Important: Read and save these instructions.
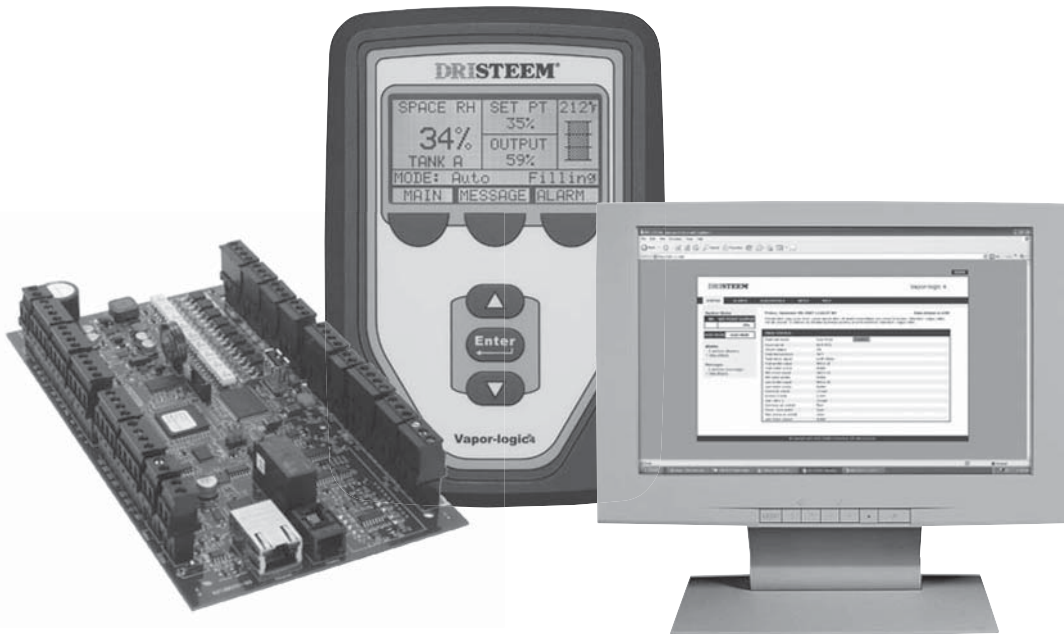
Vapor-logic®4
Humidifier Control System

Installation and Operation Manual

DRISTEEM®
The humidification experts

Contents

Vapor-logic4 capabilities

Accurate, responsive control

Vapor-logic, DRI-STEEM's humidification system controller, has been setting the standard for exceptional functionality and accurate RH control since 1992. The fourth generation controller, Vapor-logic4, retains the qualities that established the Vapor-logic reputation, plus offers several new capabilities, including:

Web interface, a standard feature, enables remote, simultaneous, secure access from anywhere, at any time.

Modbus, BACnet, and LonTalk® allow interoperability with multiple building automation systems (BAS).

Up-time optimizer keeps humidifiers operating through system faults, as long as safety conditions are met, minimizing production down-time.

USB port on Vapor-logic4 allows easy firmware updates, and data backup and restore capability.

PID control provides accurate, responsive, and adjustable relative humidity control.

Real-time clock allows time-stamped alarm and message tracking, and accurate drain and flush scheduling.

Tank temperature sensor, mounted on the evaporating chamber, provides over-temperature protection, freeze protection, and tank preheating, allowing rapid response to a call for humidity.

Auxiliary temperature sensor/transmitter allows temperature compensation control to prevent window condensation, or air temperature monitoring, such as in a duct.

Programmable outputs allow remote signaling or device activation, and are easily configured during the setup process.

Multiple-humidifier control allows staged control of up to 16 humidifiers with one controller.

Vapor-logic4 capabilities

Insert a USB flash drive into the Vapor-logic4 board's USB port to perform firmware updates, or to back up and restore data.
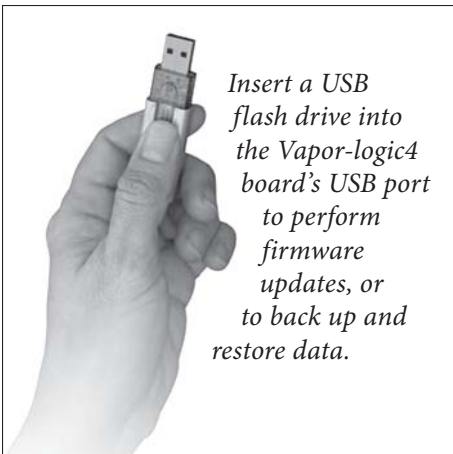
Enhanced diagnostics include:

- **Test outputs** function, using the keypad/display or Web interface to verify component operation
- **Test humidifier** function, by simulating demand to validate performance
- **Data collection** of RH, air temperature, water use, energy use, alarms, and service messages

Factory commissioning of humidifier and control board guarantees a reliable, fast installation, minimizing field installation requirements.

