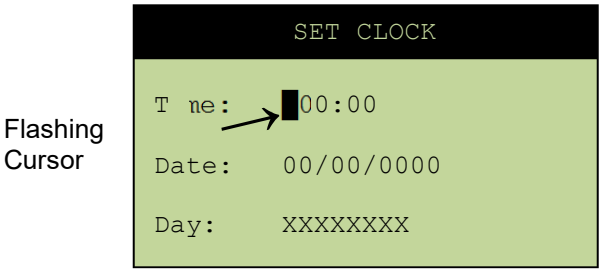
4.2.4 Cursor Position in Screens

The following display screen is shown as an example after accessing a new menu loop display screen using the function keys. The name of the menu loop is the line in the upper-most field of the screen. A flashing window also appears in the left of the uppermost field.



From this position the Up (↑) and Down (↓) arrow keys may be used to access additional selections within the current display menu.

Each screen supports a specific functional requirement. Pressing the Enter (↵) key allows access to the selected display screens to adjust any of the modifiable fields. If a screen with modifiable values is accessed, Use the Enter key to insert a flashing cursor in the modifiable fields within that screen.



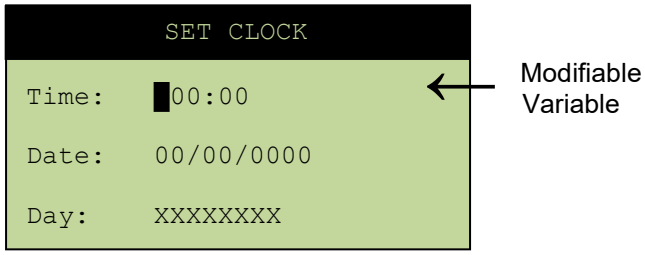
If the flashing cursor is located in a modifiable field, the value of the field will be changed with the use of the Up (↑) and Down (↓) arrow keys. When the Enter (↵) key is pressed the cursor moves to the next modifiable field.

After entering the last modifiable field within a screen, pressing the Enter key removes the cursor and the flashing window reappears in the left-hand corner of the upper-most field of the current screen. From here advancement to the next adjacent menu loop screen will occur when the Up or Down key is pressed. Successive use of the Enter key will advance the cursor through the various modifiable fields of the display screen eventually returning to the first field.

Values that are already correct may simply be skipped by using the Enter (↵) key without modification of the variable. The current value, if not changed, will be retained after pressing the Enter (↵) key**.** Values for fields being adjusted will automatically wrap when adjusted beyond the high or low limit established for that field.

Whenever the flashing cursor is located in a modifiable field, pressing the Escape **(*Esc*)** key one time returns the user to the next menu up. Each successive use of the Escape key returns to the next menu level up until the Main screen is reached.

4.2.5 Modifiable Variables



For the purpose of this manual the examples of user modifiable variables within display screens will be denoted by **bold text**. (Note the actual display may not use bold text.) Pressing the Enter (↵) key accepts the value displayed and advances the cursor to the next modifiable field. The Up (↑) or Down (↓) key may be used to modify the values of these fields.

If the modifiable field is a positive (+) number, the positive value is indicated by the absence of a (+) or (-) symbol in front of it. The (-) negative symbol will be displayed to the left of the first digit for negative numbers.

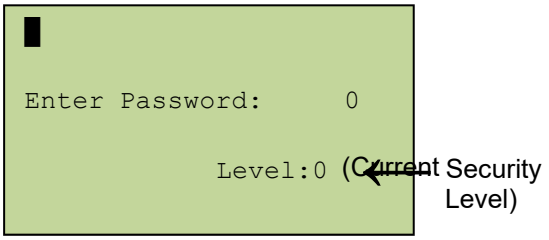
4.3 Password Authorization

Access to a menu loop may be requested from the main menu. Modifiable control screens have variables that affect system performance. Improper settings may result in erratic operation and possible system failure or damage. Anyone is allowed direct access to the **Info** and **Alarm log** display menus with no security password.

Only authorized personnel who possess a thorough understanding of the system operation should perform modifications to secured menu settings (Control, Service and Factory). These menus are configured with password protection, thus requiring a higher level of authority to access them. The screens must have accurate variables entered otherwise erratic operation may occur.

4.3.1 Password Protected Screens

Upon first attempting to select a secure menu in a given session, the **"Enter Password"** screen will be displayed. This screen displays the current security level authorized.



Enter Password Screen

A session is defined as from the time access is gained to a secure menu until 60 seconds elapses with no key activity. Security access will be terminated at this point and the password will have to be reentered to gain access. The menus that may be password protected by the user are the Control and Service menus. The Factory level menu screens are also password protected, however the password is set at the factory to limit access.

It is intended that access to the Factory menu screens only be established while the user is working with the guidance of STULZ Product Support (see Section 9.0). Incorrect settings made at the Factory level could unintentionally damage the equipment.

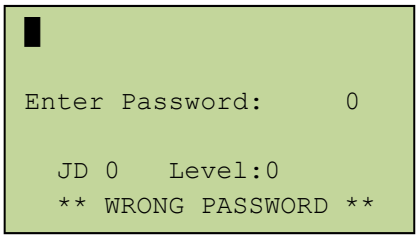
Operators, who are allowed access to the Service menu (level 2) for example, must know the password to enter that level. If the entered password equals or exceeds the level requested during a given session, the operator is allowed to access the requested loop.

For example, if the entered password allows access to level 2 and the Control menu (level 1) is requested, access will be allowed. If the entered password authority level is lower than the level requested, the words **"WRONG**

PASSWORD" will appear for several seconds at the bottom of the screen.

4.3.2 Wrong Password

The "**WRONG PASSWORD**" message is displayed any time an incorrect password has been entered and the Enter key has been pressed. If the "Wrong Password" message appears, use of the Enter key will return the operator to the "**Enter Password**" field.



A requested menu screen is displayed any time a valid password has been entered and the Enter ( ) key has been pressed.

NOTE: If the **Control** menu is requested and the **Service** menu password is entered, access to both is granted.

4.3.3 Setting the Passwords

The initial password for the Control menu (Level 1) and Service menu (Level 2) are factory set. Upon entering the Service menu, the operator is allowed to change the passwords for the menus (see Section 5.5.32). If changed, from that point on access may only be gained to that menu by personnel who know the password.

MENU	PASSWORD
Control	1
Service	2
Factory	Consult STULZ Product Support

4.4 Start-up / Commissioning

CAUTION ⚠

Ensure all system hook-ups to the Humidifier(s) have been completed and that DI water is available.

1. Turn the On/Off door switch to "On". Upon application of control power, the interface display panel function keys illuminate and the controller begins conducting internal diagnostics to confirm functionality. After about 30 seconds the controller will display the Main Info screen (see Section 4.4.1).

2. If the controller is configured for "Automatic On" operation (standard), it calculates the percentage humidification for each Group of Humidifiers and sends that information to the Humidifiers over the RS-485 Modbus interface.

3. If the status message "**OFF- Manual Restart Req**" appears, the Automatic On feature may not be enabled. In this case turn the Humidifier on by pressing the Enter (↵) key for 1 to 2 seconds until the unit switches state.

NOTE: The Humidifier may be turned off at any time by pressing and holding the Enter (↵) key for 3 seconds. Other status messages that may appear at the bottom of the screen are:

"OFF by remote shutdown"- Indicates the Remote Start/Stop feature is enabled and requires a remote start switch to be turned on.

"OFF by Network"- Indicates the BMS communication feature is enabled and the controller received a network signal to pause operation.

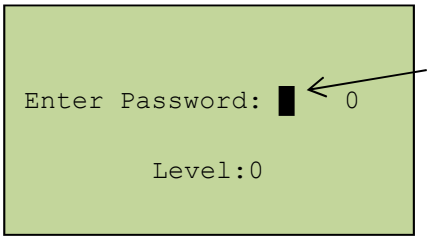
4. If the actual room humidity is below the set point minus dead band, the Humidifier(s) will operate. The controller automatically enables the control outputs and records the date and time in the alarm history log. An animated icon (shown below) appears in the display indicating the Humidifier is operating.

 = Humidifying

5. If the Humidifiers don't operate, operation may be started by creating a demand for humidification. If direct BMS control is used, generate a demand with the BMS proportional input and skip to step 11. Otherwise generate a demand using the Control menu loop (see steps 6- 10).

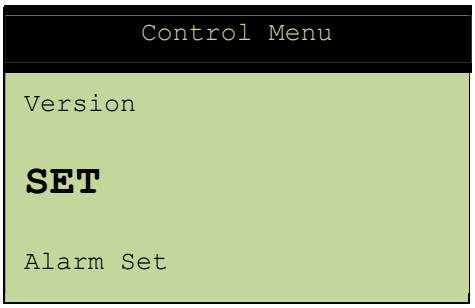
6. From the Main screen, access the Main Menu (see Section 5.1) by pressing the program **(Prg)** key.

7. Scroll through the Main Menu selections with the Up (↑) and Down (↓) arrow keys and select the Control menu by pressing the Enter (←) key when "**CONTROL** " appears in bold letters in the center of the screen. A password entry screen will be displayed.



8. To access the Control menu, press the Enter (↵) key to insert a flashing cursor in the "Enter Password" field. Change the "0" to "1" (or to the current Control menu password if it was changed in the Service menu) with the Up (↑) arrow key and then press the Enter (↵) key to accept the password. Press the Enter (↵) key again to access the Control menu screens.

9. From the Control menu, select set points by scrolling through the menu selections with the Up (↑) and Down (↓) arrow keys and pressing the Enter (↵) key when "**SET** " appears in bold capital letters in the center of the screen.



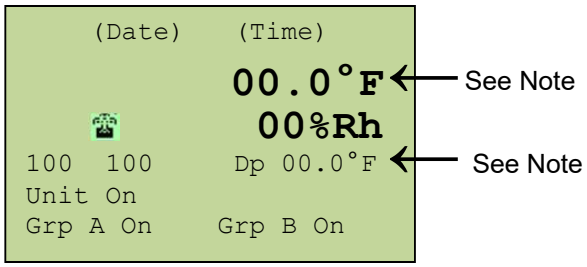
10. After entering the set points screens, select the Humidity set point screen by scrolling through the menu selections with the Up (↑) and Down (↓) arrow keys (see Section 5.4.1). Press the Enter (↵) key to move the cursor over to the set point value. Increase the Humidity set point with the **"UP"** arrow key until the humidity set point exceeds the actual room humidity. Press the Enter key again to accept the set point. Press the Escape key twice to exit the set points screens and return to the Main Menu screen.

11. Listen for the ultrasonic Humidifier transducers to energize or visually check for humidity leaving the Humidifier(s) to confirm that they are operational.

12. Observe the animated icon in the Main screen to determine if the unit is operating.

13. One to six hours may be required to see a desired level or rise of humidity in the conditioned space. Once room conditions have been programmed or set, a repeat visit to the conditioned site may be required to ensure the Humidifier is meeting the room's requirements.

4.4.1 Main Info Screen



The main information screen is displayed approximately 30 seconds after power is applied to the unit. The main screen is a status screen displaying current system operating information. See Section 5.2.1 for details on the fields in this screen.

NOTE: The relative humidity (**%Rh**) is always displayed but the current temperature (**°F**) and dew point (**DP**) appear only if an optional temperature or dew point sensor is provided. Operator interface to the menu loops is available by pressing the "***Prg***" key. The controller initiates a timer whenever a key sequence is initiated. Every time a button is pressed, the timer is reset. If there is no key activity for two minutes, the controller will return to the Main Info screen. The time delay is preset at the factory.

4.4.2 Saving & Restoring Set points

Upon initial start-up the system operates using the set points programmed by the factory (Factory Parameters) as the operating set points. As described in Section 4.4, steps
6 - 10, the customer may enter new operating parameters in the Control the new set points in the Service menu if it is intended to save them (Section 5.5.29). Once stored, the set points now become the restorable Customer Parameters. The Factory set points entered by the factory still remain stored in the controllers' memory as the Factory Parameters.

At any time, set points for the system may be re-adjusted to any value and the system will operate accordingly. If it becomes necessary however, the customer may enter the Service menu and restore the set points to the stored Customer Parameters values. The original Factory

Parameter values may also be restored from the Service menu. Whichever set points are restored (Factory or Customer); they become the current operating set points.

4.5 Controller Features

4.5.1 Alarms

As programmed into the system controller, an alarm condition activates the summary alarm logic which illuminates the alarm key and energizes an audible alarm (if that option is selected). A message detailing the alarm condition is displayed by pressing the alarm () key. Some alarms are programmed by the factory to automatically shut down the Humidifier until the alarm condition is remedied and the alarm is cleared by pressing the alarm key. Alarms that may be enabled by the factory are listed in Section 5.3.

4.5.2 Summary Alarm

A summary alarm will activate when the controller senses any programmed alarm condition. This illuminates the alarm key and activates an audible alarm. A summary alarm also energizes Normally Open/Normally Closed summary alarm contacts to remotely monitor alarms. If a *Critical alarm* condition is detected, a summary alarm will be accompanied by Humidifier shutdown.

4.5.3 Custom Alarms

A Custom Alarm (user configured) is activated upon detection of one or more individual alarm conditions as selected by the operator in the Service>Options>Custom menu loop (see Section 5.5.23). When a custom alarm condition is detected, the alarm key illuminates and a designated set of N.O. & N.C. Custom Alarm relay contacts are energized to provide remote indication of the selected alarm condition(s).

For example, you may want a remote notification when a High Conductivity pre-alarm is detected, giving notice that the mineral content of the supply water is approaching an unsafe level. This gives an alert before the mineral content of the water reaches the high conductivity threshold and the Humidifier is shut down.

The controller may be factory configured to activate up to four Custom Alarms. One user configurable Custom Alarm with relay contacts is provided as a standard and up to three additional may be provided as an option.

4.5.4 Customer Alarms

A customer provided digital (on/off switching) alarm sensor may be connected to the terminals provided in the electric box. This may be for any site specific alarm condition the user wishes to monitor that may or may not be provided in the standard alarm menu; i.e. gas detection, intrusion alarm, etc. Upon detection of a customer alarm, the alarm key illuminates and the alarm display screen provides a message indicating a customer alarm message. The screen message "**Customer Alarm 1**" will appear (default) in the controller display or the user

may re-configure the controller to display any alpha-numeric message desired, up to 20 characters long, in the Service>Options>Custom Setup menu loop (see Section 0). One Customer alarm input is provided as a standard and up to two additional customer alarm inputs may be enabled as an option.

4.5.5 Air Flow Proving (DAH option)

When the Airflow proving switch detects an insufficient air flow condition, the system controller will display a "Loss of Air Flow" alarm and shut down the Humidifier(s). When the Airflow problem is corrected and the alarm is re-set, the Humidifier(s) will automatically resume operation.

4.5.6 Air Velocity Monitoring (DAH option)

The Humidifier outlet air velocity may be monitored by a sensor. If enabled, the controller provides a display screen with the current air velocity. An air velocity alarm will be triggered if the velocity falls outside a selectable minimum and maximum range.

4.5.7 Low Temperature Limiting (Optional)

The Humidifier return air temperature may be monitored by a sensor. As the low air temperature threshold is approached, the controller linearly limits the humidification signal. If the return air temperature drops below a selectable threshold temperature, a low temperature alarm will be signaled. The controller is programmed to shut down the Humidifier and drain the reservoir upon sensing a low temperature alarm to prevent damage due to freezing.

4.5.8 Cabinet Temperature Monitoring

A digital output signal from the controller turns on a cooling fan located inside the control cabinet when the internal temperature rises to a threshold plus dead band. If the enclosure temperature continues to rise, the controller activates a high temperature alarm and stops Humidifier operation. The "Fan On" set point and "High Cabinet Temperature Alarm" threshold are adjustable in the Control>Alarm Set menu loop (see Section 5.4.2).

4.5.9 Water Conductivity Monitoring

A sensor installed in the water supply piping permits monitoring the water conductivity as a measure of determining when the mineral content is too high. This will ensure clean, mineral free mist production. The supply water quality specified for STULZ Ultrasonic

Humidifiers during normal operation should not exceed 5 microSeimens. The controller will provide a pre-alarm message if this water conductivity rises above 5 microSeimens for more than 5 minutes. If water conductivity rises above 20 microSeimens for more than 5 minutes, the controller will shut down the Humidifier(s) and provide a full alarm text message and indicate a summary alarm condition, energizing the N.O./N.C. summary alarm contacts, and optional audible alarm.

4.5.10 Water Leak Detection (Optional)

The Humidifier controller may monitor water leaks via optional water detector(s). Refer to Section 2.6.6. Upon sensing a water leak, the controller activates the summary alarm logic and displays a "Water" alarm message. The controller recognizes a water alarm as a Critical Alarm and shuts down Humidifier operation.

4.5.11 Remote On/Off

For Remote On/Off operation, terminal positions are provided to connect a remotely located, On/Off switching control device. If the Humidifier is turned on and the Ultra series controller receives a remote input signal to turn off the Humidifier, the controller disables all control outputs and a message "Off by Remote Shutdown" appears in the main display screen. The system will automatically be re-enabled when the remote On/Off signal calls for the Humidifier unit to turn back on.

The control device may be an On/Off switch, thermostat or a humidistat. If customer provided, the remote On/Off control contacts must be sized appropriately. The Remote On/Off contacts must have a minimal rating of 24 VAC.

Refer to the electrical drawing included with the unit for the electrical specifications and for wiring details.

4.5.12 Automatic Drain Cycle

The controller is configured to activate a drain cycle of the Humidifier reservoir(s) during periods of inactivity. This ensures a fresh supply of water in the reservoir. If the total demand for humidity production has been below 10% for the time interval for the drain cycle is programmed (Default of 72 hours, the humidifiers will be commanded to drain.

The idle time and drain duration may be adjusted in the Service menu (see Section 5.5.3). When a drain cycle is initiated due to the idle time elapsing, the following occurs:

1. Humidification stops.
2. The drain valve is energized open.
3. At the end of the drain duration time, the drain valve closes.
4. When a demand is present, the fill valve opens and humidification returns to normal.

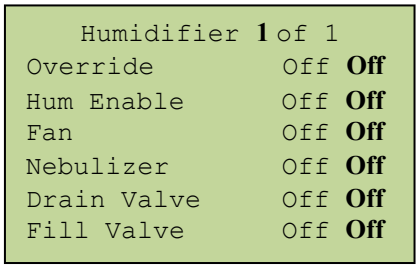
The water reservoir is emptied entirely during the auto drain cycle. If there is a demand for humidification, the drain cycle is interrupted. The drain valve closes and the fill valve opens. When the water level in the reservoir is

at an appropriate level, the unit begins producing humidity.

4.5.13 Manual Drain

The operator may manually drain the reservoir of an individual Humidifier by energizing its drain solenoid valve. This is accomplished with the controller by accessing the Manual Control screen from the Service>Humid menu loop (see Section 5.5.16).

From this screen the controller operation may be bypassed to turn certain features On or Off. The left hand column displays the current On/Off control command for the indicated feature; the right hand column is the modifiable field to change to the control state the feature.



1. Select the Humidifier desired to manually drain in the uppermost field with the Up/Down arrow keys. Press Enter.
2. Change the "**Override**" field from "**Off**" to "**On**". Press Enter repeatedly until the "**Drain Valve**" field is reached.
3. Change the "**Drain Valve**" field from "**Off**" to "**On**". Press Enter. (Water will begin to drain).
4. Allow the water to drain from the reservoir.
5. Return to the Manual Control screen in the Service>Humid menu loop. Change the "**Drain Valve**" field from "**On**" to "**Off**". Press Enter.
6. Change the "**Override**" field from "**On**" to "**Off**". Press Enter (←), and then press ***Esc***. The Humidifier returns to normal operation.

4.5.14 Communication with the Controller

It is possible for the controller to communicate in a variety of ways.

4.5.15 Serial Communication

Using an optional expansion card, the controller may be connected to a BMS for monitoring and control of data points using a choice of available serial communication protocols (see Section 5.5.7). The use of the serial communications allows direct control of the Eultra system. In this method of control, the humidification output level of the Humidifiers is controlled by the BMS by writing to variables in the controller.