Preconfigured but easily changed. Just go into the Setup menu to change a factory setting if, for example, a control signal changes.
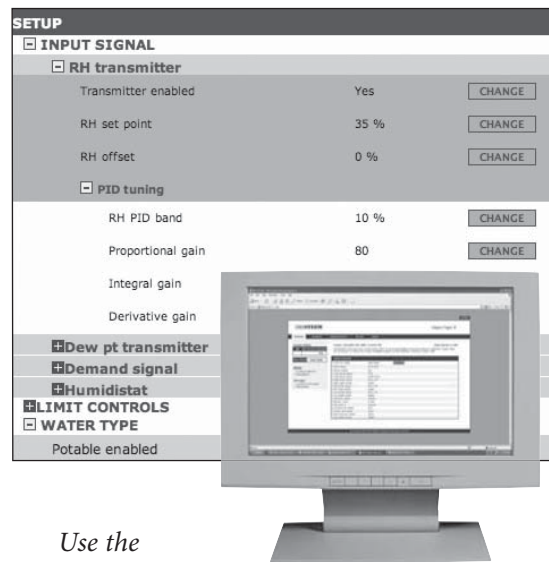
Use the Vapor-logic4 keypad/display or the standard Web interface, shown here, to control your humidification system.

Humidification system overview

Figure 3-1:
Typical humidification system layout (GTS humidifier shown)

Dispersion assembly

Humidifier

Vapor-logic4
keypad/display

Connect a computer directly to the
Vapor-logic4 board, or through a
network, to use the Web interface

Every humidification system with a Vapor-logic4 controller has a keypad/display connection and an Ethernet connection for connecting to a Web interface on a computer. A GTS humidifier is shown here, with keypad/display mounted on the cabinet. Other types of DRI-STEEM humidifiers can have the keypad/display contained within a control cabinet or mounted remotely.

OM-1220

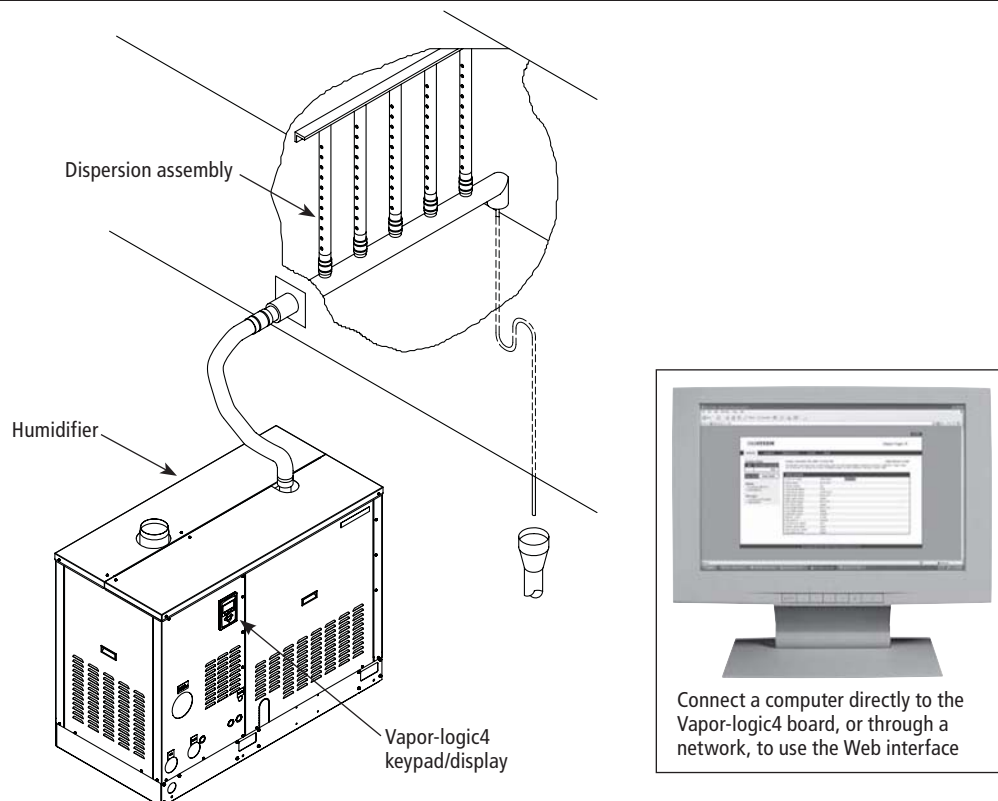## Operating conditions

The Vapor-logic4 main board and keypad/display must be operated and stored within the limits listed below. Exceeding these limits can result in poor display performance and/or damage to the unit.

Main board
Operating temperature: 32 °F to 158 °F (0 °C to 70 °C)
Storage temperate: -40 °F to 185 °F (-40 °C to 85 °C)
Operating humidity range: <95% noncondensing

Keypad/display
Operating temperature: 32 °F to 158 °F (0 °C to 70 °C)
Storage temperate: -22 °F to 176 °F (-30 °C to 80 °C)
Operating humidity range: <95% noncondensing
CAUTION! The keypad/display is not rated for plenum operation.

Vapor-logic4 control board

Figure 4-1:
Vapor-logic4 control board

Power to board connection

USB connection

Factory connection points
for drain, steam valve, etc.

Field connection points for
transmitters, power vent, etc.
Field connection terminal labels
have a white border.

Factory connection points
for water level control,
gas valves, etc.

BACnet or Modbus
connection

DRI-STEEM RS485
connection

Ethernet connection
for computer

Optional LonTalk
module location

Keypad/display
connection

The photo above shows key components of the Vapor-logic4 control board. See the illustration on the next page for more detail.

Figure 4-2:
Control board mounted on GTS subpanel

Vapor-logic4 control board

The Vapor-logic4 control board is
mounted to the subpanel located inside
the humidifier control compartment or
cabinet.