Inputs and outputs are remotely monitored (address readable) and remotely controlled (address writable) via a BMS control system that communicates with the controller via Modbus RTU, BACnet MS/TP or IP based protocols such as BACnet over IP, HTTP, or SNMP protocols. Each E-Ultra Controller added to the network must be configured for BMS communication.

4.5.16 Analog Control

The output of the unit may be controlled via a proportional current or voltage signal in certain modes. In this method of control, the humidification output level of the Humidifiers is controlled by a proportional/integral input signal from the BMS or other devices. (i.e. 4mA = 0% output; 20mA = 100% output)

4.5.17 Loading New Software

This procedure must be executed if new software is emailed to a site and then uploaded onto a Smart Key (STULZ typically sets up Smart Keys before shipping them to a site). After downloading the emailed software onto a Smart Key, the technician must upload the new software from the Smart Key into the controller.

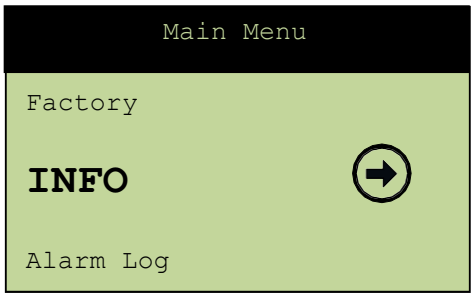
1. Turn the controller off.
2. Disconnect the Interface Display Panel from the Controller.
3. Plug-in the Smart Key.
4. Turn the controller on.
5. Wait until the LED's stop blinking on the Smart Key and the start button illuminates.
6. Press the start button on the Smart Key.
7. When the upload operation is complete, a chime sounds.
8. Turn the controller off.
9. Unplug the Smart Key.
10. Turn the controller on.

4.5.18 Multiple Humidifier Units

The Ultra-Series controller is designed to be the central terminal for up to 16 Humidifiers (Figure 5). This enables the monitoring and management of the operation of multiple humidifiers from a single Ultra-Series controller interface display panel. The controller interface display panel allows access to the data and operating functions for each networked Humidifier via additional menu screens. See Section 5.5.1.3 to set up Humidifier groups.

5 OPERATOR MENU SCREENS

5.1 Main Menu



The Main Menu is accessed from the Main screen by pressing the ***Prg*** key. The Main Menu screen Scroll through the menu categories using the Up (↑) and Down (↓) arrow keys. From the Main Menu screen, select from among the following standard menus:

"Info"- Displays the basic read-only status information. It allows the monitoring of system operational parameters. No password is needed at this level.

"Alarm Log"- Displays all alarms and "power-ups" in sequential order with a time and date stamp. No password is needed at this level.

"Control"- Allows modification of basic control parameters such as set points, temperature alarms and setting the clock. Level 1 password is needed to enter this menu.

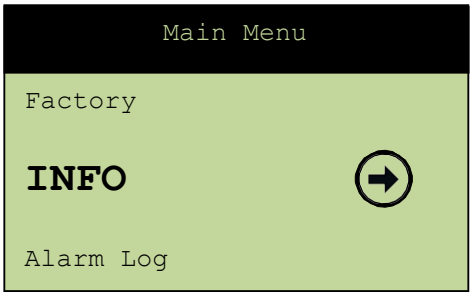
"Service"- Allows modification of advanced control parameters such as set point offsets, sensor calibration, BMS set-up and permits the user to save new customer operating parameters and/or reset the controller to the previous customer or factory (default) parameter values. It also allows the viewing but not modifying Level 2 password is needed to enter this menu.

"Factory"- Allows modification of more advanced control parameters such as sensor scaling, start-up delays and grouping parameters. Level 3 password is needed to enter this menu. Entry to the Factory menu is intended for qualified technicians working under the guidance of the STULZ Product Support during start-up and commissioning of the system. The settings can be observed but not changed in the service menu. The password to enter this menu may be obtained by contacting Product Support. (See section 9.0 of this manual).

"Config" – This section is used to set up basic configuration information at the factory before the system is shipped. Only STULZ Product Support should need to access this section. It is not selectable by the normal means; the settings can be observed but not changed in the service menu.

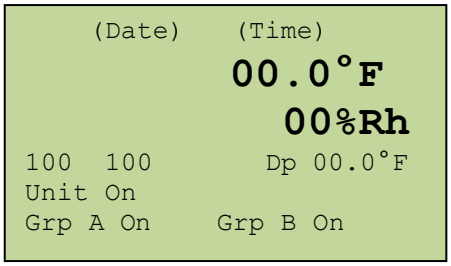
5.2 Information Menu

The Info menu screens may be accessed by simply scrolling with the Up (↑) and Down (↓) arrow keys. The same screens may also be viewed if the Info menu loop is entered by pressing the "***Prg***" key. The Info menu displays screens that provide current temperature and relative humidity conditions and shows icons indicating the state of operation. There are no adjustable parameters in this loop. From the Info loop, the following display screens may be viewed as they apply to the unit Configuration by pressing the Enter (↵) key.



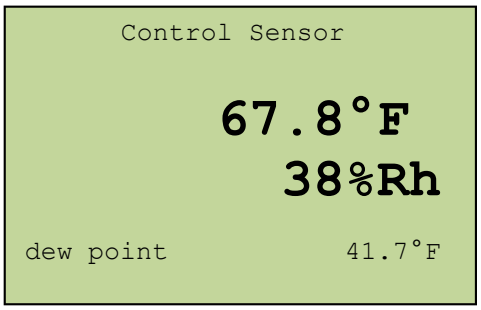
5.2.1 Main Info Screen

The first Info screen is constantly displayed when no keypad operation is taking place. It displays the current Date, Time and provides State of Operation data. The actual relative humidity (**%Rh**) is always displayed but the temperature (**°F**) and dew point (**DP**) will only appear if an optional temperature or dew point sensor is provided. The values displayed are used by the controller to develop control output signals for managing system operations. An output value appears beneath the "Humidifying" ( ) icon showing the percentage of the proportional output signal controlling humidity production. For grouped units, a percentage output value is provided for group A and group B.



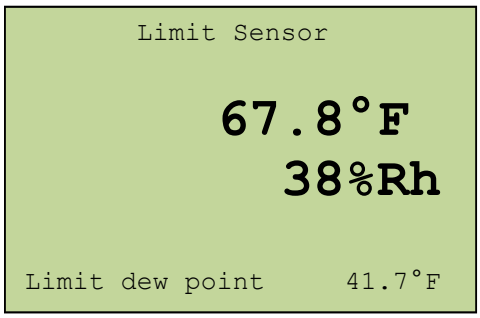
5.2.2 Control Sensor

This screen displays Temperature and Relative Humidity as measured by the control temperature and RH sensor inputs. If the controller is configured for proportional control, the **%RH** value is replaced with the percentage (**%**) of the proportional input signal controlling humidity production. The control dew point is calculated by the controller based on the control temperature and relative humidity sensor inputs and then shown at the bottom of the display screen. ** See Note 2.



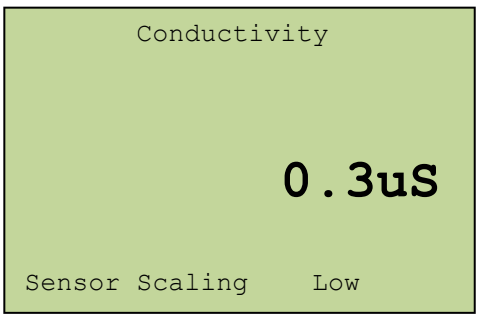
5.2.3 Limit Sensor

This screen appears if the controller is configured with limit sensors. It displays Temperature and Relative Humidity as measured by the limit temperature and RH sensor inputs. The limit dew point is calculated by the controller based on the limit sensor inputs. ** NOTE 2.



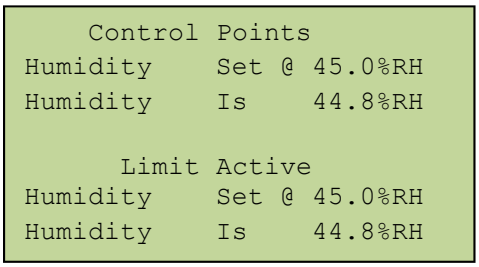
5.2.4 Conductivity

This screen is displayed if the conductivity sensor option is selected. It shows the current conductivity in MicroSiemens as well as the selected scaling factors being applied to the sensor (low or high).



5.2.5 Control Points

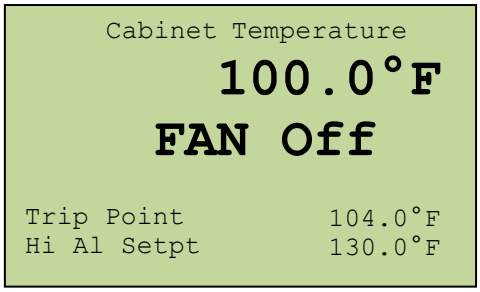
This screen displays the control points and the actual values. The top two lines show the set point and the actual control value and will display in % if proportional control is configured, %RH if humidity control is configured or in °F if dew point control is configured.



If Limit is active, then the Limit Active line will appear and the next two lines show the set point and the actual limit value and will display in %RH if humidity limit is configured or in °F if dew point limit is configured.

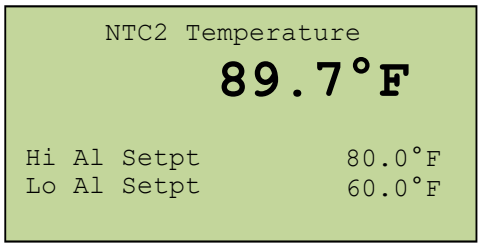
5.2.6 Cabinet Temperature

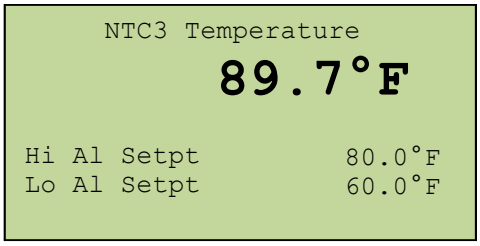
This screen displays the current operating temperature inside the controller cabinet and the "On/Off" operating status of the cooling fan. The screen also displays the set point for the cabinet fan to turn on and the temperature threshold for triggering a high temperature alarm.

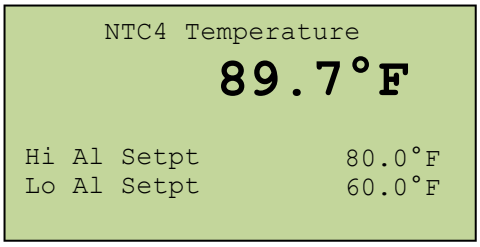


5.2.7 NTC Temperature Sensors

A screen is provided for each optional NTC sensor utilized with the unit (up to four). These screens appear only if the option is selected. The NTC numbers coincide with the reference designators that appear in the electrical drawing. These screens display the current operating temperature measured by the sensor. The screen also displays the set points for triggering a high temperature and a low temperature alarm.

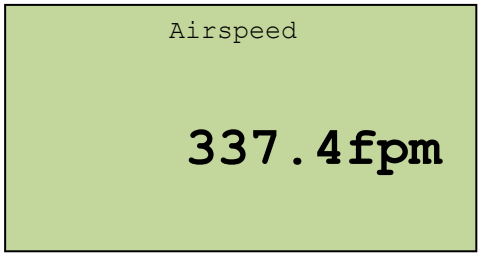






5.2.8 Air Speed

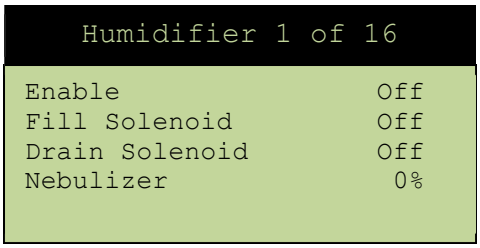
If the Air Speed Sensor is enabled, the Air Speed screen will appear. It displays the speed of the air as measured by an Airflow sensor typically placed in a supply air duct. The controller compares the measured value against a control set point and signals an "Airflow" alarm if the value drops to an unsafe level.



5.2.9 Humidifier Information (Loop)

The Humidifier Information screen displays current operating status information for each configured Humidifier. Press the Enter (↵) to move the flashing cursor to the Humidifier number and press Up (↑) and Down (↓) to select the Humidifier (1 to 16) to display depending on how many Humidifiers are enabled.

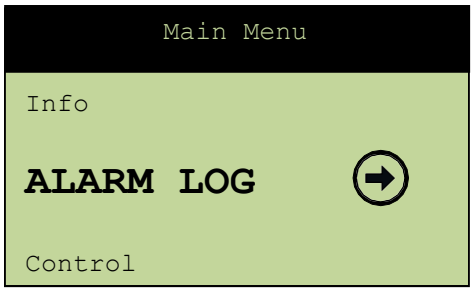
Enable is the signal to the humidifier to operate. The nebulizer percentage value appearing at the bottom of the screen is the magnitude of the output signal controlling humidity production (0-100%). When this is greater than 10%, the humidifier is enabled. If the humidifier needs to fill the tank, the Fill Solenoid is turned on. If the humidifier is in a drain cycle, the Drain Solenoid will turn on.



5.2.10 About Screen

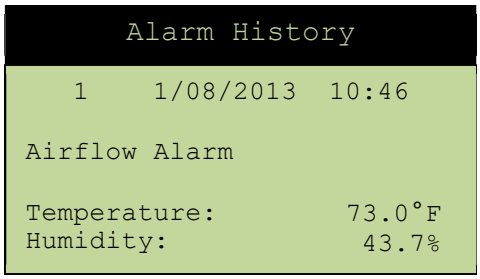
This screen displays the type of Humidifier being controlled on the top line, the current software version and the date of the installed software on the bottom line.

5.3 Alarm Log



No password is required to view alarm display messages. Press the Enter (↵) key to enter the Alarm Log loop.

When access is gained to the Alarm Log loop, use of the Up (↑) and Down (↓) arrow keys allows the scrolling through the log for additional alarm messages. The alarms log may be cleared in the Service>Alarm log menu loop.



The first number on the top line is the alarm number. 1 is the first alarm that occurred since the log was cleared, 2 is the second, etc. The date and time of the alarm is also shown on the top line. The alarm that occurred is shown in the middle of the screen and the temperature and humidity at the time of the alarm is also shown. Use of the Up (↑) and Down (↓) arrow keys allows the scrolling for any additional alarm messages.

5.3.1 Alarms

The red LED backlight within the alarm key will illuminate any time an active alarm condition is present or previous alarms existed without having been reset or cleared. An audible alarm in the display will also activate when an alarm condition occurs. The audible alarm may be enabled or disabled in the Service>Options menu loop. The first active alarm screen may be displayed by pressing the Alarm ( ) key. The Alarm display provides a text message describing the abnormal operating condition.

Use of the Up (↑) and Down (↓) arrow keys allows scrolling for any additional alarm messages. Only active alarm screens will be displayed when the Alarm ( ) key is pressed. The alarm screen display will remain unchanged until the alarm condition is corrected and the alarm key is pressed again to clear the alarm.

The application software supports two (2) types of alarms, *"Non-Critical*" and "*Critical*". Any alarm may be programmed to activate the "User Configured" alarm relay contacts.

5.3.2 Non-Critical Alarms

A Non-Critical alarm will activate the alarm screen with which it is associated. These alarms may be programmed to activate the "Summary Fault" alarm and close the "Summary Fault" relay contacts or the Custom alarm contacts without stopping unit operation. The factory programmed, *Non-Critical* alarms are:

- Low Humidity
- High Conductivity Pre-alarm
- Customer Alarm Input
- Low Air Velocity
- High Air Velocity

5.3.3 Critical Alarms

Critical Alarms will coincide with automatic shutdown of the Humidifier(s) as needed to prevent possible system damage. Any *Critical* alarm may be programmed to activate the Custom alarm relay contacts.
The Humidifier(s) will remain shut down until the alarm condition(s) are no longer sensed and the controller has been reset. *Critical* alarms are "Hard" coded and cannot be changed to *Non-Critical*. The *Critical* alarms are:

- Smoke Alarm
- Airspeed Sensor Failure
- Water Detector Alarm
- Condensate Pan Alarm
- High Humidity Limit Alarm
- Airflow Alarm
- Control Humidity Sensor Failure Alarm
- Cabinet Temperature Alarm
- NTC2 Alarm
- NTC3 Alarm
- NTC4 Alarm

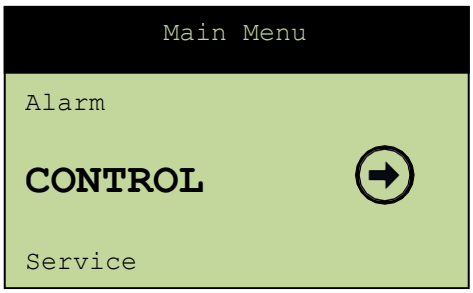
In addition, the custom alarm outputs can be configured to shut down the system.

5.3.4 Alarm Screen Messages

ALARM MESSAGE	DESCRIPTION OF ALARM CONDITION
Control Temperature Sensor Failure	Control temperature sensor is disconnected or failed
Control Humidity Sensor Failure	Control humidity sensor is disconnected or failed
Limit Temperature Sensor Failure	Limit temperature sensor is disconnected or failed
Limit Humidity Sensor Failure	Limit humidity sensor is disconnected or failed
Conductivity Sensor Failure	Conductivity sensor is disconnected or failed
Air Speed Sensor Failure	Air Velocity sensor is disconnected or failed
High Control Temperature	Control air temperature is above user defined alarm point
High Control Humidity	Control air humidity is above user defined alarm point
High Cabinet Temperature	Cabinet Temperature is above user defined high alarm point
Low Cabinet Temperature	Cabinet Temperature is below user defined low alarm point
Low Control Temperature	Control air temperature is below user defined alarm point
Low Control Humidity	Control air humidity is below user defined alarm point
Remote Shutdown	Remote shutdown as occurred and configured to be an alarm
Customer Alarm 1	The customer defined alarm #1 input is active
Airflow Alarm	The airflow alarm switch input is active
Water Alarm	The water detector alarm input is active
Condensate Pan Full Alarm	The condensate pan full alarm input is active
Smoke Alarm	The smoke alarm input is active
Customer Alarm 2	The customer defined alarm #2 input is active
Customer Alarm 3	The customer defined alarm #3 input is active
Humidifier n Alarm	An alarm on humidifier n (n=1-16) has occurred
Conductivity Pre-alarm	Mineral content of supply water is approaching high level.
Conductivity Alarm	Mineral content of supply water too high.
NTC 2 High Temperature Alarm	NTC2 temperature is above user defined high alarm point
NTC 2 Low Temperature Alarm	NTC2 temperature is below user defined high alarm point
NTC 3 High Temperature Alarm	NTC3 temperature is above user defined high alarm point
NTC 3 Low Temperature Alarm	NTC3 temperature is below user defined high alarm point
NTC 4 High Temperature Alarm	NTC4 temperature is above user defined high alarm point
NTC 4 Low Temperature Alarm	NTC4 temperature is below user defined high alarm point
Humidity Limit Alarm	The high humidity alarm switch input is active
High Limit Temperature	Limit air temperature is above user defined alarm point
Low Limit Temperature	Limit air temperature is below user defined alarm point
High Limit Humidity	Limit air humidity is above user defined alarm point
Low Limit Humidity	Limit air humidity is below user defined alarm point
High Airflow Alarm	Airflow velocity is above user defined alarm point
Low Airflow Alarm	Airflow velocity is below user defined alarm point
Freeze Alarm	Freeze thermostat indicates water temperature is at or below freezing

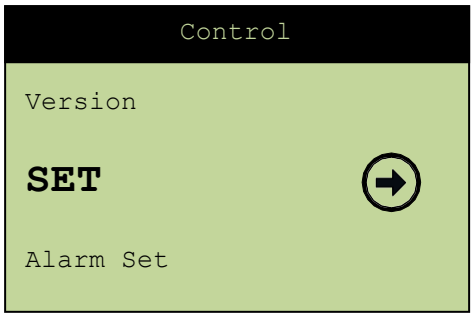
5.4 Control Menu

From the Control Menu 4 menus may be selected: Set points, Alarm Set points, Clock and Version. The controller may be programmed by the user to require level 1 password authorization to enter this menu (see Section 4.3). Once password access is granted, selecting and adjusting basic settings controlling the performance of the system, enabling alarms and determining their set points and setting the clock is allowed. Some fields in the Control Menu screens are read only.