Note: Control board is shown here
mounted on a GTS humidifier subpanel.
Location of control board on subpanel
will vary with humidifier type.

Vapor-logic4 board connections

Figure 5-1:
Vapor-logic4 control board connections

LED-1 (power indicator)

LED-2

P1:
24VAC = Power to board
= Ground for power return

P2:
Low = Low water probe
Mid = Mid water probe
Top = Top water probe
= Ground for water probe

P3:
GV1 = Gas valve 1 (24VAC input)
BT1 = Blower tach 1 (pulse tach input)
LW = Low water (24VAC input)
FPsw = Flue pressure switch
(24VAC input)

P4:
Isw = Interlock switch (24VAC input)
TT = Tank temp sensor (RTD input)
= Ground for tank temp sensor
AI2 = Analog input (0-10VDC typical)

P5:
GV2 = Gas valve 2 (24VAC input)
BT2 = Blower tach 2 (pulse tach input)
GV3 = Gas valve 3 (24VAC input)
BT3 = Blower tach 3 (pulse tach input)

P6:
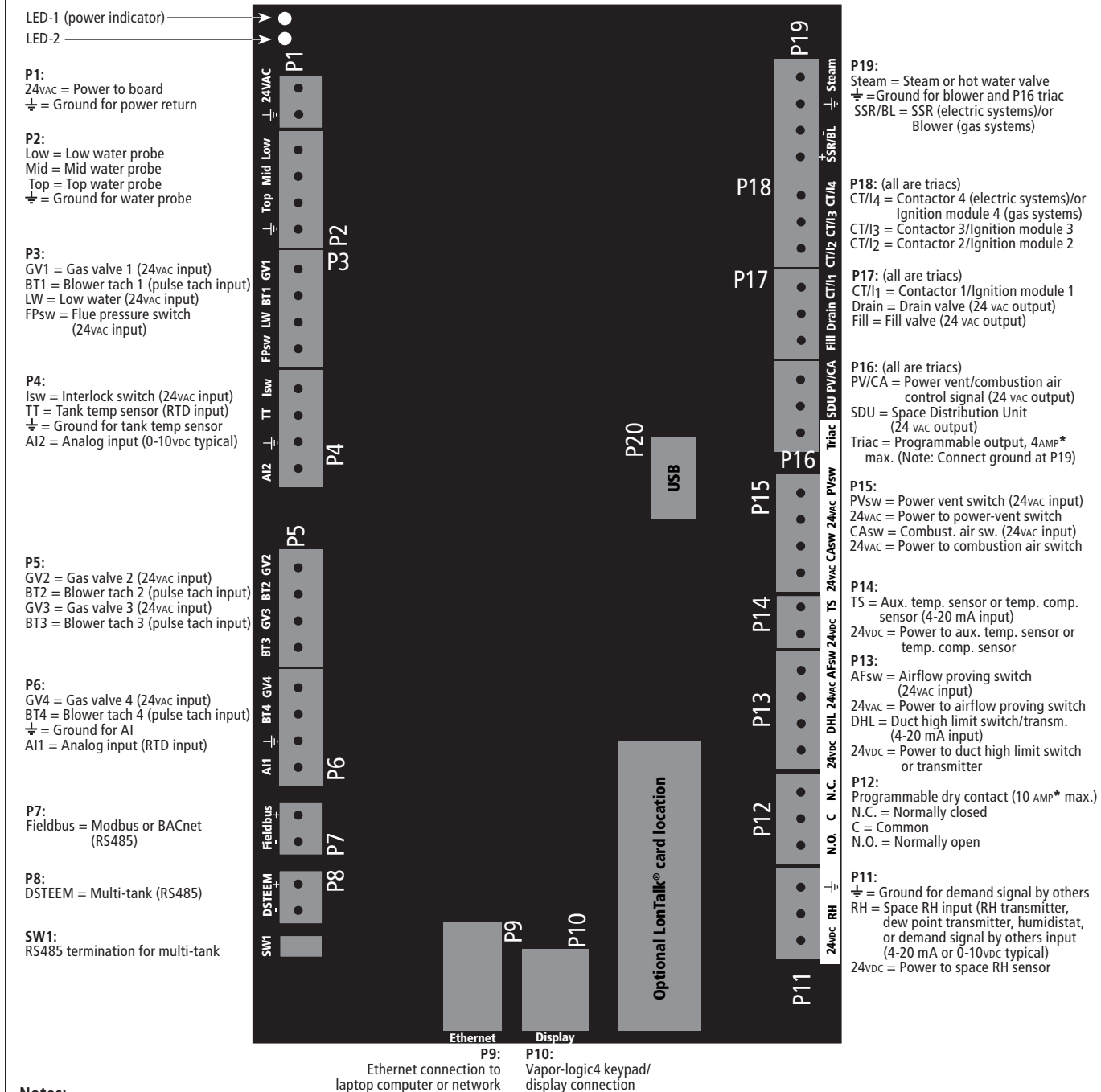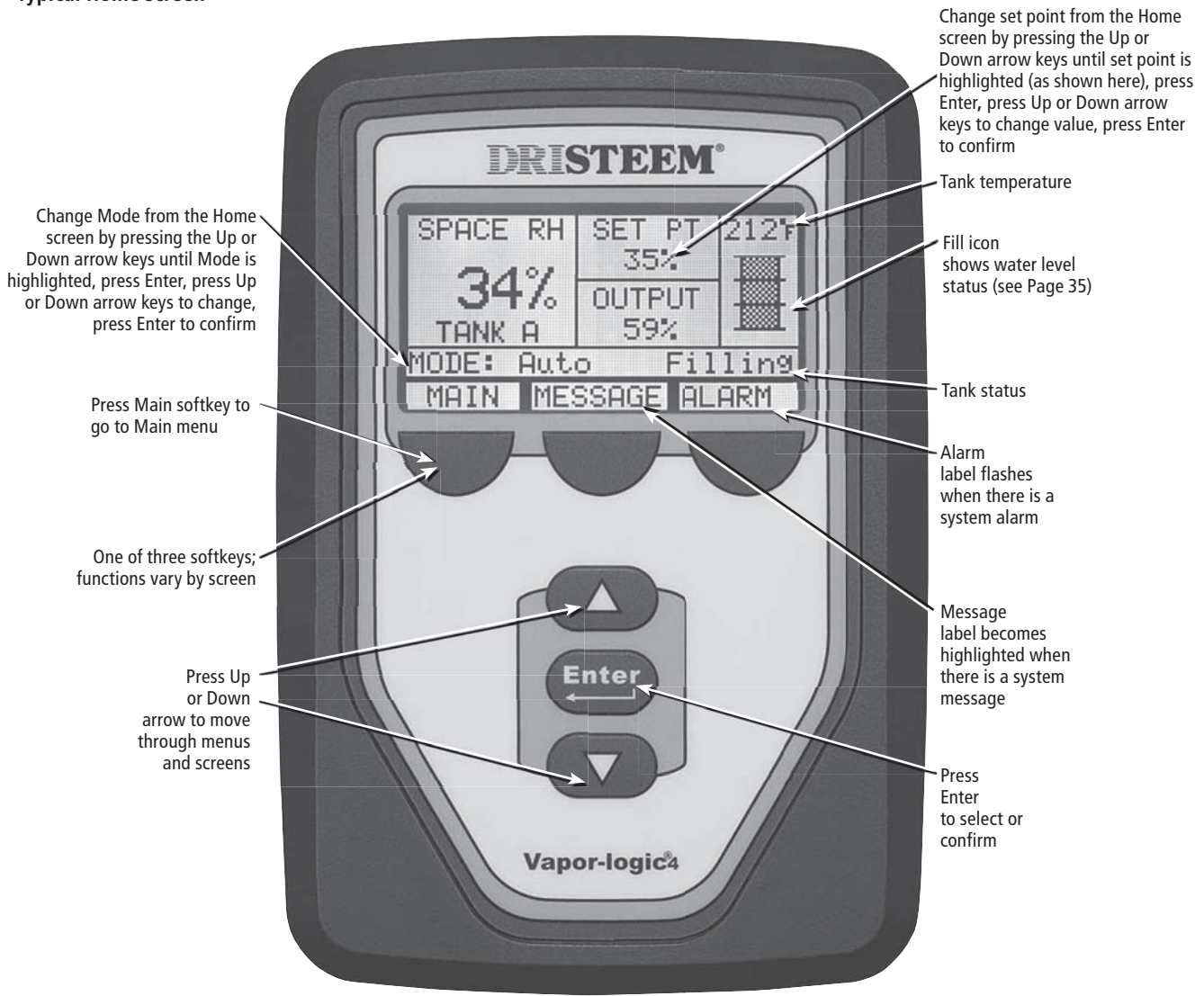GV4 = Gas valve 4 (24VAC input)
BT4 = Blower tach 4 (pulse tach input)
= Ground for AI
AI1 = Analog input (RTD input)