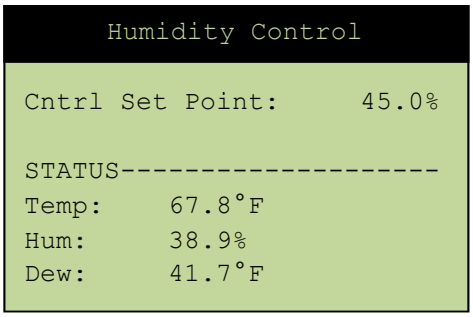
5.4.1 Set Point Screens

Press Enter (↵) at this screen to enter into the Set Point screens.



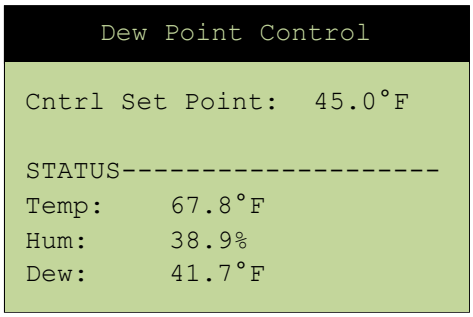
5.4.1.1 Humidity Control Set Point

If humidity control is selected, the Humidity Control screen shows the current set point and the conditions related to control. If the control temperature sensor is enabled, the “Temp” and “Dew” will be visible. If the control temperature sensor is not enabled, they will not appear. Press the Enter (↵) at this screen to enter move to the set point value. Use the Up (↑) and Down (↓) keys to change the value. When the desired value is displayed, press the Enter (↵) key. The cursor will return to the upper left hand corner, allowing the use of the Up (↑) and Down (↓) keys to move to the next set point.



5.4.1.2 Dew Point Control Set Point

If dew point control is selected, the Humidity Control screen shows the current set point and the conditions related to control. Press the Enter (↵) at this screen to enter move to the set point value. Use the Up (↑) and Down (↓) keys to change the value. When the desired value is displayed, press the Enter (↵) key. The cursor will return to the upper left hand corner, allowing the use of the Up (↑) and Down (↓) keys to move to the next set point.



5.4.1.3 Humidity Limit Set Point

The Limit Set Point field appears if the E-Ultra controller is configured with an optional remote humidity sensor. The sensor may be located in the duct downstream of the Humidifier where condensation could form. A value is entered in the Limit Set Point field to limit humidity production based on a remote humidity or dew point sensor input to prevent condensation from forming in the duct.

If the limit temperature sensor is enabled, the “Temp” and “Dew” will be visible. If the limit temperature sensor is not enabled, they will not appear. Press the Enter (↵) at this screen to enter move to the set point value. Use the Up (↑) and Down (↓) keys to change the value. When the desired value is displayed, press the Enter (↵) key. The cursor will return to the upper left hand corner, allowing the use of the Up (↑) and Down (↓) keys to move to the next set point.

```
      Humidity Limit

Limit Set Point:     80.0%

STATUS--------------------
Temp:     74.6°F
Hum:      74.9%
Dew:      66.0°F
```

5.4.1.4 Dew Point Limit Set Point

The Dew Point Limit Set Point field appears if the unit is configured with an optional remote dew point sensor and the Limit is selected to be dewpoint. The sensor may be located in the duct downstream of the Humidifier where condensation could form. A value is entered in the Limit Set Point field to prevent condensation from forming in the duct. Press the Enter (↵) at this screen to enter move to the set point value. Use the Up (↑) and Down (↓) keys to change the value. When the desired value is displayed, press the Enter (↵) key. The cursor will return to the upper left hand corner, allowing the use of the Up (↑) and Down (↓) keys to move to the next set point.

```
      dew point Limit

Limit SetPoint:     50.0°F

STATUS--------------------
Temp:     67.8°F
Hum:      38.9%
Dew:      41.7°F
```

5.4.2 Manual Group Control

The Manual Control screen allows the selection of the lead Group and manual rotation of the Humidifier groups, bypassing the programmed rotation schedule. This is enabled only if there are units assigned to Group B and external group control is not enabled. The time is the elapsed time the lead group has been running.

```
      Manual Control


Lead Group:    A
Rotate Group: No
Group Time:    0:00
```

5.4.3 Alarm Set Point Screens

Enter the alarm set menu to change trip points for common alarms on analog inputs.

```
         Control

Set

ALARM SET

Clock
```

NOTE: The menu for a sensor will only appear if it is enabled in the System Configuration.

5.4.4 Control Temperature Alarms

If the control temperature sensor is enabled, high and low alarms may be enabled and set to specific trip points. The entered offset applies to both the "High" and "Low" Trip Point values entered in the screens. The offset is subtracted when it's applied to the high alarm trip point and it is added when it's applied to the low alarm trip point. For the values shown in the screen below, the temperature alarm is set at 5.0°F (default), the high temperature alarm will turn on when the Temperature reaches 80°F and turn off when the actual temperature drops to the High Temperature Alarm trip point (80.0°F) - the Offset (5.0°F) or, 80.0°F - 5.0°F = 75.0°F

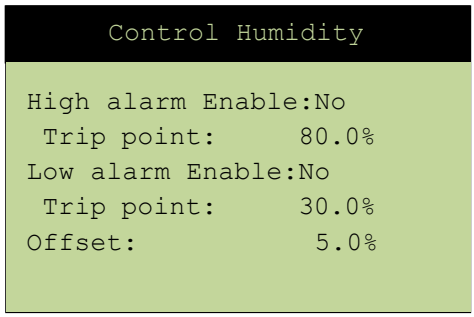
Conversely, the low temperature alarm will turn on at 60°F and turn off when the actual temperature rises to the Low Temperature Alarm trip point (60.0°F) + the Offset (5.0°F) or, 60.0°F + 5.0°F = 65.0°F.

```
   Control Temperature

High alarm Enable:No
 Trip point:     80.0°F
Low alarm Enable:No
 Trip point:     60.0°F
Offset:           5.0°F
```

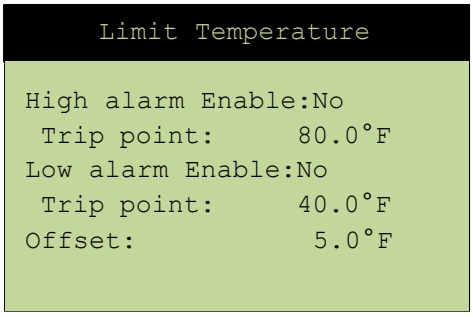
5.4.5 Control Humidity Alarms

If the control humidity sensor is enabled, high and low alarms may be enabled and set to specific trip points. The offset behaves in the same manner as described in section 5.4.4. It applies to both the high and low alarms.



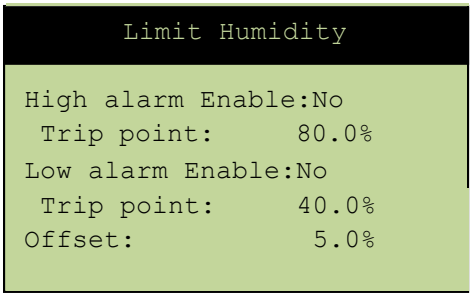
5.4.6 Limit Temperature Alarms

If the limit temperature sensor is enabled, high and low alarms may be enabled and set to specific trip points. The offset behaves in the same manner as described in section 5.4.4. It applies to both the high and low alarms.



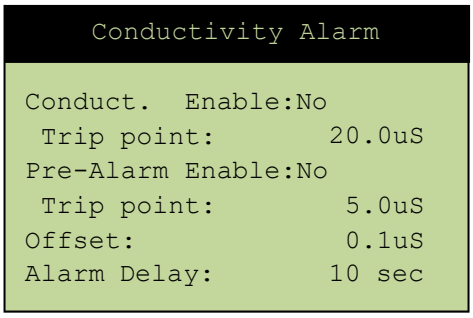
5.4.7 Limit Humidity Alarms

If the control humidity sensor is enabled, high and low alarms may be enabled and set to specific trip points. The offset behaves in the same manner as described in section 5.4.4. It applies to both the high and low alarms.



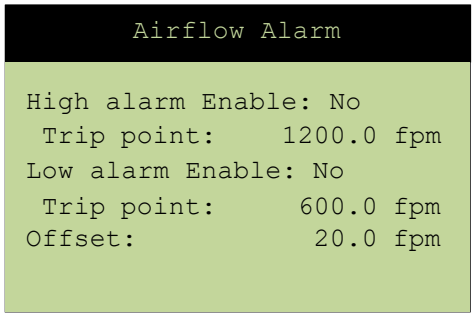
5.4.8 Conductivity Alarms

If the conductivity sensor is enabled, a conductivity alarm can be enabled and the trip point in MicroSiemens can be adjusted. A Pre-conductivity alarm can be enabled and the trip point in MicroSiemens can be adjusted. The offset behaves in the same manner as described in section 5.4.4. It applies to both the high and low alarms.



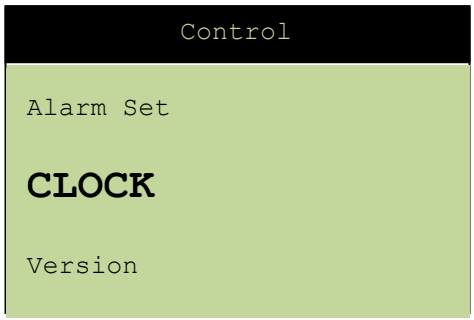
5.4.9 Airflow Alarm

If the airflow sensor is enabled, high and low alarms may be enabled and set to specific trip points. The offset behaves in the same manner as described in section 5.4.4. It applies to both the high and low alarms.



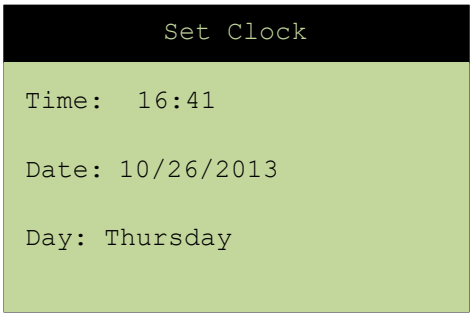
5.4.10 Clock Screen

Enter the Clock menu to change trip points for common alarms on analog inputs.



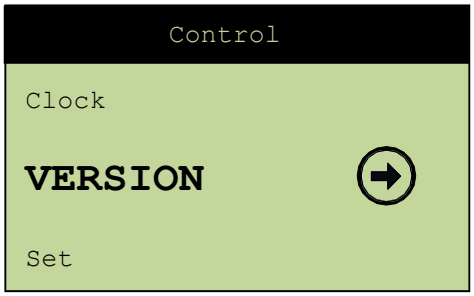
5.4.11 Set Clock

The Set Clock screen allows the setting and/or adjusting the current time (in 24 hour format), date and day. The clock is used to time stamp alarms.

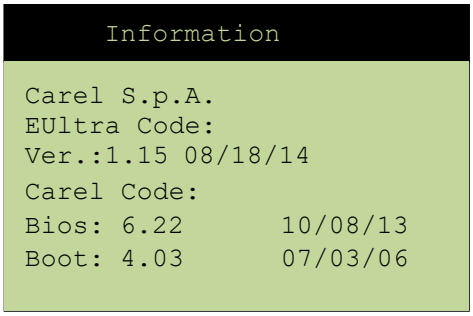


5.4.12 Version Screen

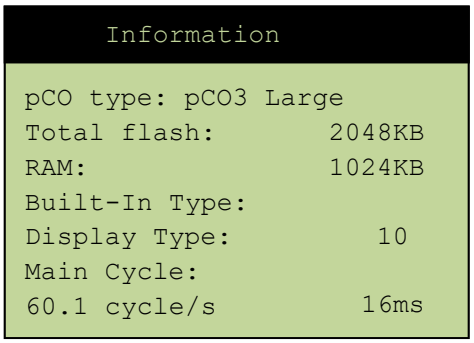
Enter the Version menu to view the details of the version of the installed software. Two Version screens are provided for information only. They show controller hardware and software details that are useful to STULZ Product Support if technical assistance is needed.



5.4.12.1 Version Info Screen 1

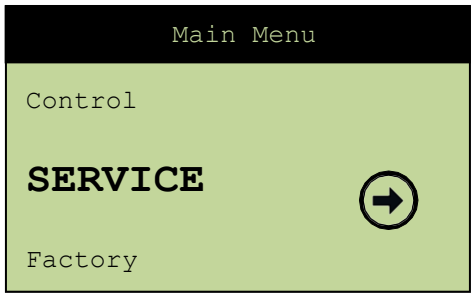


5.4.12.2 Version Info Screen 2



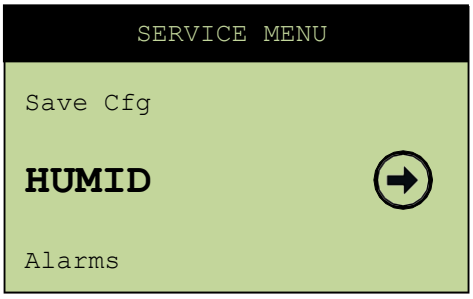
5.5 Service Menu

The Service screens allow the user to enter cut-in and cut-out values, calibrate control sensor(s), save and restore parameters and view the alarm history log. The Service menu may be entered via the password screen (requires level 2 password).



5.5.1 Humidifier Configuration

Once password access is granted, the user may access the service menus. The first menu allows detailed setup of overall settings for the humidifiers and also detailed information from individual humidifiers.

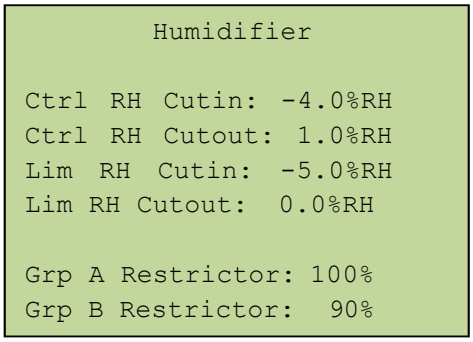


5.5.2 Humidifier Cut-in/Cut-out

The first screen in the Service->Humidifier loop allows adjustment of the cut-in / cut-out setpoints for the control and limit inputs. These setpoints are the used to set the slope of the proportional control between 0% and 100% output. If the control is set up for humidity, the cut-in and cut-out are in terms of %RH. If the control is set for dew point, the cut-in and cut-out is in terms of °F or °C (depending on the selection of US or SI units). If a limit sensor is setup, the cut-in and cut-out values appear, again in RH or dew point.

Cut-in and Cut-out work based on the set point and set the span of the control range. In the example below, the control cut-in is set to -4%RH. Assume the humidity set point is 45%RH. With this value of the cut-in, 100% humidification will be reached at 41%RH. The cut-out is the point at which 0% humidification occurs. Again, the control would be at 0% when the humidity reaches 46%RH. The span is the difference between the cut-in and cut-out and in this case over a 5%RH change in RH, the output would go from 0 to 100%.

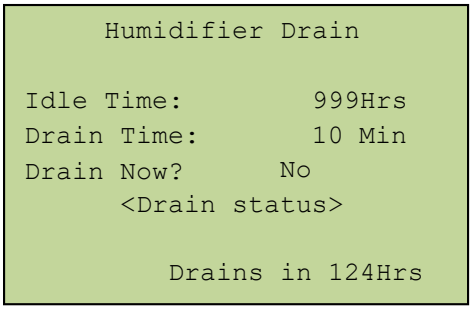
In the example below, the limit goes from 0% at the set point to 100% at 5%RH below the set point. Cut-in must always be less than cut-out.



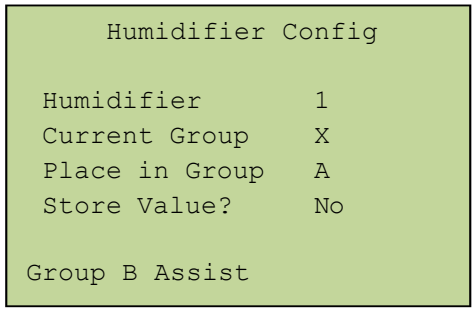
The restrictor imposes a scaling on the actual output of each group of humidifiers. In the example above, Group A will physically output 0 to 100% over the range of the called for humidification of 0 to 100%. Group B will physically output 0 to 90% over the range of the called for humidification of 0 to 100%. It is equivalent of taking the output of control output and multiplying it by 0.9. This is useful if the installation has a group of humidifiers that would cause condensation due to proximity to objects. The output of the humidifiers can be prevented from reaching maximum capacity.

5.5.3 Humidifier Drain

This screen is used to set the interval and time duration for the automatic drain cycle to occur when the Humidifier(s) have been inactive (no command to humidify). The "**Drain Now**" field to initiate a manual drain cycle by changing "**No**" to "**Yes**". The Humidifier drain valve will stay open for the duration set in the "**Drain Time**" field and then return to the closed position (for either Manual or Auto drain). The word "**Draining**" appears in the status field when in the Auto or Manual drain mode. The bottom line shows the number of hours left until a drain will occur. It is reset to zero whenever there is a call for humidification.



5.5.4 Humidifier Group Configuration

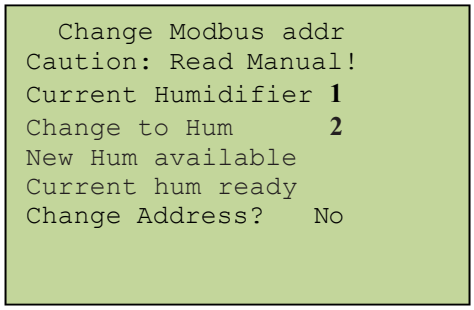


Humidifier group Configuration parameters are adjustable from this screen. Advance the cursor using the Enter (↵) key to the Humidifier number in the first field to select which Humidifier to view. Use the Up (↑) and Down (↓) keys to change the humidifier number. Its current group placement is displayed. It may be assigned to a different group by advancing to the "**Place in Group**" field. If the unit is assigned to a new group, it must be confirmed in the "**Store value?**" field. Valid entries for groups are X (not active), A, or B.

The duty assignment for group B can be changed to "Capacity Assist", Unison or "Rotate" in the lowermost field (reference Section 2.6.8.1 & 2.6.8.2).

5.5.5 Change Humidifier Address

If a new Humidifier is added to an existing group of multiple ultrasonic Humidifiers, it must be configured with a new unique address for Modbus communication. From this screen a Humidifier may be selected and its assigned Modbus address number may be changed. A new Humidifier is typically shipped from the factory with its Modbus address set to one. In this case it will need to be assigned a new address to differentiate it from the current Humidifier in the group that is already addressed as number one.



- **Current Humidifier**: The Humidifier that will have its address changed.
- **Change to Hum**: The address the current Humidifier will be changed to.
- **New Hum available/New Hum in use/Wait** is an indication of the new humidifier number availability. "**New Hum available**" means no humidifier is responding to the address shown as the Change to Hum number. **New Hum in use** indicates that a humidifier is responding to the Change to Hum number already. **Wait** is displayed during changing of the display number, waiting for the assignment change to be complete. This should last typically 30 seconds.

5.5.6 Change Humidifier Assignment

With power turned off at the control box, complete the Modbus and power wiring connections to the Humidifier to be added.

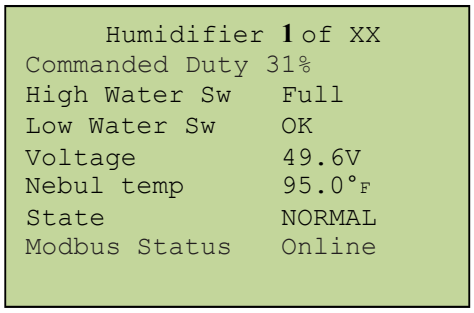
Turn Off all the Humidifier circuit breakers inside the control box and any in auxiliary boxes (see Figure 3 - Control Box Internal Layout; item 17), except the one power supply for the Humidifier to be addressed. This isolates the existing Humidifiers from the Modbus allowing only the address of the new humidifier to be changed.

When power is re-applied to the control box (and with the circuit breaker turned on only for the new Humidifier to be addressed in the appropriate control or auxiliary box), bring up this screen. Go to the last line and change the "NO" to "Yes" indicating the desire to change the address of the humidifier.

The third line in the screen displays "**Wait**" while the E-Ultra sends out the change command and waits for a response at the new address. The third line will change to "**New Hum in Use**" and the fourth line will change to "**Current hum not ready**" indicating it is communicating using the "**Change to Hum**" address and not the original address.

If the third line displays "**New Hum Available**", it indicates the Humidifier did not accept the change.

5.5.7 Humidifier Input Status



From this screen a Humidifier may be selected to view the displayed controller operating input parameters. If the system consists of multiple Humidifiers, advance the flashing cursor to the Humidifier number in the top line by pressing Enter (↵). The cursor will move the humidifier number. Select which Humidifier to view by using the Up (↑) and Down (↓) arrow keys then press Enter (↵) to view that humidifier's data.

The "Commanded Duty" field is the proportional control output signal the Humidifier reports it received from the controller.

The high water switch indicates "Full" or "Low". When it is "Low" the fill solenoid should open to bring the tank level back to "Full".

The low water switch indicates "OK" or "Empty". "OK" indicates enough water is over the transducers to operate them.

The Voltage is the voltage at the humidifier after line losses from the power supply. This should be drop below 46 volts when the humidifier is running at full output.

The Nebul temp is the nebulizer temperature.

The State is either "NORMAL", or "DRAIN"

The Modbus Status indicates the state of the communication interface:

Display	Meaning
Sub list	Sub list number = 0 for the required Modbus command. Code managed with BIOS >= 5.07.
INV Data	Invalid data for the requested Modbus command. Summarizes one or more data errors from Modbus sub lists.
Offline	Timeout (no response after query for all repeated attempts)
Comm Err	Invalid response (incomplete with CRC error)
Online	Command successfully completed. All commands requested by sub lists were successfully completed
Ill Func	ILLEGAL FUNCTION. The command code does not correspond to any foreseen action.
Ill Adr	ILLEGAL DATA ADDRESS. The received address is not permitted.
Ill Data	ILLEGAL DATA VALUE. The value to be assigned is not permitted.
Dev Fail	SLAVE DEVICE FAILURE. Error during requested action.
Ack	ACKNOWLEDGE. The Slave accepted the request and is processing it, but this requires a certain amount of time. This result is returned to prevent Master timeout errors.
Busy	SLAVE DEVICE BUSY. The Slave is busy running a command that requires a certain amount of time.

5.5.8 Humidifier Output Status

```
   Humidifier 1 of XX
       Coil Status

Enable Status       Off
Fan                 Off
Drain Valve         Off
Fill Valve          Off
Version          3. 0. 6
```

From this screen a Humidifier may be selected to view the displayed controller operating output parameters. If the system consists of multiple Humidifiers, advance the flashing cursor to the Humidifier number in the top line by pressing Enter (↵). The cursor will move the humidifier number. Select which Humidifier to view by using the Up (↑) and Down (↓) arrow keys then press Enter (↵)to view that humidifier's data.

The version number appearing at the bottom of the screen is the software version of that Humidifier's Level Controller. The field displays either the software version number or it will display "**99.99.99**" indicating the Level Controller software is version 1.x.x or 2.x.x and can't report the version number.

5.5.9 Humidifier Alarms Status

```
    Humidifier 1 of XX
1 Low Volt Alarm      No
2 High Volt Alarm     No
3 Freeze Alarm        No
4 High Temp Alarm     No
5 Low Water Alarm     No
6 Water Fill Alarm    No
8 Transducer alarm    No
```

From this screen a Humidifier may be selected to view the displayed controller alarms. If the system consists of multiple Humidifiers, advance the flashing cursor to the Humidifier number in the top line by pressing Enter (↵). The cursor will move the humidifier number. Select which Humidifier to view by using the Up (↑) and Down (↓) arrow keys then press Enter to view that humidifier's data.

An alarm condition is indicated by "**Yes**" to the right of each field. The Humidifier level control board includes a blinking LED for fault indication (see the Humidifier IOM Section 1.6, Level Controller).The number in the left side of each field coincides with the number of blinks that will be observed from the LED on the board if a fault occurs.

5.5.10 Humidifier Readable Parameters

```
   Humidifier 1 of XX
Duty cycle        100
Modbus addr         6
Volt cal           31
Temp cal           50
Max fill time      10
Config              0
Clock Adj           0
```

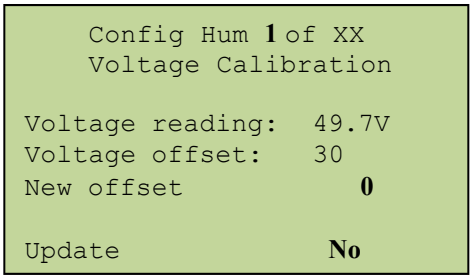
From this screen a Humidifier may be selected to view the controller readable registers. If the system consists of multiple Humidifiers, advance the flashing cursor to the Humidifier number in the top line by pressing Enter (↵). The cursor will move the humidifier number. Select which Humidifier to view by using the Up (↑) and Down (↓) arrow keys then press Enter (↵) to view that humidifier's data.

- Duty Cycle: Actual duty cycle
- Modbus Adr: physical Modbus address (unit one is 6, unit two is 7, etc.).
- Volt cal: the current calibration factor for the voltage sensor
- Temp cal: the current temperature calibration factor for the temperature sensor
- Max fill time: the maximum time in minutes the humidifier will attempt to fill the tank before declaring a fill alarm.
- Config a bit packed word showing the current configuration of the level controller board.
  - Bit 0: Fan Present
  - Bit 1: Standalone if 1, Modbus if 0
  - Bit 2: Drain disabled
  - Bit 3: No high Level Check on startup
- Clock Adjust: adjusts Level Controller internal clock.

Caution!

This should only be modified if directed by STULZ Product Support. Otherwise, communications with the humidifier may be lost until the Level Controller software is reloaded.

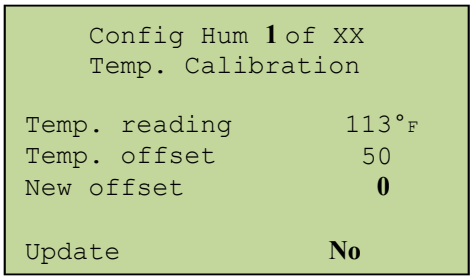
5.5.11 Voltage Calibration Screen



From this screen a Humidifier may be selected to modify the voltage calibration. If the system consists of multiple Humidifiers, advance the flashing cursor to the Humidifier number in the top line by pressing Enter (↵). The cursor will move the humidifier number. Select which Humidifier to view by using the Up (↑) and Down (↓) arrow keys then press Enter (↵) to view that humidifier's data.

To properly calibrate the voltage sensor at the humidifier, power off the humidifier and remove the cover(s) to expose the Level Controller. Power up the humidifier and set the output to 100%. Measure the power supply voltage at the humidifier and compare to the displayed value. If the reading is different, enter a new offset. And then change the Update field to Yes. The new offset will be written into the humidifier and the voltage reading will be updated.

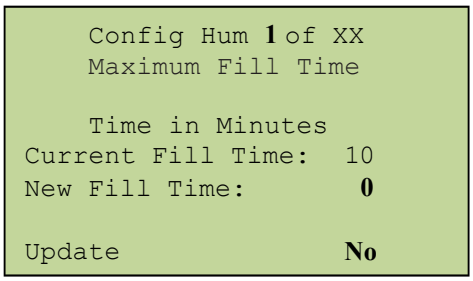
5.5.12 Temperature Calibration Screen



If the humidifier temperature sensor feature is turned on, this screen appears to allow a Humidifier to be selected to modify the temperature calibration. If the system consists of multiple Humidifiers, advance the flashing cursor to the Humidifier number in the top line by pressing Enter (↵). The cursor will move the humidifier number. Select which Humidifier to view by using the Up (↑) and Down (↓) arrow keys then press Enter (↵) to view that humidifier's data.

To properly calibrate the temperature sensor at the humidifier, power off the humidifier and remove the cover(s) to expose the temperature sensor. Apply power to the humidifier. Measure the temperature with an infrared meter at the sensor and compare to the displayed value. If the reading is different, enter a new offset. And then change the Update field to Yes. The new offset will be written into the humidifier and the temperature reading will be updated.

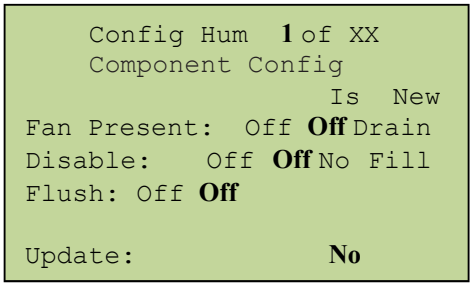
5.5.13 Maximum Fill Time Screen



From this screen a Humidifier may be selected to modify the maximum fill time. If the system consists of multiple Humidifiers, advance the flashing cursor to the Humidifier number in the top line by pressing Enter (↵). The cursor will move the humidifier number. Select which Humidifier to view by using the Up (↑) and Down (↓) arrow keys then press Enter (↵) to view that humidifier's data.

The maximum fill time stored in the humidifier is 10 minutes when shipped from the factory. If water pressures are low, it is possible on the larger humidifiers to need more time to fill. If a new maximum fill time is entered, it must be confirmed in the "**Update**" field.

5.5.14 Component Config Screen



In this screen the current humidifier configuration On/Off status of the features are displayed in the "**Is**" field. The values may be altered by changing the value in the "**New**" field. If a feature is changed to On or Off, it must be confirmed in the "**Update**" field.

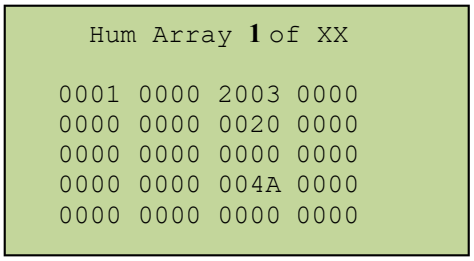
Fan Present must be on for any DRH humidifier as well as any DAH with a booster fan.

Drain Disable disables the operation of the drain valve.

When "**No Fill Flush**" is off, and the Humidifier is called to start and water level is full, the drain valve will open to drain the water to the Fill level. The drain valve is then closed and the fill valve is opened to bring the water level back to the Full level. Then the nebulizers begin

operation. The purpose of this feature is to assure the water level is not too high.

5.5.15 Humidifier Array Screen



The information codes in this screen provide an overview of all information known about the humidifiers. The codes are useful to STULZ Product Support if technical assistance is needed. All information is in hexadecimal (base 16) format.

The first line contains the index into the array of data kept for all humidifiers, the read value of the coils, the write value of the coils, and the read value of the discrete inputs.

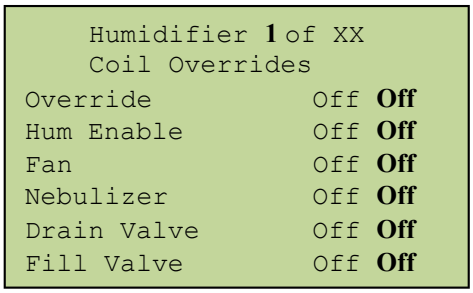
The second line contains the read voltage, the read status register, the read value of the temperature and duty cycle of the nebulizers.

The third line contains the Modbus address of the humidifier, the voltage calibration value, the configuration register and the temperature calibration value.

The fourth line contains the maximum fill time, the index into the register last written, the value last written. The last word is not used.

The fifth line contains the major revision number, the minor revision number, the third part of the version number referred to as the beta number, and the clock tweak value. The clock tweak value is used to modify the internal clock used to establish the communications baud rate and should be zero unless there are extraordinary conditions requiring it to be different.

5.5.16 Manual Control Screen



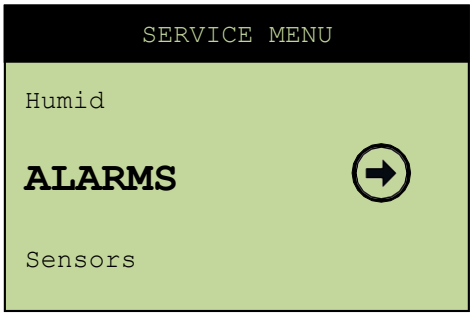
This screen allows manual control over the coils in the selected humidifier. The top line shows the selected humidifier among the number of humidifiers available. The subsequent lines show the current and desired state of the coil. The left hand column displays the current controller On/Off command for the indicated component, the right hand column is the modifiable field to change to change the state of the coil. To use this feature, the Override Coil must be changed to "**On**".

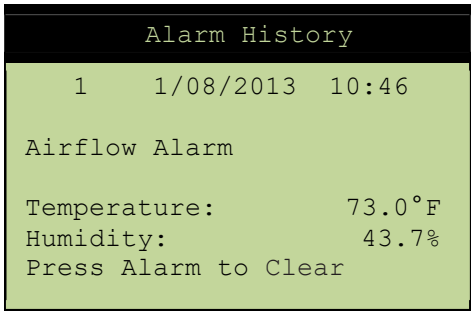
With the Override Coil turned On, manual control of the listed coils may be turned On or Off. The coils will remain in the commanded state until the Override Coil is set to OFF. At that point, the coils revert to normal operations.

NOTE: On Humidifiers equipped with fans, the fan coil will automatically be turned on by the humidifier if the nebulizer coil is turned on.

5.5.17 Alarms

A log of events is stored for view from the Service>Alarms menu.

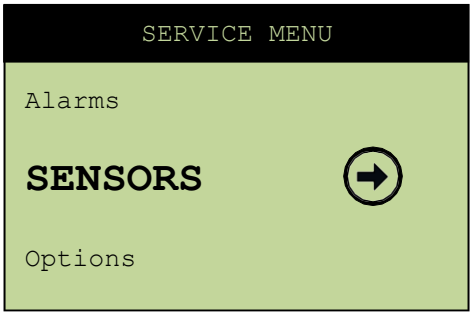




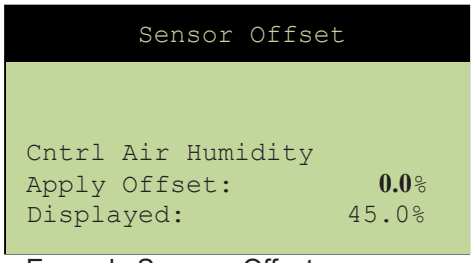
This menu is identical to the Alarm Log accessed from the main menu. It displays the last 50 events sequentially numbered in order of occurrence. The alarm log may be erased by pressing the Alarm (🔔) key while in this menu.

NOTE: If the Alarm (🔔) key is pressed when in any of the Service>Alarms screens, all stored alarm messages will be permanently erased from the controller's memory.

5.5.18 Sensors



This group of screens allows the setting of an offset to analog inputs. The offsets are added to the analog input value for minor corrections of the displayed values.



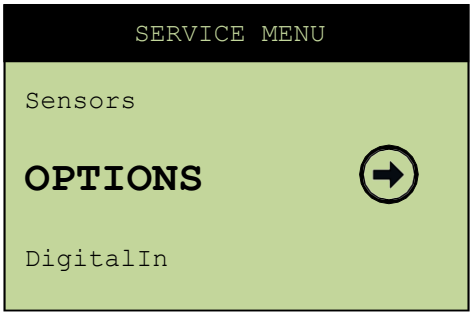
Example Sensors Offset screen

Sensor Offsets are available for the following sensors:

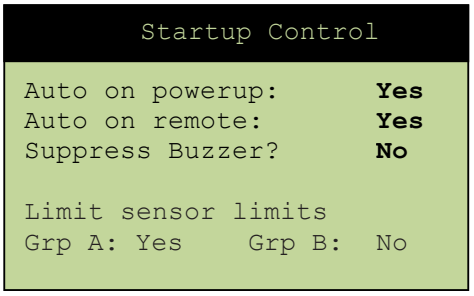
- Control Air Temperature (if enabled)
- Control Air Humidity
- Water Conductivity (if enabled)
- Limit Air Temperature (if enabled)
- Limit Air Humidity (if enabled)
- Air Speed (if enabled)
- Cabinet Temperature
- NTC2 Sensor (if enabled)
- NTC3 Sensor (if enabled)
- NTC4 Sensor (if enabled)

NOTE: When calibrating sensors, an offset at one extreme may produce an error at the other extreme. Always verify that any offset is valid over the entire range of the sensor.

5.5.19 Options Menu Loop



5.5.20 Startup Control



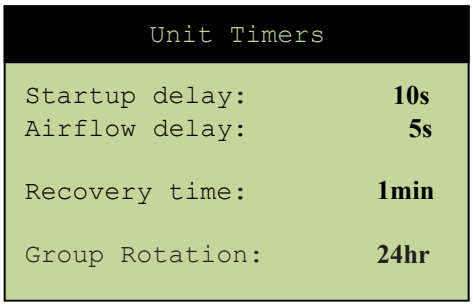
"Auto on power up"- If set to **Yes**, the unit turns on automatically when main power is applied.

"Auto on remote"- If set to **Yes**, the unit may be turned on via a remote On/Off switch.

"Suppress Buzzer?"- Enables or disables the alarm signal buzzer.

The limit sensors may be enabled on one, both or neither group of Humidifiers. Setting a Group to Yes enables the limit function on that group.

5.5.21 Unit Timers



Startup delay is the number of seconds before control output signals are sent to the Humidifiers after the system is turned on.

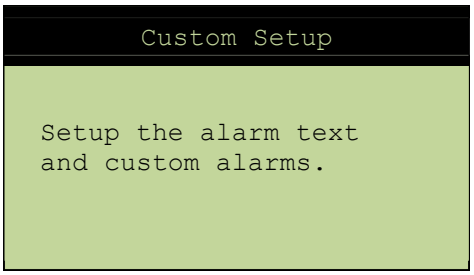
Airflow delay is the number of seconds after start-up to allow the Airflow switch to close before an alarm is signaled is the airflow switch is enabled. This will display

only if the airflow switch is configured in the System Configuration.

Recovery time is the number of minutes before Humidifier(s) re-start after a critical alarm is cleared.

Group Rotation is the number of operating hours before Humidifier groups rotate duty.

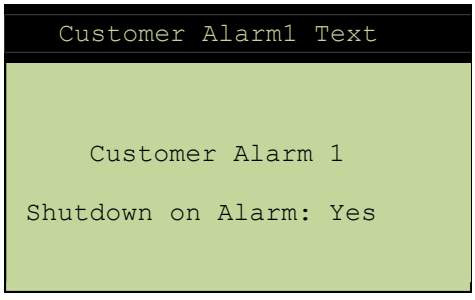
5.5.22 Custom Alarm Setup



Press the Enter (↵) key to access a menu loop to set-up optional customer alarm inputs and set-up and select conditions for custom (dry contact) alarm outputs.

Customer Alarm Input Setup

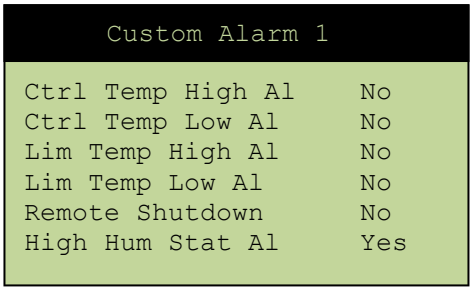
The Ultra-Series controller may monitor a customer supplied digital alarm input device and annunciate a Customer Alarm message. One set of Customer Alarm input terminals is standard and up to two more may be added as an option depending on the size of the E-Ultra controller. Upon receiving a Customer Alarm input the controller presents a user selectable message in the alarm display screen. A Customer Alarm message may simply be displayed as "CUSTOMER ALARM #" as shown below, or press (↵) to advance to the next character and use the (↑) and (↓) arrow keys to scroll through the ASCII character set to construct a specific alpha/numeric message in the line stating the specific alarm condition; i.e. "**GAS DETECTION**", "**INTRUSION ALARM**", etc. The Customer Alarm message may be setup with up to 20 characters.