P7:
Fieldbus = Modbus or BACnet
(RS485)

P8:
DSTEEM = Multi-tank (RS485)

SW1:
RS485 termination for multi-tank

P19:
Steam = Steam or hot water valve
= Ground for blower and P16 triac
SSR/BL = SSR (electric systems)/or
Blower (gas systems)

P18: (all are triacs)
CT/I4 = Contactor 4 (electric systems)/or
Ignition module 4 (gas systems)
CT/I3 = Contactor 3/Ignition module 3
CT/I2 = Contactor 2/Ignition module 2

P17: (all are triacs)
CT/I1 = Contactor 1/Ignition module 1
Drain = Drain valve (24 VAC output)
Fill = Fill valve (24 VAC output)

P16: (all are triacs)
PV/CA = Power vent/combustion air
control signal (24 VAC output)
SDU = Space Distribution Unit
(24 VAC output)
Triac = Programmable output, 4AMP*
max. (Note: Connect ground at P19)

P15:
PVsw = Power vent switch (24VAC input)
24VAC = Power to power-vent switch
CAsw = Combust. air sw. (24VAC input)
24VAC = Power to combustion air switch

P14:
TS = Aux. temp. sensor or temp. comp.
sensor (4-20 mA input)
24VDC = Power to aux. temp. sensor or
temp. comp. sensor

P13:
AFsw = Airflow proving switch
(24VAC input)
24VAC = Power to airflow proving switch
DHL = Duct high limit switch/transm.
(4-20 mA input)
24VDC = Power to duct high limit switch
or transmitter

P12:
Programmable dry contact (10 AMP* max.)
N.C. = Normally closed
C = Common
N.O. = Normally open