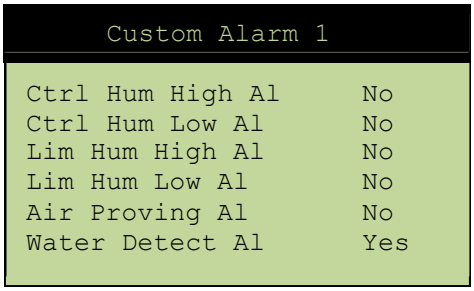


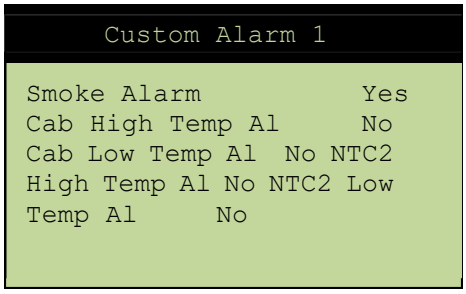
5.5.23 Custom Alarm Output Setup

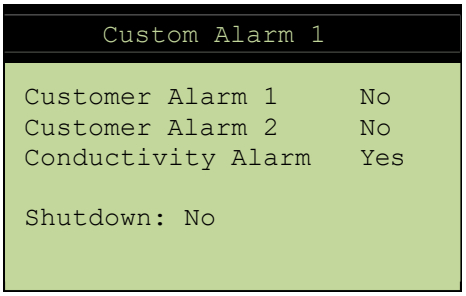
In addition to the Summary Alarm output to a designated dry contact relay, the Ultra-Series controller may also activate Custom Alarm outputs to energize separate dry contact relay(s). Up to four custom alarm outputs may be configured depending on the size of the E-Ultra controller. A custom alarm output is set up by selecting specific alarm conditions that trigger a custom alarm output from the menu screens in this loop.

Upon entering this loop, press Enter (↵) and select the Custom Alarm number (1 to 4) in the uppermost field. Then press Enter (↵) to scroll through each field to select any mix of the alarm conditions shown in the screens with the Up/Down arrow keys. The alarm must be enabled in order to be sensed as a custom alarm.

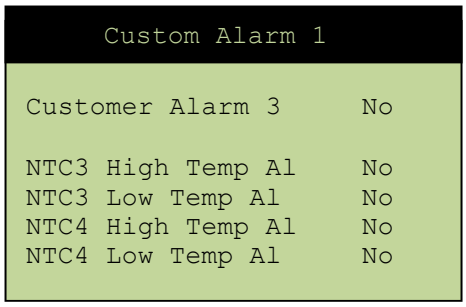


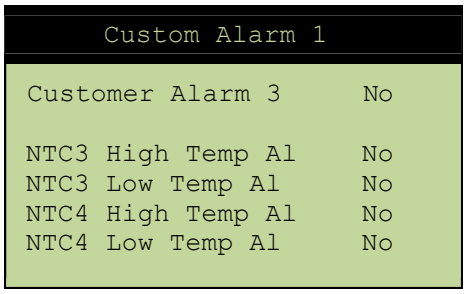


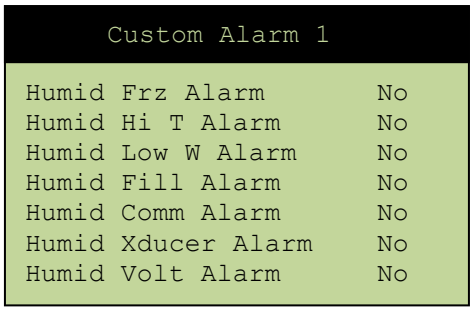




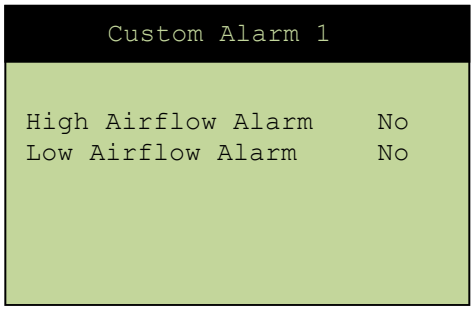
NOTE: On the above screen is the option to shut down the system when this custom alarm is active.







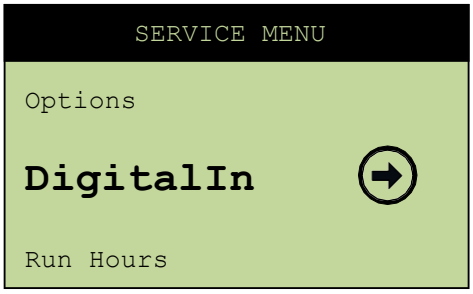
The selections in the above screen are the alarms from the humidifiers.

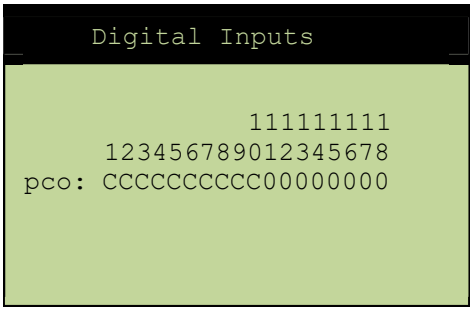


The above screen is shown only a large E-Ultra Controller.

As an example, for a custom alarm based only on the occurrence of high humidity, water detection, smoke and high water conductivity scroll through the screens and enter "**Yes**" in the appropriate fields as shown. Upon detection of any of the selected alarm conditions, the alarm key illuminates and the controller energizes the designated custom alarm relay.

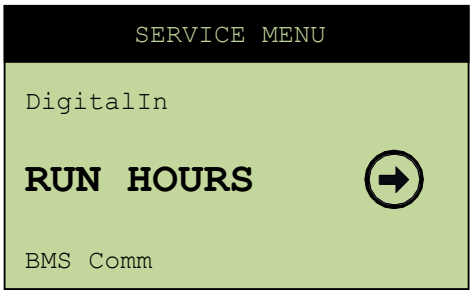
5.5.24 Digital In





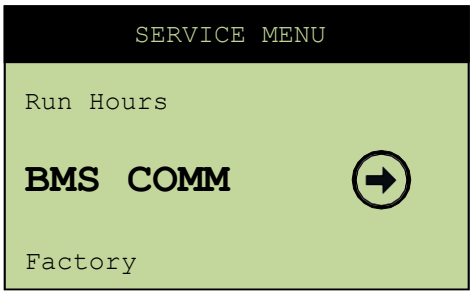
This screen is provided for information only. It shows the state of each digital input as either **C**losed or **O**pen. Only the first 10 inputs are used on the E-Ultra controller to date. The rest are shown as zeros.

5.5.25 Run Hours



The run hours display screen shows the number of hours the humidifiers have been running at 10% or greater output. Also shown is number of starts logged for the humidifier (transition from below to above 10% output. The run hours and starts values may be reset to 0 from this display screen. The values displayed are the values logged since the last time the screen was reset.

5.5.26 BMS Communication

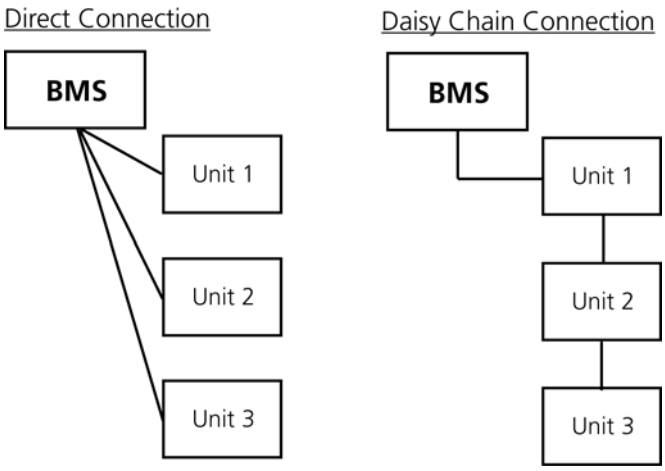


The BMS Comm menu is used to set up parameters to allow a Building Management System (BMS) to interface with the controller. The unit may be connected to a BMS for monitoring and control of data points using a multitude of different serial communication protocols.

When BMS communication is utilized, the controller must be equipped with an expansion card designed for one of a variety of serial communication protocols available.

A RS-485 serial port is available for Modbus or BACnet MS/TP protocols and a 10BaseT port is available for TCP/IP based protocols such as BACnet over IP, BACnet over Ethernet, SNMP or HTTP.

Supported Protocols	Media	Connection
BACnet over IP	10 BaseT	RJ45 direct
BACnet over Ethernet	10 BaseT	RJ45 direct
HTTP	10 BaseT	RJ45 direct
SNMP V1, V2c	10 BaseT	RJ45 direct
Modbus over IP	10 BaseT	RJ45 direct
BACnet MS/TP	Twisted pair	Daisy chain
Modbus RTU	Twisted pair	Daisy chain



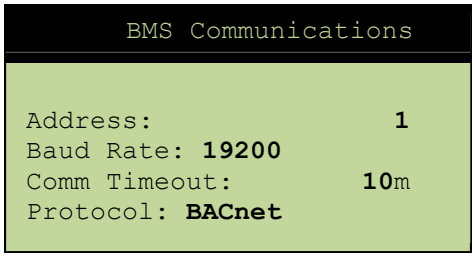
If multiple Ultra-Series controllers are connected to a BMS, each controller must be configured with a unique address for BMS communication. This is done by programming the serial interface port from a lap top. Contact STULZ Product Support for assistance (see Section 11).

5.5.27 Direct BMS Control

The controller may be configured to accept proportional analog signals that mimic sensors. The controller will act on that signal whether it comes from a real sensor or a BMS analog output. Refer to Appendix A for the Ultra-Series controller BMS parameters.

5.5.28 BMS Set-up

The following menu screen is accessed from the Service>BMS COMM screen to set-up the parameters for a BMS interface to monitor controller operation for the serial-based networks such as BACnet MS/TP. Units using the BACnet over IP, BACnet over Ethernet, or HTTP protocols do not need to change anything in this menu loop.



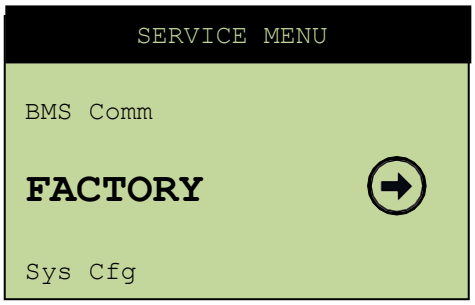
The BMS address and baud rate have meaning only on RS-485 networks and with the serial protocols of Modem, Modbus RTU, Commission, and Carel. The baud rate is fixed for BACnet. Systems utilizing a 10BaseT interface should use the defaults of address 1, baud rate 19200, and protocol BACnet.

If the mode selected uses a BMS supplied signal via the communications interface (modes 1, 3 or 5), the loss of BMS active (which is held true as long as the toggling of the keep alive is switched between 1 and 2), will simply cause the system to shut down and display “Off by Network”.

The general procedure is to set up variables like return humidity/proportional control and then toggle the value (1 or 2) to the BMS "keep alive" address.

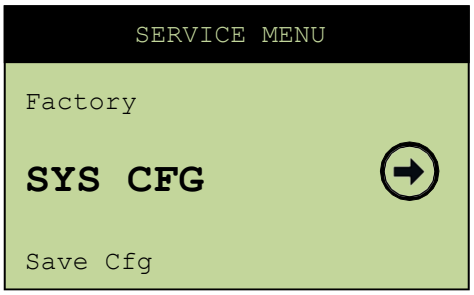
For further details on utilizing BMS control, contact STULZ Product Support (see Section 11).

5.5.29 Factory Configuration



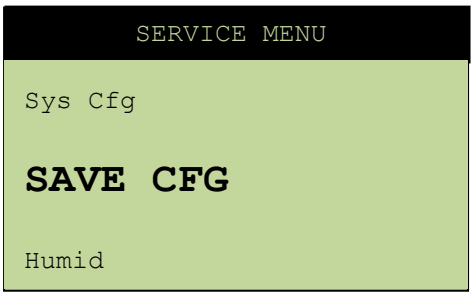
The Factory Configuration menu loop contains settings for the options that should not need to be adjusted once the system ships from the factory. When entered using the Service Password, all parameters are read only and cannot be changed. See Section 6 for details.

5.5.30 Sys Configuration



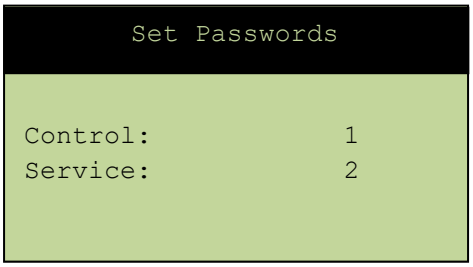
The System Configuration menu loop contains configuration screens to set up options selected at the time of sale. When accessed using the Service password, the parameters are read only and cannot be changed. Not all options are available on a particular E-Ultra Controller. Depending on the size of the controller, (small, medium or large), some inputs and outputs are not available. See Section 6.4 for details.

5.5.31 Save Configuration



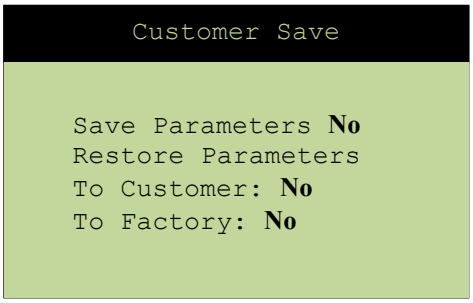
The next screen in the Service Menu after the System Configuration review menu is the Service Level Save of the configuration. Passwords may be changed and the default set points may be restored and from this loop.

5.5.32 Set Passwords



This screen allows setting new passwords for entering the Control and Service menus.

5.5.33 Customer Save

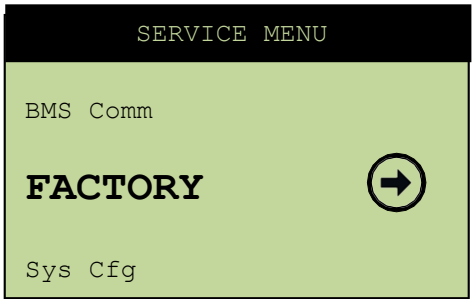


This screen allows the save of any adjustments made in Service level menu screens as new "Customer" parameters or restore the controller to the previously saved "Customer" parameters. The user may also restore the controller to the original "Factory" parameter values shown in Table 1

.

Use the Enter (↵) key to move the flashing cursor to the field to be confirmed and press the Up (↑) or Down (↓) arrow key. The word "**No**" will momentarily change to "**Yes**" indicating the command has been accepted. Then exit by pressing the Enter (↵) key repeatedly until the flashing cursor returns to the top left corner of the screen.

6 Factory and System Configuration Screens



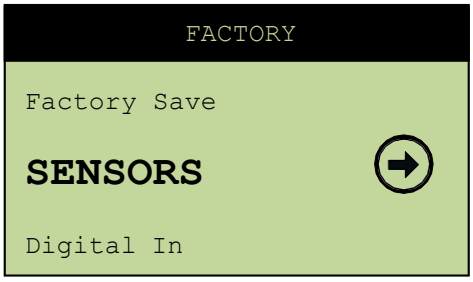
The Factory menu loop may be accessed from the Service>Factory screen to view the Factory settings but not change them.

Only authorized personnel who possess a thorough understanding of the system operation should perform modifications to the Factory menu. The menu screens must have accurate variables entered otherwise erratic operation may occur. These menu screens are accessible for changes with additional password protection. It is intended that access to changing the Factory menu screens only be established while the user is working with the guidance of STULZ Product Support (see Section 11) because incorrect settings made at that level could unintentionally damage the equipment.

The Factory Configuration menu loop contains settings for the options that should not need to be adjusted once the system ships from the factory.

NOTE: Only those options that are enabled in the System Configuration will display in the Factory menus.

6.1 Sensor Input Setup



The Sensor inputs are analog inputs comprising of a signal that is one of the following types: 4-20 mA, 0-1 Volt, 0-5 Volt, 0-10 Volt or an NTC sensor. The first parameter shows if the sensor is enabled or disabled.

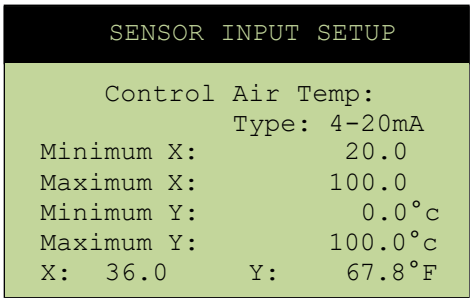
The second parameter is the type of the input signal. The Sensor Input Setup screens define the relationship between the input (X) and the display value (Y).

It is a linear relationship with Xmin, Ymin defining the low end of the linear relationship and Xmax, Ymax defining the high end of the linear relationship. The minimum value of X corresponds to the minimum value of Y and the maximum value of X corresponds to the maximum value of Y.

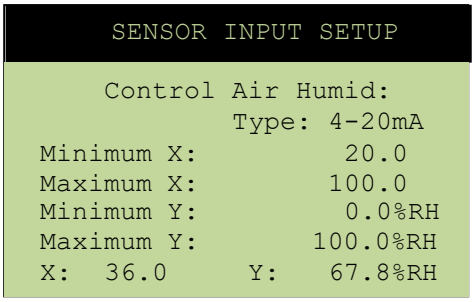
The bottom line shows the raw input (X) and the corresponding display value (Y). Note that the minimum and maximum values of Y for temperatures are always in Celsius. The display value for Y for other sensors are in the units selected.

The X values for 4-20 ma sensors are nominally 20.0 and 100.0. The X values for all other sensors is nominally 0.0 and 100.0.

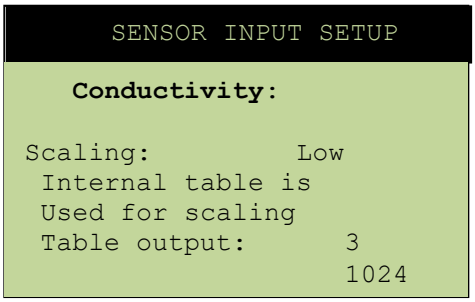
6.1.1 Control Temperature Setup



6.1.2 Control Humidity Setup

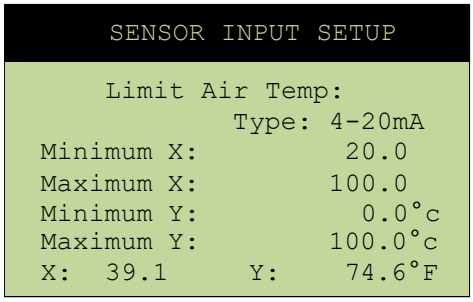


6.1.3 Conductivity Setup

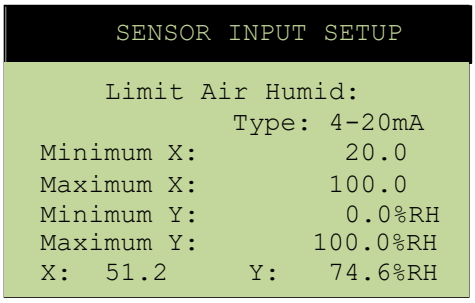


The exception to the analog inputs is the conductivity sensor. It has two selections for scaling: low and high. The input is a 0-1 volt signal. The low scale has a maximum of 26.8 Siemens and the high scale has a maximum of 175.0 Siemens.

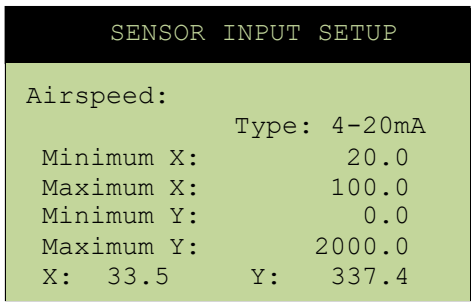
6.1.4 Limit Temperature Setup



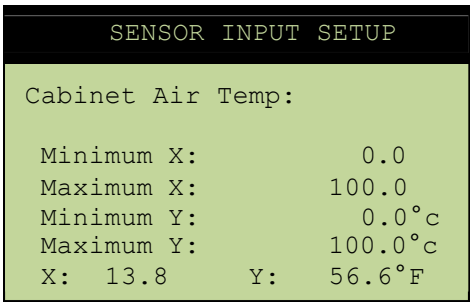
6.1.5 Limit Humidity Setup



6.1.6 Airspeed Setup

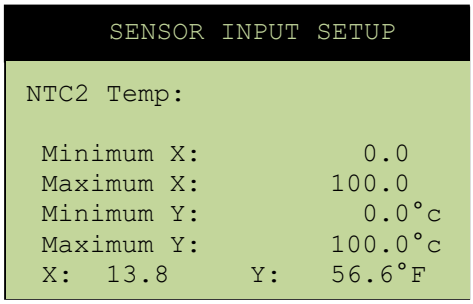


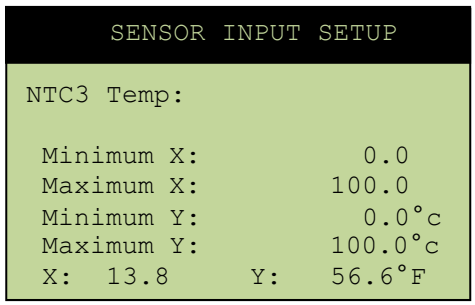
6.1.7 Cabinet Temperature Setup

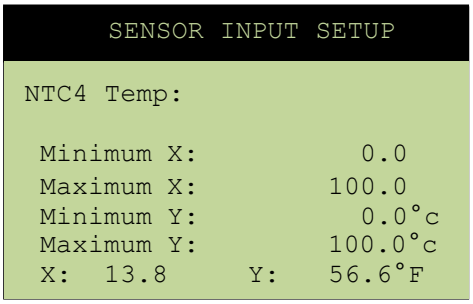


The cabinet temperature sensor is always enabled and is always an NTC sensor so there is no type selection on this sensor.

6.1.8 NTC2-4 Temperature Setup







NTC2, NTC3 and NTC4 are always NTC sensors so there is no type selection on these sensors.

6.2 Factory Digital Input Setup

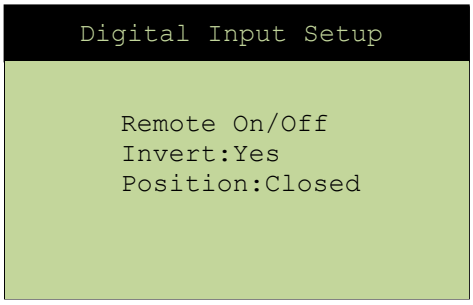
The Factory Digital Input setup screens allow modifying the nature of the input. Digital inputs are switch inputs tied to ground or open.

Invert allows the polarity of the signal to be set. “Yes” means to interpret an Open as On and Closed as Off. “No” means to interpret an Open as Off and Closed as On.

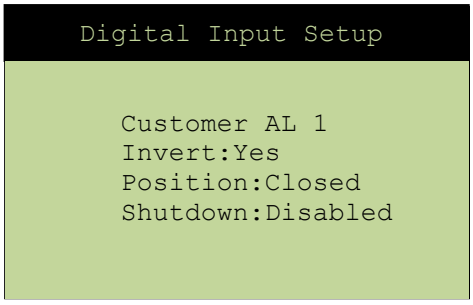
The Position is the current state of the input, Open or Closed to ground.

Some inputs may have the ability to shut down the system when the input is On and the enabling or disabling of that shutdown is included in the screen.

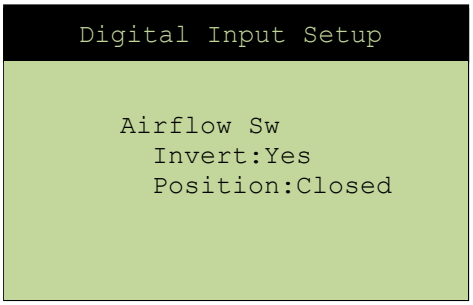
6.2.1 Remote On/Off Setup



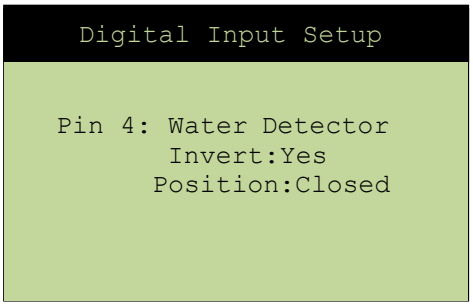
6.2.2 Customer Alarm 1 Setup



6.2.3 Airflow Switch Setup

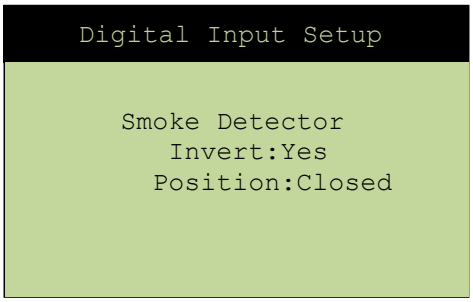


6.2.4 Pin 4 Function Setup

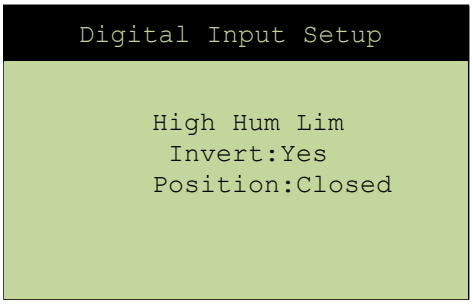


Pin 4 can be configured in the SYS CFG level to be None, Under floor Water Detector or Condensate Pan detector. This menu will not appear if it is configured as None.

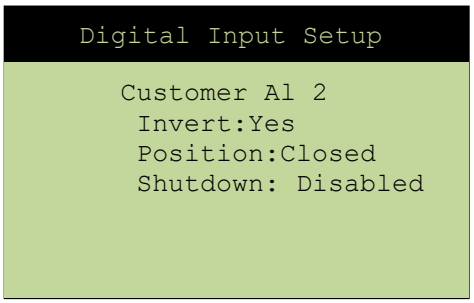
6.2.5 Smoke Detector Setup



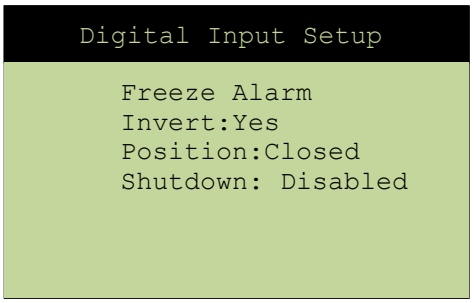
6.2.6 High Humidity Limit Setup



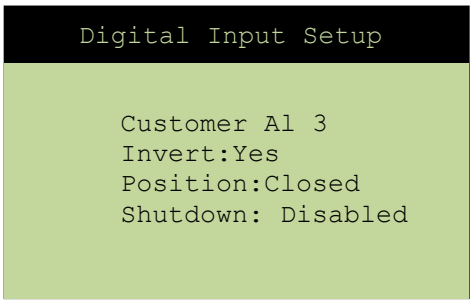
6.2.7 Customer Alarm 2 Setup



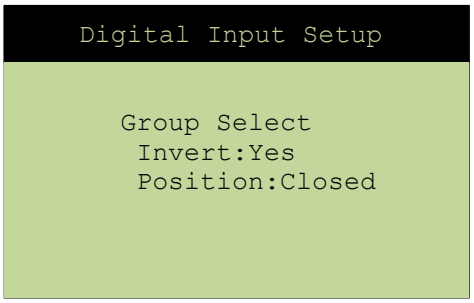
6.2.8 Freeze Alarm Setup



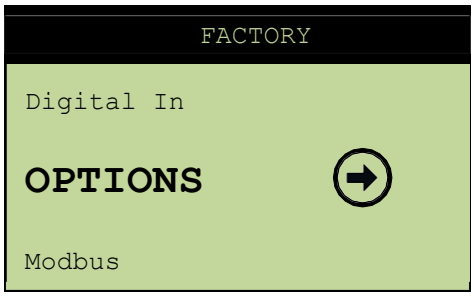
6.2.9 Customer Alarm 3 Setup



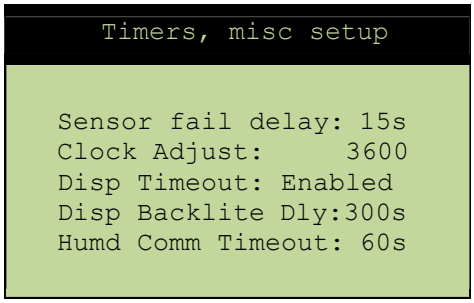
6.2.10 Group Select Setup



6.3 Factory Options



6.3.1 Timers and Miscellaneous Setup



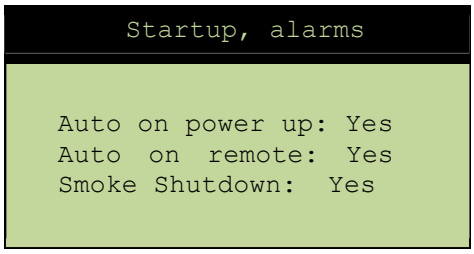
Sensor fail delay masks the failure alarm to make sure the sensor has really failed.

Clock Adjust is the number of seconds considered to be in an hour.

In order to extend the life of the backlight on the display, it can be enabled to turn off after a period of time when no key has been pressed. Disp Timeout can be set to “Enabled” or “Disabled”. If enabled, Disp Backlite Dly is the number of seconds to wait after the last key press before turning the display off.

Humd Comm Timeout is the number of seconds to wait for a response from the humidifier before declaring it offline.

6.3.2 Startup, Alarms

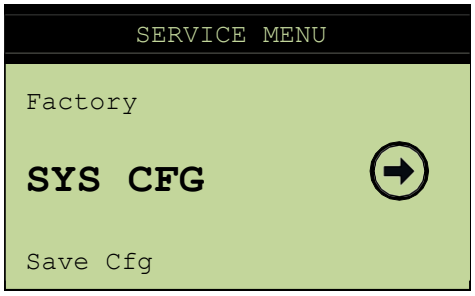


Auto power up set to Yes will start the system when power is restored without having to press the Enter (↵) key.

Auto on Remote will start the system without having to press the Enter (↵) key.

Smoke shutdown will prevent the system to start until the smoke alarm has been cleared.

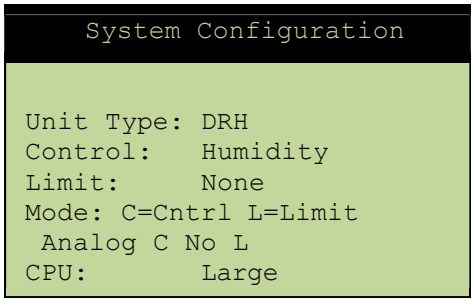
6.4 System Configuration



The System Configuration menu loop contains configuration screens to set up options selected at the time of sale. When accessed using the Service password, the parameters are read only and cannot be changed. Not all options are available on a particular E-Ultra Controller.

Depending on the size of the controller, (small, medium or large), some inputs and outputs are not available. If they are not available on the particular controller installed, they do not appear on the menus.
Check section 0 for inputs and outputs available on the controller installed.

6.4.1 Basic System Configuration



The Unit type is set to DRH or DAH, depending on what type of humidifiers are connected to the E-Ultra controller.

The Control displayed is the means by which the humidifiers will be controlled. It is selectable to be a proportional input, by relative humidity input or by dew point input. This input may be from a BMS command or by an analog input.

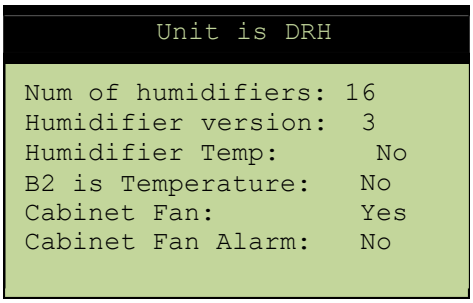
The Limit is an option to apply a limit control. It can be None, Humidity or Dew Point. This input may be from a BMS command through the BMS communications port or by an analog input.

The Mode is one of six operating modes. This is the means of selecting Inputs for control by sensor signals or commands over a BMS serial interface.

Mode	Input 1 (Control)	Input 2 (Limit)	Function
1	BMS Command	None	Room Control
2	Control Sensor	None	
3	BMS Command	BMS Command	Return duct monitoring with proportional high limit
4	Control Sensor	Limit Sensor	
5	BMS Command	Limit Sensor	
6	Control Sensor	BMS Command	

Mode 1 displays as: “BMS C no L” Mode 2 displays as: “Analog C no L” Mode 3 displays as: “BMS C & L” Mode 4 displays as: “Analog C & L” Mode 5 displays as: “BMS C Analog L” Mode 6 displays as: “Analog C BMS L”

6.4.2 Humidifiers and Cabinet Fan



The top line reflects the type of humidifier that is being controlled.

The number of humidifiers is set to number of humidifiers attached to the E-Ultra Controller. This should be set to the exact number of humidifiers. If it is set too high, time is wasted in the Modbus

communications trying to access the non-existent humidifiers and results in communication alarms with the non-existent units.

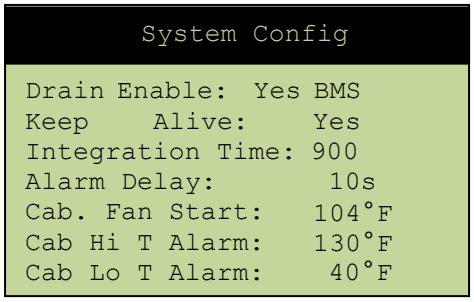
The line with “Humidifier Temp” is set to YES if the humidifiers have nebulizer temperature sensors.

The line with “B2 is Temperature” only appears on the small controller and allows the use of a control temperature sensor instead of a limit humidity sensor. This allows a small controller to have dew point control.

The cabinet fan can be enabled or disabled by setting this parameter to “Yes” or “No”. All E-Ultra cabinets ship with a NTC temperature, so this parameter should always be set to “Yes”.

An alarm can be enabled if the cabinet temperature falls out of range (too hot or too cold, by setting the last parameter to “Yes”.

6.4.3 Drain, BMS and Integration



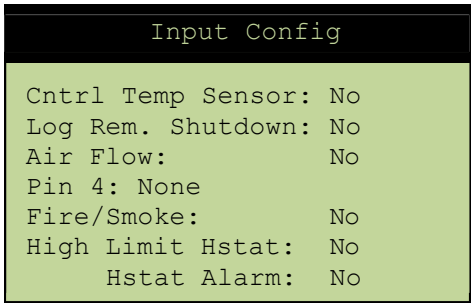
Drain Enable determines if the system will drain the humidifiers after being idle for a long period of time.

BMS Keep Alive set to Yes requires the BMS system to toggle the keep-alive parameter between 1 and 2 at a maximum of 10 minutes between changes. The purpose is to allow the E-Ultra to drop back to safe control outputs when the BMS goes off line.

Integration time is the number of cycles used in the PI loop for Humidity or Dew Point Control. The larger the number, the longer it takes to wind up the integrator and increase the percentage output when the humidity does not change.

Cabinet Fan Start temperature is the trip point for the cabinet fan to start. The Cabinet Fan high and low alarm points are shown.

6.4.4 Input Configuration



The Control Temperature sensor, if available, can be enabled in this screen.

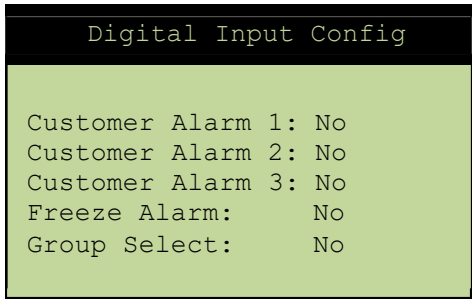
The Log Remote Shutdown, if set to YES, will be treated as an alarm and logged as such.

Air Flow is the Air Flow Switch input.

Pin 4 can be assigned to None, Water Detector or Condensate Pan depending on the sensor and function.

The Fire/Smoke and High Limit Humidistat can also be enabled on this screen. Optionally, the High Limit Humidistat may be set to cause an alarm.

6.4.5 Digital Input Configuration



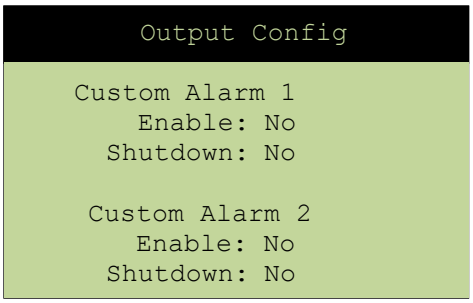
This screen allows the enabling of inputs.

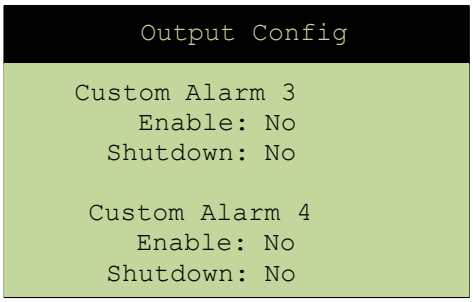
A Customer alarm, when set to Yes, allows that input to annunciate its alarm presence. The text that appears for the customer alarm is set elsewhere.

Freeze Alarm, if available, when set to Yes, allows a freeze thermostat input to disable the humidification function.

Group Select, when set to Yes, allows the Group Select input to determine which Group operates (A or B). This overrides any auto rotation when set to Yes.

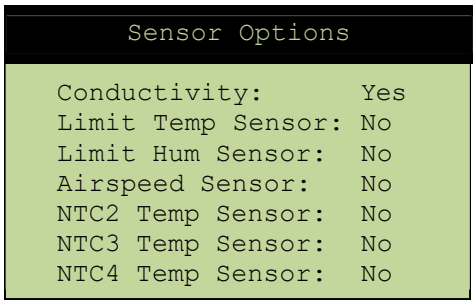
6.4.6 Output Configuration





The custom alarms can be enabled and can be configured to shut down the system.

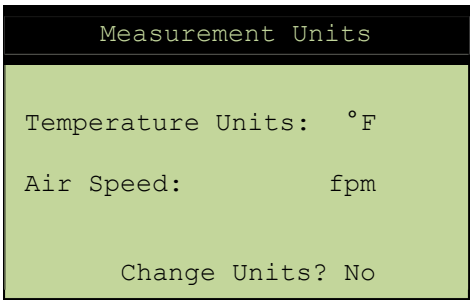
6.4.7 Sensor Options



This screen shows the enable state of the rest of the analog sensors.

6.4.8 Measurement Units

The temperature units may be selected to be °F or °C.

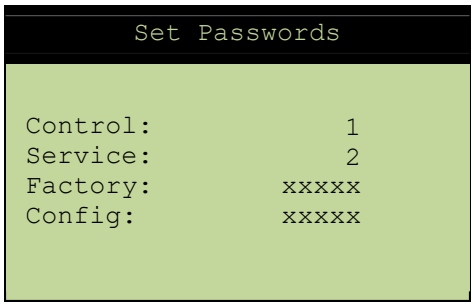


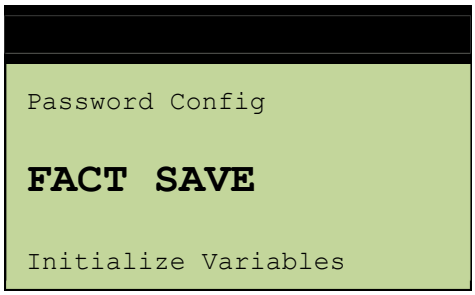
The air speed units may be selected as meters per minute (m/m) or feet per minute (fpm).