P11:
= Ground for demand signal by others
RH = Space RH input (RH transmitter,
dew point transmitter, humidistat,
or demand signal by others input
(4-20 mA or 0-10VDC typical)
24VDC = Power to space RH sensor

Optional LonTalk® card location

USB

Ethernet
P9:
Ethernet connection to
laptop computer or network

Display
P10:
Vapor-logic4 keypad/
display connection

Notes:
* **CAUTION!** Programmable dry contact (P12) is rated for 10 Amp maximum; programmable triac (P16) is rated for 4 Amp maximum. Exceeding these maximum ratings can cause the triac or relay components on the Vapor-logic4 board to fail.
• Triac and dry contact functions are defined using the keypad/display or Web interface during the Setup process.
• For most applications, field connections are made at terminals on the board that are surrounded with a white border (P11-P16).
• This control board is used for several types of humidifier systems (for example, gas humidifiers as well as electric humidifiers). Your application will not have connections at all terminals.

Using the keypad/display

Figure 6-1:
Using the Vapor-logic4 keypad/display

Typical Home screen

Change set point from the Home screen by pressing the Up or Down arrow keys until set point is highlighted (as shown here), press Enter, press Up or Down arrow keys to change value, press Enter to confirm

Tank temperature

Change Mode from the Home screen by pressing the Up or Down arrow keys until Mode is highlighted, press Enter, press Up or Down arrow keys to change, press Enter to confirm

Fill icon shows water level status (see Page 35)

Press Main softkey to go to Main menu

Tank status

Alarm label flashes when there is a system alarm

One of three softkeys; functions vary by screen

Message label becomes highlighted when there is a system message

Press Up or Down arrow to move through menus and screens

Press Enter to select or confirm

Using the Web interface

Figure 7-1:
Using the Vapor-logic4 Web interface (Setup screen shown)

Pre-installation Checklist

Figure 8-1:
Vapor-logic4 control board detail

Full board
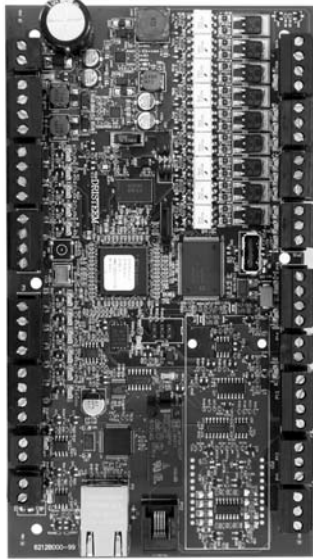
Terminals P-11 through P-16 have a white border on the Vapor-logic4 board. This is where you will make most of your field wiring connections.

Board detail showing white border

Field connection terminals have labels printed on a white border.

☐ See Figure 8-1 for field terminal block locations. Note that field wiring connection locations on the Vapor-logic4 board are surrounded with a white border.

☐ See the figure on the next page for instructions on how to make wiring connections.

☐ See the wiring drawings and manuals that shipped with your humidifier.

☐ When making field connections, do not route low voltage wires near the line voltage area in the humidifier control cabinet. Do not route low voltage wires in the same conduit as line voltage wires.

☐ Humidistat, room/duct transmitter, temperature sensor, and airflow proving switch wiring must be minimum 18-gauge (1 mm^2) plenum rated, shielded (screened), twisted pair wire with a bare drain wire for grounding.

☐ Connect the shield (screen) wire [with a length less than 2" (50 mm)] to the shield (screen) ground terminal on the electric subpanel. Do not ground the shield (screen) wire on the humidistat or transmitter end.
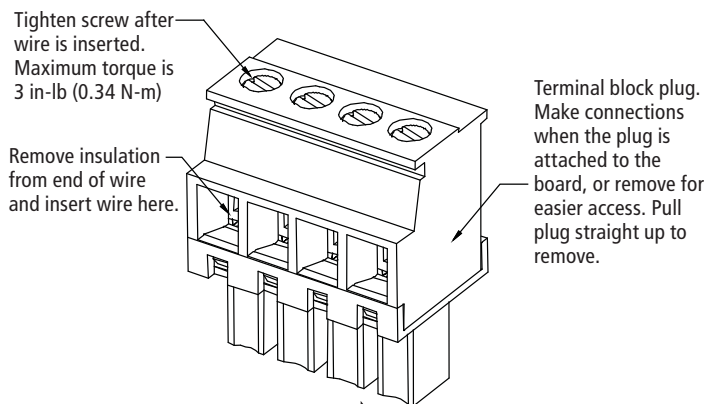
Pre-installation Checklist (continued)

☐ If you have a remote-mounted control cabinet, the water level control device, thermal trip, safety interlock, fill valve, and drain valve wiring must be minimum 18-gauge (1 mm²) stranded wire run in a conduit separate from power wires.
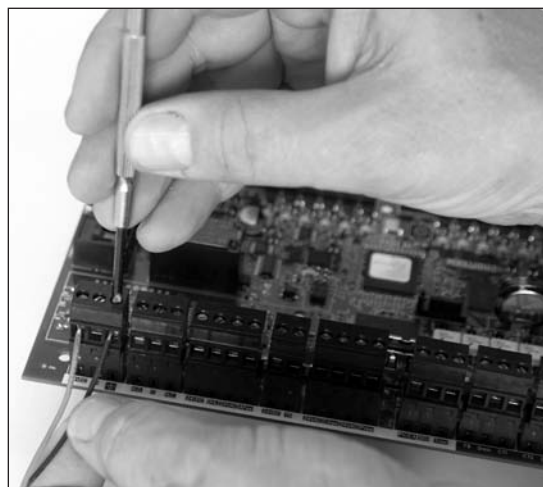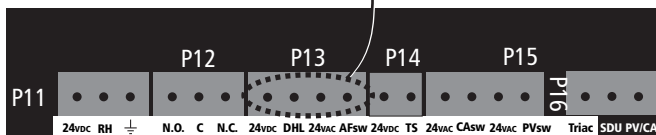
Do not use shielded (screened) cable for water level control devices.

When the control cabinet is mounted remotely from the humidifier, connect a ground wire from the machine ground lug on the humidifier to the machine ground lug in the control cabinet. The bonding machine ground wire should be the same AWG (mm²) as the largest heater wire (electric humidifiers) or sized per NEC or IEC 60364 requirements.

Figure 9-1:
Vapor-logic4 terminal block detail and connection instructions

Tighten screw after wire is inserted. Maximum torque is 3 in-lb (0.34 N-m)

Remove insulation from end of wire and insert wire here.

Terminal block plug. Make connections when the plug is attached to the board, or remove for easier access. Pull plug straight up to remove.

Vapor-logic4 board detail (see also Figure 5-1)

P11 P12 P13 P14 P15 P16

24vdc RH ⏚   N.O. C N.C.   24vdc DHL 24vac AFsw 24vdc TS   24vac CAsw 24vac PVsw   Triac SDU PV/CA

Installation process

The Vapor-logic4 board is designed to make installation very easy:
- Terminal blocks that require field connections are outlined in white.
- Terminal plugs can be removed to allow easy access when inserting wires and tightening screws.
- For most applications, humidifiers ship with the control board fully configured, with drain, fill, and other humidifier components factory-wired to the board, and the keypad/display attached to the humidifier and connected to the Vapor-logic4 board.

Installing Vapor-logic4 is a three-step process:

1. **Connect field wiring from device to Vapor-logic4 board.**

   See instructions beginning on Page 12. Note that some connections listed here may not apply to your system.

   - **Control input** (one required)
     – RH or dew point transmitter
     – Demand signal by others (4-20 mA or 0-10 VDC typical)
     – Room or duct humidistat
     – Demand signal by BACnet, Modbus, or LonTalk

   - **Limit controls**
     – Airflow switch (duct or SDU)
     – Duct high limit on-off switch or transmitter
     – Temperature compensation transmitter (or auxiliary temperature sensor connected to same terminal)

Installation process

- **Communication connections**
  - Vapor-logic4 keypad
  - Ethernet
  - Modbus
  - BACnet
  - LonTalk
  - Multiple-tank communication
- **Programmable triac and/or relay**
- **Area-type or SDU dispersion fans**
- **GTS combustion air switch and power vent**

2. Complete the Setup process.

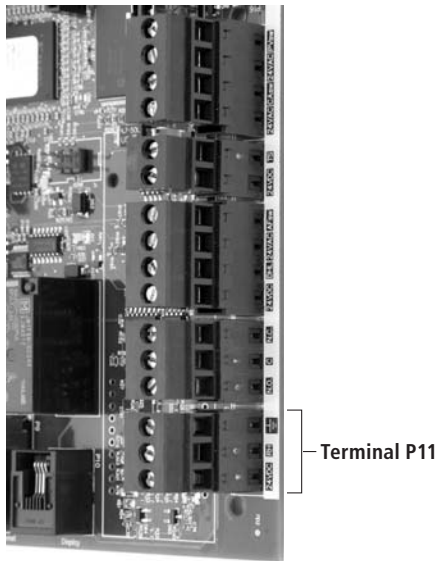See instructions beginning on Page 24.

3. Start up humidifier(s).

See instructions beginning on Page 33.

Refer to the Pre-installation Checklist and drawings on the previous pages, and then make the field wiring connections as described on the following pages.

Field wiring: Control input

— Terminal P11

Terminal P11:
24vDC = Power to space RH sensor
RH = Space RH input (RH transmitter, dew point
        transmitter, humidistat, or demand signal by
        others) (4-20 mA or 0-16 (typ. 0-10) VDC input
÷ = Ground for demand signal by others

Note:

If you do not know which control components were ordered with your system, contact DRI-STEEM or connect your keypad/display to the Vapor-logic4 board per the instructions on Page 17. Go to the Setup menu per the instructions on Page 24 to view system parameters that were factory configured as ordered.

Connect control input signal wiring by inserting wires into Terminal P11 (labeled 24vDC, RH, and ground) per the wiring diagram on the next page. Tighten screws; maximum torque is 3 in-lb (0.34 N-m).

Allowed inputs at Terminal P11 include:

- **RH transmitter or dew point transmitter**
  Transmitters provide a signal proportional to the RH or dew point being measured. All transmitters provided by DRI-STEEM are two-wire devices using a 4 to 20 mA signal.

- **Demand signal by others**
  Demand signals are sent to the Vapor-logic4 board from another control system such as a building automation system. These systems have their own RH or dew point transmitters, calculate required humidifier output, and send a demand signal to the humidifier to create steam at a percentage of that humidifier's capacity. Demand signals are typically 0-10 VDC or 4-20 mA, but may also come from a DDC signal via Modbus, BACnet, or LonTalk.