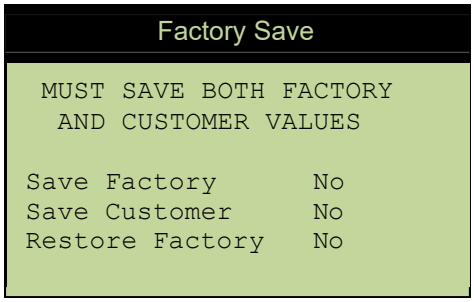
Since this affects many parts of the program, the changing of the units can only be done by using the Config password and changing the bottom line from No to Yes. It will change back to No when it is finished modifying the system.

6.4.9 Screens Visible by Config Password

The following screens appear only when the configuration password is in effect. They will not appear when any other password is in effect.

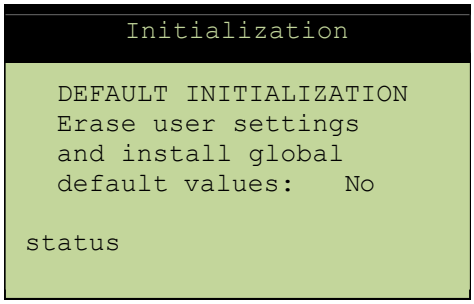






After the factory settings have been completed, they can be saved into permanent memory. It also should be saved into the customer's memory. This allows the restoration to the factory settings, or to customer saved settings if the customer inadvertently sets up situations that cause erratic behavior. By returning to this screen the STULZ Product Support technicians

can restore the settings back to the factory settings or the customer's last saved configuration.



This screen is used to set the entire permanent memory values back to their default values. This must be done any time new software is downloaded. Use the Enter (↵) key to position the cursor at the "No" text and then press either the Up or Down key to display "Yes". Then press the Enter (↵) key to start the initialization process. The area labeled status will show the progress of the restoration to the default values.

When it is done, it will go back to the Basic System Configuration screen.

6.5 Factory Default Set Points

Table 1- Default Set Points

Parameter	Set Point
Remote Enable	Yes
Customer Alarm 1 Enable	No
Airflow Enable	No
BMS keep alive Override	No
Smoke Alarm Enable	No
High humidity Switch Enable	No
Customer Alarm 2 Enable	No
Humidifier Temperature Enable	No
Customer Alarm 3 Enable	No
Group Select	No
Cabinet Fan Enable	Yes
Custom Alarm 1 Output Enable	No
Custom Alarm 2 Output Enable	No
Custom Alarm 3 Output Enable	No
Custom Alarm 4 Output Enable	No
Log Remote Shutdown	No
Bank Enable	No
High Airflow Alarm Enable	No
Low Airflow Alarm Enable	No
High limit humidity alarm Enable	No
Control Temperature Enable	No
Control Humidity Enable	Yes
Conductivity Enable	Yes
Limit Temperature Enable	No
Limit Humidity Enable	No
Airspeed Enable	No
Low Limit Humidity Alarm Enable	No
NTC2 Temperature Sensor Enable	No
NTC3 Temperature Sensor Enable	No
NTC4 Temperature Sensor Enable	No
Control Temperature X Low Scale	0
Control Temperature X High Scale	50.0
Control Humidity X Low Scale	0
Control Humidity X High Scale	100.0
Limit Temperature X Low Scale	0
Limit Temperature X High Scale	50.0
Limit Humidity X Low Scale	0
Limit Humidity X High Scale	100.0
Remote On/OFF Invert	Yes
Customer Alarm 1 Invert	Yes
Airflow Switch Invert	Yes
Water Detector Invert	Yes
Smoke Alarm Invert	Yes
High Humidistat Invert	Yes
Customer Alarm 2 Invert	Yes
Freeze Alarm Invert	Yes
Customer Alarm 3 Invert	Yes
Group Select Invert	Yes
Group A Limit Enable	Yes
Group B Limit Enable	Yes
Cabinet Temperature Alarm Shutdown	No
NTC2 Temperature Alarm Shutdown	No
NTC3 Temperature Alarm Shutdown	No
Custom Alarm 1 Shutdown Enable	No
Custom Alarm 2 Shutdown Enable	No
Custom Alarm 3 Shutdown Enable	No
Custom Alarm 4 Shutdown Enable	No
Cabinet Low Temperature Alarm Enable	Yes
Cabinet High Temperature Alarm Enable	Yes
NTC2 Low Temperature Alarm Enable	No
NTC2 High Temperature Alarm Enable	No
NTC3 Low Temperature Alarm Enable	No
NTC3 High Temperature Alarm Enable	No
NTC2 Low Temperature Alarm Enable	No
NTC2 High Temperature Alarm Enable	No
Humidity Limit Alarm Enable	No
Demo Case Selected	No
Control Temperature Offset	0.0°F
Control Humidity Offset	0.0%RH
Conductivity Offset	0.0 uS
Airspeed Offset	0.0 fpm
Cabinet Temperature Offset	0.0°F
NTC2 Temperature Offset	0.0°F
NTC3 Temperature Offset	0.0°F
NTC4 Temperature Offset	0.0°F
Customer Alarm 1 Shutdown Enable	No
Customer Alarm 2 Shutdown Enable	No
Customer Alarm 3 Shutdown Enable	No
Airflow Shutdown Enable	No
Control Mode	Humidity
Limit Humidity Set Point	80.0%RH
Limit Temperature Set Point	72.0°F
Startup Delay	10 Sec
Pin 4	None
Airflow Delay	5 sec
Alarm delay	10 sec
Airflow offset	0.0 fpm
dew point Cut-in	-4.0°F
dew point Cutout	0.0°F
Sensor Fail Delay	15 sec
Recovery Delay	1 sec
Limit dew point Cut-in	5.0°F
Limit dew point Cutout	0.0°F
Control Password	1
Service Password	2
Factory Password	-
System Configuration Password	-
Number of humidifiers	1
First Modbus address of Humidifiers	6
Airspeed Type	4-20mA
High Limit Humidity Alarm Set Point	95.0%RH
Low Limit Humidity Alarm Set Point	20.0%RH
Limit Humidity Alarm Offset	5.0%RH
BMS Timeout	10 sec
BMS Address	1
BMS Baud rate	19,200
BMS Protocol Select	BACnet
Control Humidity Sensor Type	4-20mA
Control Humidity Set Point	45.0%RH
Control Humidity Cut-in	-4%RH
Control Humidity Cutout	0.0%RH
Limit Humidity Sensor Type	4-20mA
Control Temperature Sensor Type	4-20mA
High Control Humidity Alarm	70.0%RH
Low Control Humidity Alarm	30% RH
Control Humidity Alarm Offset	5.0%RH
Drain Duration	10 mins.
Cabinet Temperature Sensor X minimum	0.0
Cabinet Temperature Sensor X minimum	100.0
Cabinet Temperature Sensor Y minimum	0.0°C
Cabinet Temperature Sensor Y minimum	100.0°C
NTC2 Temperature Sensor X minimum	0.0
NTC2 Temperature Sensor X minimum	100.0
NTC2 Temperature Sensor Y minimum	0.0°C
NTC2 Temperature Sensor Y minimum	100.0°C
NTC3 Temperature Sensor X minimum	0.0

Parameter	Set Point
NTC3 Temperature Sensor X minimum	100.0
NTC3 Temperature Sensor Y minimum	0.0°C
NTC3 Temperature Sensor Y minimum	100.0°C
NTC4 Temperature Sensor X minimum	0.0
NTC4 Temperature Sensor X minimum	100.0
NTC4 Temperature Sensor Y minimum	0.0°C
NTC4 Temperature Sensor Y minimum	100.0°C
Group Rotation Hours	24 hours
Humidifier Type	3
Limit Temperature Sensor Type	4-20mA
Conductivity Delay	10 sec
Group A Restrictor	100%
Group Switch Time	24 hours
Group B Restrictor	100%
Limit Humidity Cut-in	-4.0%rH
Limit Humidity Cutout	0.0%RH
Limit Temperature Cut-in	-4.0°F
Limit Temperature Cutout	0.0°F
Group B Assist	Rotate
Humidifier Modbus number of stop bits	0
Humidifier Modbus parity	None
Humidifier Modbus Baud rate	19,200
Operating Mode	2 (See Table, Section 5.7.1)
Clock Adjust	3600
Drain hours high	0
Drain hours low part	72 hours
High Control Temperature Alarm Enable	No
Low Control Temperature Alarm Enable	No
High Control Humidity Alarm Enable	Yes
Low Control Humidity Alarm Enable	Yes
Fahrenheit is Temperature Unit of Measure	Yes
Auto Reset	Yes
Auto Reset Remote	Yes
Smoke Shutdown on Alarm	No
Drain Enable	Yes
Suppress Buzzer	Yes
High Limit Temperature Alarm Enable	No
Air Speed Units	fpm
Low Limit Temperature Alarm Enable	No
Freeze Alarm Enable	No

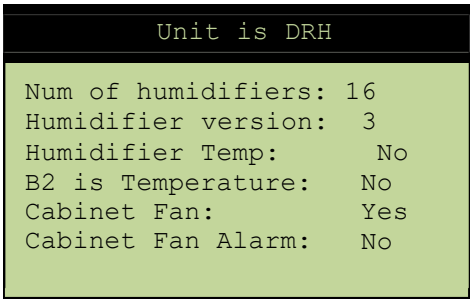
7 INITIAL STARTUP

7.1 Humidifier Address Scheme

The humidifiers come from the factory set to address 1, but each humidifier must be assigned a unique address from 1-16. The method of numbering the humidifiers is not important, just that the numbers are consecutive. That is, if there are nine humidifiers, the addresses assigned to the humidifiers must be 1-9. It may be done in the order in which they connected to the communications line or by positions in the room or ductwork, or any other scheme.

7.2 Check the Humidifier Address Range

The number of humidifiers must be set in the EUltra controller and is done at the factory. To verify the number of humidifiers is set correctly, go to the Service Menu use the Down arrow (↓) key to get to the SYS CFG selection and press the Enter (↵) key. Press the down arrow (↓) key to display the following screen:



Verify that the **Num of Humidifiers** line shows the number of humidifiers for this installation. If it is not correct, contact your factory authorized service center to arrange for a technician to make the changes.

7.3 Setting the Humidifier Address

Return to the service menu and enter the HUMID sub menu. Use the down arrow (↓) key to select the Humidifier Config Menu (see section 0). Make sure all humidifiers are selected to be in Group A or Group B as needed by the dictates of the installation. Follow the procedure in that section to make any changes.

To assign addresses to the units, turn off all the output circuit breakers to the humidifiers. Then turn on main power to the EUltra cabinet and to the auxiliary power cabinets. Starting with the unit with the highest address, turn the output circuit breaker on for that unit. Follow the directions found in section 5.5.5 to change the address of the unit from 1 to that highest number. Verify the change was accepted as described in that section.

Next, turn on the output breaker for the next highest unit and repeat the procedure.

Repeat the process of turning on the breaker and setting the address until the unit with address 2 has been set. Then turn on the breaker for unit 1. At this point, communications with all humidifiers should be occurring. Go to the menu described in section 5.5.7 and verify each humidifier is communicating.

7.4 Replacing a Humidifier

If a humidifier is replaced with a factory supplied humidifier, turn off the breaker for the offending humidifier and replace it. It will have to have its address changed from 1 to the correct address. Turn off the output breaker to humidifier 1 and follow the directions found in section 5.5.5 to change the address of the replacement unit from 1 to the correct address. Verify the change was accepted as described in that section. Then turn the output breaker for humidifier 1 back on.

8 MAINTENANCE

8.1 General

Because conditions vary greatly, individual maintenance schedules must be determined for each location, based upon periodic examination of the controller.

Check for corrosion on the exterior of the enclosure. Touch-up the finish if required.

WARNING

Power is still present inside the control box when the On/Off switch on the enclosure door is Off.

Turn off main supply power before performing maintenance to the interior of the box.

Check the interior of the enclosure for accumulated dust or dirt. Vacuum if required.

Check for corrosion on the electrical connections. Clean corrosion if necessary and apply anti-corrosion grease. Periodically, check and tighten all terminal connections.

Check the interior of the enclosure for signs of overheating. If evidence of overheating is observed, Ensure the vent openings are free of obstructions and the vent fan operates when the cabinet temperature is above 104°F.

A system should be established for trend analysis of problems, defects and deficiencies noted by operators and discovered during maintenance inspections together with the corrective actions taken. For maintenance assistance, contact the STULZ Product Support.

9 TROUBLESHOOTING

9.1 General

The Ultra-Series controller is designed for continuous and dependable operation. In the event that a problem is encountered with the humidification system, the system controller may be used to diagnose the cause.
The controller signals an alarm condition when the red backlight LED is illuminated behind the alarm function key.

An alarm indication is accompanied by a screen text message with a brief description of the cause (See Alarm Screen Messages, Section 5.3.4). Often the remedy is simple to determine by reading the alarm message i.e. “High Conductivity Alarm” (Check supply water quality).

The following abbreviated guidelines are included to assist in troubleshooting the system due to operational or performance problems. Refer to the Humidifier IOM for troubleshooting guidelines when there are system performance issues.

If the problem can’t be resolved using the alarm screens and the guidelines, contact STULZ Product Support for assistance (See Section 9.0).

Problem: “Alarm” Lamp is ON

1. Use the system controller to check the Alarm display message(s).
2. Identify and correct cause of alarm condition.
3. Reset if necessary.

Problem: Control Is Erratic

1. Wiring improperly connected or broken.
2. Wires shorted. Check all wire connections to ensure they are tight and that no shorts are present. Also check wiring against the schematic diagram included with the unit to ensure the wire terminations are correct.

WARNING

Keep hands, clothing and tools clear of live electrical terminals. Turn off all power to the unit before conducting any troubleshooting or repair procedures unless the procedure specifically requires the system to operate.

9.2 Controller Signal LED's

The controller includes 3 LED's (red, yellow and green) that provide information on the operation of the control module and status of the connection to the pLAN. These signal LED's are positioned adjacent to the yellow, "Power On" LED (see Figure 4). The signal LED's may be used for diagnostic purposes if a problem arises.

Key: ● LED off ○ LED on ⊖ LED flashing

RED LED	YELLOW LED	GREEN LED	
●	●	●	Correct operation with or without local terminal.
○	●	●	Application with error or no pLAN table.
○	○	○	Application with error or no pLAN table. Controller connected to ONLY one terminal.
●	○	○	Application with correct pLAN table.
●	○	○	Correct operation in pLAN.
●	⊖	●	Awaiting communication with WinLoad (factory configuration software). Check address.
●	⊖/●	●/⊖	(LED flashing alternately) Communication with WinLoad not valid. No power supply or wrong driver.
●	●	⊖	Communicating with WinLoad (in low level operation).
●	⊖	⊖	Communication with WinLoad on hold.
⊖	⊖	⊖	WinLoad not suitable or incorrect software protection password.
●	○	⊖	Communicating with WinLoad (in normal operation).
●	●	○	Controller supervisor protocol (slave) active on serial 0.

10 REPAIR PROCEDURES

10.1 General

Under normal operating conditions and with the proper preventive maintenance, the unit should provide excellent service for many years. If necessary, the unit may be returned to the manufacturer for major overhaul and refurbishment. All work must be performed by qualified technicians.

10.2 Component Replacement

Replaceable components may be removed and replaced from the controller using common hand tools. Ensure power is disconnected from the controller before removing or replacing components.

WARNING 

Power is still present inside the controller enclosure when the On/Off switch on the enclosure door is in the Off position.

11 PRODUCT SUPPORT

STULZ provides its customers with Product Support which not only provides technical support and parts but the following additional services, as requested:

- Performance Evaluations
- Start-up Assistance
- Training

11.1 Technical Support

The STULZ Technical Support Department is dedicated to the prompt reply and solution to any problem encountered with a unit. Should a problem develop that cannot be resolved using this manual, call (888) 529-1266 Monday through Friday from 8:00 a.m. to 5:00 p.m. EST. If a problem occurs after business hours, provide your name and telephone number. One of our service technicians will return your call.

When calling to obtain support, it is important to have the following information readily available, (information is found on the unit's nameplate):

- Unit Model Number
- STULZ Sales Order Number
- STULZ Item Number
- Unit Serial Number
- Description of Problem

11.2 Obtaining Warranty Parts

Warranty inquiries are to be made through the Technical Support Department at (888) 529-1266 Monday through Friday from 8:00 a.m. to 5:00 p.m. EST. A service technician at STULZ will troubleshoot the system over the telephone with a field service technician to determine the defect of the part. If it is determined that the part may be defective a replacement part will be sent via UPS ground. If the customer requests that warranty part(s) be sent by any other method than UPS ground the customer is responsible for the shipping charges. If you do not have established credit with STULZ you must give a freight carrier account number.

A written (or faxed) purchase order is required on warranty parts and must be received prior to 12:00 p.m. for same day shipment. The purchase order must contain the following items:

- Purchase Order Number
- Date of Order
- STULZ Stated Part Price
- Customer Billing Address
- Shipping Address
- Customer's Telephone and Fax Numbers
- Contact Name
- Unit Model Number
- Serial Number
- STULZ Item Number.

The customer is responsible for the shipping cost incurred for returning the defective part(s) back to STULZ. Return of defective part(s) must be within 30 days at which time an evaluation of the part(s) is conducted and if the part is found to have a manufacturing defect a credit will be issued.

When returning defective part(s) complete the Return Material Authorization Tag and the address label received with the replacement part.

See the STULZ Standard Warranty located in section one of this manual.

11.3 Obtaining Spare/Replacement Parts

Spare and replacement parts requests are to be made through Product Support by fax (301) 620-1396, telephone (888) 529-1266 or E-mail (parts@stulz-ats.com). Quotes are given for specified listed parts for a specific unit. STULZ accepts Visa and MasterCard. STULZ may extend credit to its customers; a credit application must be prepared and approved (this process could take one week).

A 25% minimum restocking charge will be applied on returned stocked parts that were sold as spare/replacement parts. If the returned part is not a stocked item, a 50% restocking charge may be applied.

Additionally a Return Material Authorization Number is required when returning parts. To receive credit for returned repair/replacement parts, the parts must be returned to STULZ within 30 days of the purchase date.

Spare part sales over 30 days old will be considered final and the parts will remain the sole property of the ordering party.