  A humidistat also delivers a demand signal to the humidifier, but it is not typically used with Vapor-logic4.

  Humidistats provide either on-off control or modulating control. DRI-STEEM humidistats are powered by a 24 VDC supply provided by the Vapor-logic4 control board.

  When using modulating control, the signal from a humidistat directly controls the amount of output from the humidifier.

Notes:
- See the wiring diagrams on the next page.
- For more information about control input signal types and operation, see the control input signals section in the Appendix.
- See the interoperability section of this manual for more information about LonTalk, BACnet, or Modbus control input signals.
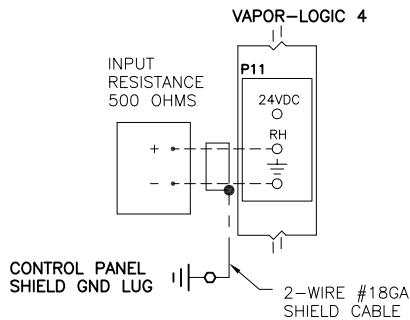
Field wiring:
Control input

Figure 13-1:
Vapor-logic4 control input wiring connections

Signal by others

0-10 VDC SIGNAL BY OTHERS — VAPOR-LOGIC 4

4-20 mA SIGNAL BY OTHERS — VAPOR-LOGIC 4

Transmitter

DEW POINT — VAPOR-LOGIC 4

RH — VAPOR-LOGIC 4
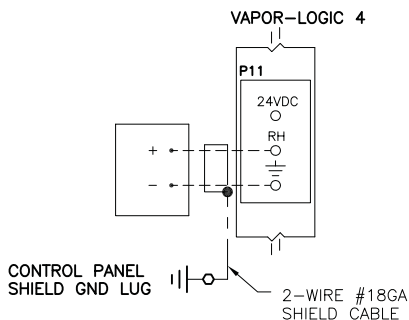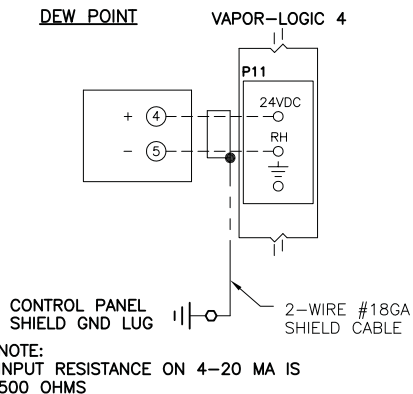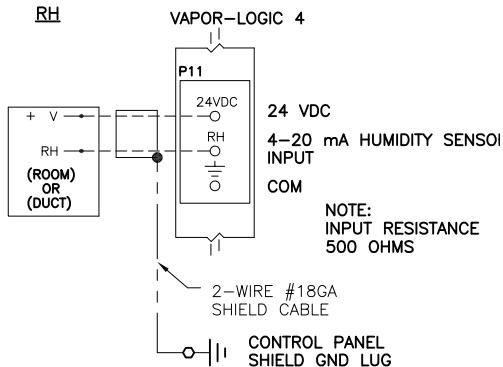
On-off RH humidistat

ROOM HUMIDISTAT — VAPOR-LOGIC 4
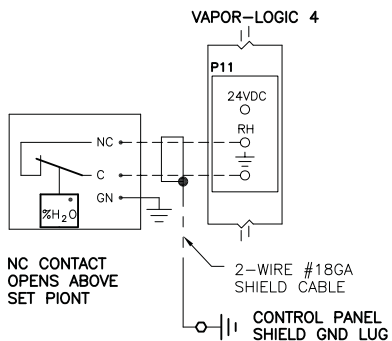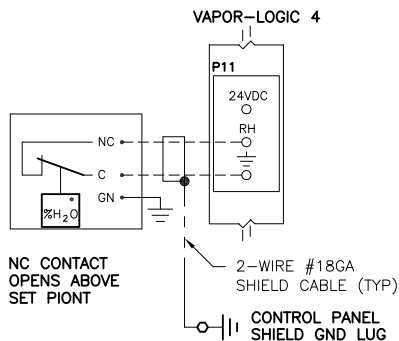
DUCT HUMIDISTAT — VAPOR-LOGIC 4

Key

CONTROL CIRCUIT WIRING

FIELD WIRING

OPTIONAL FACTORY

OPTIONAL FIELD

BREAK TO EXTERNAL CONNECTIONS DIAGRAM

Field wiring: Limit controls

**Figure 14-1:
Terminal P13**
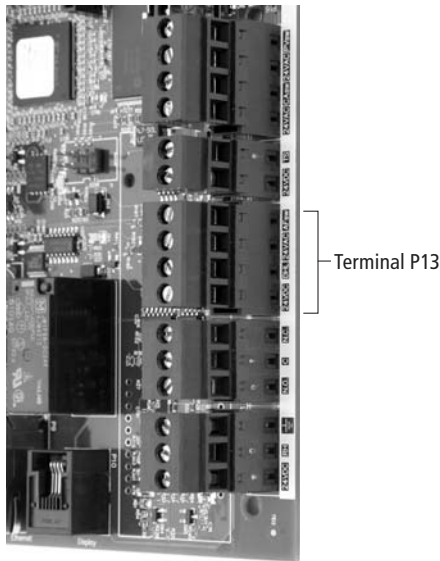
Terminal P13

Terminal P13:
24VDC = Power to duct high limit switch or transmitter
DHL = Duct high limit switch/transm. (4-20 mA input)
24VAC = Power to airflow proving switch
AFsw = Airflow proving switch (24 VAC input)

Duct or SDU airflow proving switch
Connect wiring for a duct or Space Distribution Unit (SDU) airflow proving switch by inserting wires into the terminal block plug at P13 (labeled AFsw and 24VAC) per the wiring diagram on the next page. Tighten screws; maximum torque is 3 in-lb (0.34 N-m). (An SDU is a cabinet fan dispersion assembly.)