12 APPENDIX A - BMS Parameters

Supported Protocols	Speed	Media	Connection	Notes
BACnet over IP	10 Mbps	10pBaseT	RJ45 direct communications	Uses BMS addresses
BACnet over Ethernet	10 Mbps	10pBaseT	RJ45 direct communications	Uses BMS addresses
HTTP	10 Mbps	10pBaseT	RJ45 direct communications	Uses BMS addresses
SNMP V1, V2c	10 Mbps	10pBaseT	RJ45 direct communications	Uses BMS addresses
Modbus over IP	10 Mbps	10pBaseT	RJ45 direct communications	Uses Modbus addresses
BACnet MS/TP	19200 baud	Twisted Pair	Daisy chain connection	Uses BMS addresses
Modbus RTU	19200 baud	Twisted Pair	Daisy chain connection	Uses Modbus addresses

12.1 Signed Values for HTTP, SNMP / Modbus Holding Registers / Analog Values for BACnet

Modbus TCP/IP	BMS Address	Modbus Address	BACnet Address	Description	Default	Min	Max	Read/ Write
40002	1	40002	1	Control Dew point Set Point	72.0			R/W
40003	2	40003	2	Control Humidity Set Point	45.0	10.0	95.0	R/W
40004	3	40004	3	Control temperature sensor current value				R
40005	4	40005	4	Control humidity sensor current value				R
40006	5	40006	5	dew point from return temp and humidity				R
40007	6	40007	6	Limit temperature sensor value				R
40008	7	40008	7	Limit humidity sensor value				R
40009	8	40009	8	dew point from limit temperature and humidity				R
40010	9	40010	9	Airspeed sensor current value				R
40011	10	40011	10	Control Cabinet Temperature				R
40012	11	40012	11	NTC2 Temperature				R
40013	12	40013	12	NTC3 Temperature				R
40014	13	40014	13	NTC4 Temperature				R
40015	14	40015	14	Conductivity				R
40016	15	40016	15	Humidifier 1 Temperature (xxx.x°C)				R
40017	16	40017	16	Humidifier 1 Voltage (xx.x volts)				R
40018	17	40018	17	Humidifier 2 Temperature (xxx.x°C)				R
40019	18	40019	18	Humidifier 2 Voltage (xx.x volts)				R
40020	19	40020	19	Humidifier 3 Temperature (xxx.x°C)				R
40021	20	40021	20	Humidifier 3 Voltage (xx.x volts)				R
40022	21	40022	21	Humidifier 4 Temperature (xxx.x°C)				R
40023	22	40023	22	Humidifier 4 Voltage (xx.x volts)				R
40024	23	40024	23	Humidifier 5 Temperature (xxx.x°C)				R
40025	24	40025	24	Humidifier 5 Voltage (xx.x volts)				R
40026	25	40026	25	Humidifier 6 Temperature (xxx.x°C)				R
40027	26	40027	26	Humidifier 6 Voltage (xx.x volts)				R
40028	27	40028	27	Humidifier 7 Temperature (xxx.x°C)				R
40029	28	40029	28	Humidifier 7 Voltage (xx.x volts)				R
40030	29	40030	29	Humidifier 8 Temperature (xxx.x°C)				R
40031	30	40031	30	Humidifier 8 Voltage (xx.x volts)				R
40032	31	40032	31	Humidifier 9 Temperature (xxx.x°C)				R
40033	32	40033	32	Humidifier 9 Voltage (xx.x volts)				R
40034	33	40034	33	Humidifier 10 Temperature (xxx.x°C)				R
40035	34	40035	34	Humidifier 10 Voltage (xx.x volts)				R
40036	35	40036	35	Humidifier 11 Temperature (xxx.x°C)				R
40037	36	40037	36	Humidifier 11 Voltage (xx.x volts)				R
40038	37	40038	37	Humidifier 12 Temperature (xxx.x°C)				R
40039	38	40039	38	Humidifier 12 Voltage (xx.x volts)				R
40040	39	40040	39	Humidifier 13 Temperature (xxx.x°C)				R
40041	40	40041	40	Humidifier 13 Voltage (xx.x volts)				R
40042	41	40042	41	Humidifier 14 Temperature (xxx.x°C)				R
40043	42	40043	42	Humidifier 14 Voltage (xx.x volts)				R
40044	43	40044	43	Humidifier 15 Temperature (xxx.x°C)				R

Modbus TCP/IP	BMS Address	Modbus Address	BACnet Address	Description	Default	Min	Max	Read/ Write
40045	44	40045	44	Humidifier 15 Voltage (xx.x volts)				R
40046	45	40046	45	Humidifier 16 Temperature (xxx.x°C)				R
40047	46	40047	46	Humidifier 16 Voltage (xx.x volts)				R
40050	49	40050	49	Dew Point Setpoint				R
40051	50	40051	50	Limit Dewpoint				R
40052	51	40052	51	Limit humidity low alarm point	30.0			R/W
40053	52	40053	52	Limit temperature high alarm point	80.0			R/W
40054	53	40054	53	Limit temperature low alarm point	60.0			R/W
40055	54	40055	54	Limit humidity high alarm point	70.0			R/W
40101	100	40101	100	Control temperature high alarm point	80.0			R/W
40102	101	40102	101	Control temperature low alarm point	60.0			R/W
40103	102	40103	102	Control humidity high alarm point	70.0			R/W
40104	103	40104	103	Control humidity low alarm point	30.0			R/W
40105	104	40105	104	dew point Limit Point	72.0			R/W
40106	105	40106	105	Humidity Limit set point	80.0			R/W
40107	106	40107	106	Limit high humidity cut-in	79.0			R/W
40108	107	40108	107	Limit high humidity cutout (band is cutout-cut-in)	75.0			R/W
40109	108	40109	108	Conductivity Pre Alarm limit	5.0			R/W
40110	109	40110	109	Conductivity Alarm limit	20.0			R/W
40111	110	40111	110	Network supplied Control Humidity or Proportional Control *				R/W
40112	111	40112	111	Network supplied control temperature				R/W
40113	112	40113	112	Network supplied dew point Value (when dew point configured)				R/W
40114	113	40114	113	Network supplied Limit Temperature Value				R/W
40115	114	40115	114	Network supplied Limit Humidity Value				R/W
40116	115	40116	115	High Airflow Alarm trip point				R/W
40117	116	40117	116	Low Airflow Alarm trip point				R/W
40118	117	40118	117	dew point Control cut-in	-4.0			R/W
40119	118	40119	118	dew point Control cutout	0.0			R/W
40120	119	40120	119	dew point Limit cut-in	-4.0			R/W
40121	120	40121	120	dew point Limit cutout	0.0			R/W
40122	121	40122	121	Network supplied dew point limit				R/W
40123	122	40123	122	Control Dewpoint High Alarm point				R/W
40124	123	40124	123	Control Dewpoint Low Alarm point				R/W
40125	124	40125	124	Limit Dewpoint High Alarm point				R/W
40126	125	40126	125	Limit Dewpoint Low Alarm point				R/W

* If configured for humidity, this is return humidity; if configured proportional, this the percent output

12.2 Unsigned Values
HTTP, SNMP / Modbus Holding Registers / Analog Values for BACnet

Modbus TCP/IP	BMS Address	Modbus Address	BACnet Address	Description	Default	Read/ Write
5002	1	40130	1001	Group A proportional output		R
5003	2	40131	1002	Group B proportional output		R
5004	3	40132	1003	Packed bits for BMS – Alarms 1		R
5005	4	40133	1004	Packed bits for BMS – Alarms 2		R
5006	5	40134	1005	Packed bits for BMS – Humidifier 1 Alarms		R
5007	6	40135	1006	Packed bits for BMS – Humidifier 2 Alarms		R
5008	7	40136	1007	Packed bits for BMS – Humidifier 3 Alarms		R
5009	8	40137	1008	Packed bits for BMS – Humidifier 4 Alarms		R
5010	9	40138	1009	Packed bits for BMS – Humidifier 5 Alarms		R
5011	10	40139	1010	Packed bits for BMS – Humidifier 6 Alarms		R
5012	11	40140	1011	Packed bits for BMS – Humidifier 7 Alarms		R
5013	12	40141	1012	Packed bits for BMS – Humidifier 8 Alarms		R
5014	13	40142	1013	Packed bits for BMS – Humidifier 9 Alarms		R
5015	14	40143	1014	Packed bits for BMS – Humidifier 10 Alarms		R
5016	15	40144	1015	Packed bits for BMS – Humidifier 11 Alarms		R
5017	16	40145	1016	Packed bits for BMS – Humidifier 12 Alarms		R
5018	17	40146	1017	Packed bits for BMS – Humidifier 13 Alarms		R
5019	18	40147	1018	Packed bits for BMS – Humidifier 14 Alarms		R
5020	19	40148	1019	Packed bits for BMS – Humidifier 15 Alarms		R
5021	20	40149	1020	Packed bits for BMS – Humidifier 16 Alarms		R
5022	21	40150	1021	Packed bits for BMS – Raw digital inputs		R
5023	22	40151	1022	Packed bits for BMS – Digital inputs 2		R
5024	23	40152	1023	Packed bits for BMS – Digital outputs		R
5025	24	40153	1024	Packed bits for BMS – Humidifier 1 Digital outputs		R
5026	25	40154	1025	Packed bits for BMS – Humidifier 2 Digital outputs		R
5027	26	40155	1026	Packed bits for BMS – Humidifier 3 Digital outputs		R
5028	27	40156	1027	Packed bits for BMS – Humidifier 4 Digital outputs		R
5029	28	40157	1028	Packed bits for BMS – Humidifier 5 Digital outputs		R
5030	29	40158	1029	Packed bits for BMS – Humidifier 6 Digital outputs		R
5031	30	40159	1030	Packed bits for BMS – Humidifier 7 Digital outputs		R
5032	31	40160	1031	Packed bits for BMS – Humidifier 8 Digital outputs		R
5033	32	40161	1032	Packed bits for BMS – Humidifier 9 Digital outputs		R
5034	33	40162	1033	Packed bits for BMS – Humidifier 10 Digital outputs		R
5035	34	40163	1034	Packed bits for BMS – Humidifier 11 Digital outputs		R
5036	35	40164	1035	Packed bits for BMS – Humidifier 12 Digital outputs		R
5037	36	40165	1036	Packed bits for BMS – Humidifier 13 Digital outputs		R
5038	37	40166	1037	Packed bits for BMS – Humidifier 14 Digital outputs		R
5039	38	40167	1038	Packed bits for BMS – Humidifier 15 Digital outputs		R
5040	39	40168	1039	Packed bits for BMS – Humidifier 16 Digital outputs		R
5041	40	40169	1040	Humidifier communications protocol level		R
5042	41	40170	1041	Number of hours left until drain occurs		R/W
5043	42	40171	1042	Not used		
5044	43	40172	1043	Percentage restriction on Group A output (0-100)		R/W
5045	44	40173	1044	Percentage restriction on Group B output (0-100)		R/W
5048	47	40048	47	Limit Mode 0=disabled;1=humidity;2=dewpoint	0	R/W
5101	100	40229	1100	Type of humidifier system (1 – DRH, 2 = DAH)	0	R
5102	101	40230	1101	Control method (0 = humidity, 1 = dew point, 2 = proportional)	1	R
5103	102	40231	1102	Regulation mode – see section 6.4.1	2	R
5104	103	40232	1103	BMS keep alive (toggle between 1 & 2 every 10 mins.)	0	R/W
5124	123	40252	1123	Current day	1	R/W
5125	124	40253	1124	Current month	1	R/W
5126	125	40254	1125	Current year	0	R/W
5127	126	40255	1126	Current hour	0	R/W
5128	127	40256	1127	Current minute	0	R/W

12.3 Boolean Values
for HTTP, SNMP / Modbus Coils / Binary Values for BACnet

Modbus TCP/IP	BMS Address	Modbus Address	BACnet Address	Description	Default	Read/ Write
002	1	002	1	Global alarm output		R
003	2	003	2	System on status		R
004	3	004	3	Airflow has been proven		R
005	4	005	4	Call for humidification		R
006	5	006	5	Lead Group (0 = Group A, 1 = Group B)		R/W
007	6	007	6	Customer alarm input 1		R/W
008	7	008	7	Condensate Pan		R
009	8	009	8	Airflow Switch		R
010	9	010	9	Water Detector		R
011	10	011	10	High Limit Stat		R
012	11	012	11	Smoke		R
013	12	013	12	Customer alarm input 2		R/W
014	13	014	13	Customer alarm input 3		R/W
015	14	015	14	Custom Alarm 1		R
016	15	016	15	Custom Alarm 2		R
017	16	017	16	Custom Alarm 3		R
018	17	018	17	Custom Alarm 4		R
019	18	019	18	Cabinet Fan		R
020	19	020	19	High control temperature alarm		R
021	20	021	20	Low control temperature alarm		R
022	21	022	21	High control humidity alarm		R
023	22	023	22	Low control humidity alarm		R
024	23	024	23	Cabinet high temperature alarm		R
025	24	025	24	Cabinet low temperature alarm		R
026	25	026	25	NTC2 high temperature alarm		R
027	26	027	26	NTC2 low temperature alarm		R
028	27	028	27	NTC3 high temperature alarm		R
029	28	029	28	NTC3 low temperature alarm		R
030	29	030	29	NTC4 high temperature alarm		R
031	30	031	30	NTC4 low temperature alarm		R
032	31	032	31	Control temperature sensor fail		R
033	32	033	32	Control humidity sensor fail		R
034	33	034	33	Limit temperature sensor fail		R
035	34	035	34	Limit humidity sensor fail		R
036	35	036	35	Conductivity sensor fail		R
037	36	037	36	Airspeed sensor fail		R
038	37	038	37	Conductivity Pre-Alarm		R
039	38	039	38	Conductivity Alarm		R
040	39	040	39	High Control Temperature Alarm Enable		R
041	40	041	40	Low Control Temperature Alarm Enable		R
042	41	042	41	High Return Humidity Alarm Enable		R
043	42	043	42	Low Return Humidity Alarm Enable		R
044	43	044	43	High Airflow Alarm		R
045	44	045	44	Low Airflow Alarm		R
046	45	046	45	High limit temperature alarm		R
047	46	047	46	Low limit temperature alarm		R
048	47	048	47	Enable high limit temperature alarm		R/W
049	48	049	48	Enable low limit temperature alarm		R/W
050	49	050	49	High limit humidity alarm		R
051	50	051	50	Enable high humidity alarm		R/W
052	51	052	51	Enable low humidity alarm		R/W
053	52	053	52	Low limit humidity alarm		R
054	53	054	53	Enable high temperature alarm		R/W
055	54	055	54	Enable low temperature alarm		R/W
057	56	057	56	Airflow Shut Down Enable		R/W
058	57	058	57	Airflow Shut down		R
059	58	059	58	BMS Freeze Alarm Enable		R/W
060	59	060	59	Freeze alarm		R
061	60	061	60	---not used---		
062	61	062	61	NTC2 sensor failure		R

Modbus TCP/IP	BMS Address	Modbus Address	BACnet Address	Description	Default	Read/ Write
063	62	063	62	NTC3 sensor failure		R
064	63	064	63	NTC4 sensor failure		R
065	64	065	64	Enable high limit dewpoint alarm		R/W
066	65	066	65	Low control temperature alarm enable		R/W
067	66	067	66	---not used---		
068	67	068	67	---not used---		
069	68	069	68	High control air temperature alarm		R
070	69	070	69	Low control temperature alarm		R
071	70	071	70	high control air temperature alarm		R
072	71	072	71	low control temperature alarm		R
102	101	102	101	Remote shutdown		R/W
103	102	103	102	---not used---		---
104	103	104	103	Group Select		R/W
105	104	105	104	Reset Alarms		R/W
106	105	106	105	Group Select Enable		R/W

12.4 Alarm Packed Bit Variables

Bit	Value	Alarms 1	Alarms 2	Humidifier x Alarms
0	1	High control temperature alarm	Control temperature sensor fail	Low water alarm
1	2	Low control temperature alarm	Control humidity sensor fail	Fill failure alarm
2	4	High control humidity alarm	Limit temperature sensor fail	High temperature alarm
3	8	Low control humidity alarm	Limit humidity sensor fail	Freeze alarm
4	16	Cabinet high temperature alarm	Conductivity sensor fail	High voltage alarm
5	32	Cabinet low temperature alarm	Airspeed sensor fail	Low voltage alarm
6	64	NTC2 high temperature alarm	High limit temperature alarm	Humidifier off line alarm
7	128	NTC2 low temperature alarm	Low limit temperature alarm	Transducer failure alarm
8	256	NTC3 high temperature alarm	High limit humidity alarm	
9	512	NTC3 low temperature alarm	Low limit humidity alarm	
10	1024	NTC4 high temperature alarm	Freeze Alarm	
11	2048	NTC4 low temperature alarm	NTC2 sensor failure	
12	4096	Conductivity Pre-Alarm	NTC3 sensor failure	
13	8192	Conductivity Alarm	NTC4 sensor failure	
14	16384	High Airflow Alarm		
15	32768	Low Airflow Alarm		

12.5 Input Packed Bit Variables

Bit	Value	Raw Digital Inputs	Description
0	1	Remote enable	
1	2	Customer input 1	
2	4	Condensate Pan	
3	8	Airflow Switch	
4	16	Water Detector	
5	32	High Limit Stat	
6	64	Smoke	
7	128	---	
8	256	Customer input 2	
9	512	Customer input 3	
10	1024	Group Select	
11	2048	Reset Alarms	Set to a 1 to reset alarms that have cleared.
12	4096		
13	8192		
14	16384		
15	32768		

12.6 Output Packed Bit Variables

Bit	Value	Digital Output	Humidifier x Outputs
0	1	Global Alarm	Fill Valve State
1	2	Custom Alarm 1	Drain Valve State
2	4	Custom Alarm 2	Fan State
3	8	Custom Alarm 3	Drain enabled
4	16	Custom Alarm 4	Drain to fill level on startup
5	32	Cabinet Fan	In Group A
6	64		In Group B
7	128		Humidifier Enable State
8	256		Fan Configured
9	512		High Water Switch State
10	1024		Low Water Switch State
11	2048		Temperature Switch State
12	4096		
13	8192		
14	16384		
15	32768		

13 APPENDIX B - Inputs/Outputs

The inputs/outputs available for the various size controllers are listed in the following table.

Type	Virtual Pin number	Pco3 small	Pco3 medium	Pco3 large	Use	U = Universal N = NTC only	Option Name	Notes on basic units
DI	1	ID1	ID1	ID1	Remote shut down		Remote Shutdown	std. all units
DI	2	ID2	ID2	ID2	Customer Alarm 1		Customer Alarm 1	opt all units
DI	3	ID3	ID3	ID3	Air proving switch		Air Proof	opt all units
DI	4	ID4	ID4	ID4	Water Alarm		Water detection	opt all units
DI	5	ID5	ID5	ID5	Fire/Smoke detector		Fire/smoke	opt all units
DI	6	ID6	ID6	ID6	High limit humidistat		High limit humidistat	opt all units
DI	7	ID7	ID7	ID7	Customer Alarm 2		customer alarm 2	opt all units
DI	8	ID8	ID8	ID8	Freeze Alarm Thermostat (provided by others)		Freeze Alarm	opt all units
DI	9		ID9	ID9	Customer Alarm 3		Customer Alarm 3	opt med & large
DI	10		ID10	ID10	Bank Select		Bank select	opt med & large
DI	11		ID11	ID11	Not Used			
DI	12		ID12	ID12	Not Used			
DI	13		ID13	ID13	Not Used			
DI	14		ID14	ID14	Not Used			
DO	1	NO1	NO1	NO1	Summary alarm		Summary Alarm	std. all units
DO	2	NO2	NO2	NO2	Custom alarm 1		Custom Alarm 1	opt all units
DO	3	NO3	NO3	NO3	Custom alarm 2		custom alarm 2	opt all units
DO	4	NO4	NO4	NO4	Not available			
DO	5	NO5	NO5	NO5	Cabinet fan enable		Cabinet fan	std. all units
DO	6	NO6	NO6	NO6	Not available			
DO	7	NO7	NO7	NO7	open			
DO	8	NO8	NO8	NO8	open			
DO	9		NO9	NO9	Custom alarm 3		custom alarm 3	opt all units
DO	10		NO10	NO10	Custom alarm 4		custom alarm 4	opt all units
DO	11		NO11	NO11	Not Used			
DO	12		NO12	NO12	Not Used			
DO	13		NO13	NO13	Not Used			

Type	Virtual Pin number	Pco3 small	Pco3 medium	Pco3 large	Use	U = Universal N = NTC only	Option Name	Notes on basic units
AI	1	B1	B1	B1	Control Air Humidity	U	Remote sensor	std. all units
AI	2	B2	B2	B2	Limit Air Humidity	U	standard	opt all units
AI	3	B3	B3	B3	Conductivity	U	standard	opt all units
AI	4		B6	B6	Control Air Temperature	U	remote sensor	opt all units
AI	5	B4	B4	B4	Cabinet Temperature	N	Cabinet Temperature	std. all units
AI	6	B5	B5	B5	NTC2 input temperature	N	2nd temperature sensor	opt all units
AI	7		B7	B9	NTC3 input temperature	N	3rd temperature sensor	opt all units
AI	8		B8	B10	NTC4 input temperature	N	4th temperature sensor	opt all units
AI	9			B7	Limit Air Temperature	U	limit sensor	opt all units
AI	10			B8	Airflow Sensor	U	remote sensor	opt all units
AO	1	Y1	Y1	Y1	Not Used			
AO	2	Y2	Y2	Y2	Not Used			
AO	3	Y3	Y3	Y3	Not Used			
AO	4	Y4	Y4	Y4	Not Used			
AO	5			Y5	Not Used			
AO	6			Y6	Not Used			

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