See also the sensor placement section in the Appendix.

Duct high limit switch or transmitter
Connect wiring for a duct high limit switch or transmitter by inserting wires into the terminal block plug at P13 (labeled DHL and 24VDC) per the wiring diagram on the previous page. Tighten screws; maximum torque is 3 in-lb (0.34 N-m).

Note: The duct high limit sensor connected at this location can be an on-off high limit switch, or it can be a duct high limit transmitter with an adjustable high limit set point (4-20 mA input).

See also the sensor placement section in the Appendix.

Field wiring: Limit controls

Figure 15-1:
Vapor-logic4 limit controls wiring connections

Airflow switch

In a duct
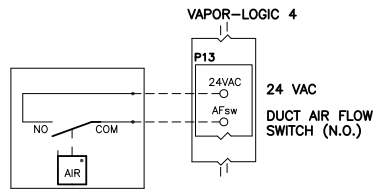
When using an SDU
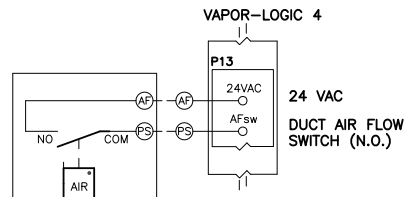
DUCT AIR FLOW SWITCH IS IN SDU CABINET

DUCT AIR FLOW SWITCH IS NOT USED ON AREA-TYPE

NOTE:
FIELD WIRING REQUIRED BETWEEN SDU CABINET TERMINAL STRIP AND CONTROL CABINET TERMINAL STRIP FOR SDU BLOWER AND AIR FLOW SWITCH.

Duct high limit (not used on SDU or Area-type)

ON/OFF
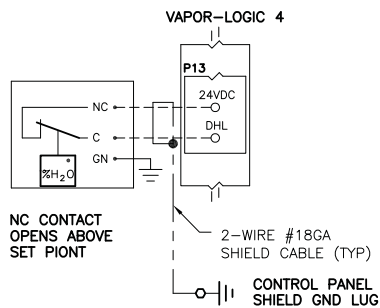
TRANSMITTER
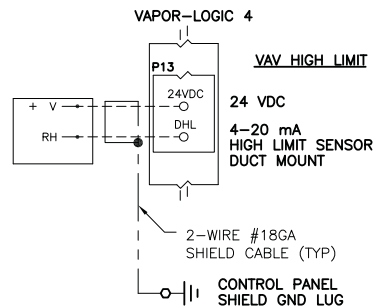
Temperature compensation transmitter or auxiliary temperature sensor

TEMP COMP TRANSMITTER
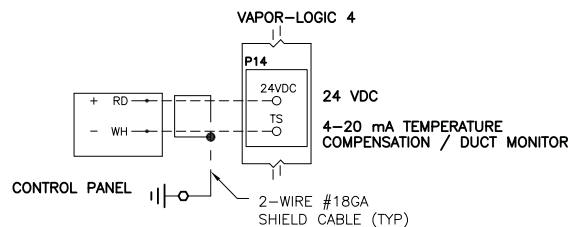
Key

CONTROL CIRCUIT WIRING

FIELD WIRING

OPTIONAL FACTORY

OPTIONAL FIELD

BREAK TO EXTERNAL CONNECTIONS DIAGRAM

Field wiring: Limit controls

Figure 16-1: Terminal P14
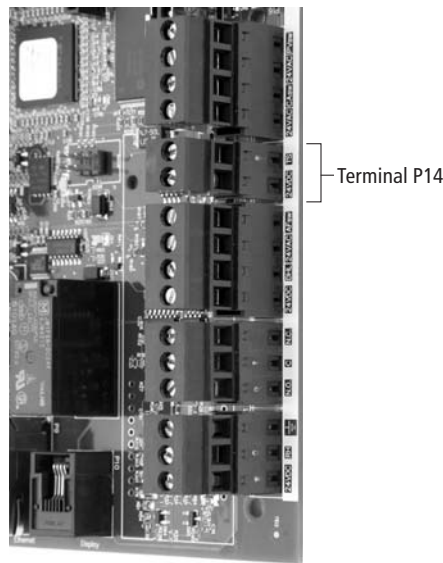
Terminal P14

Terminal P14:
24VDC = Power to auxiliary temperature sensor or temperature compensation sensor (transmitter)
TS = Auxiliary temperature sensor or temperature compensation sensor (transmitter) (4-20 mA input)

Figure 16-2: Temp. comp. transmitter installation

Window frame

Thermostat control wires

Double-pane window glass

Surface-mounted thermostat temperature control box on wall

Typical sensor cord routing

Secure temperature sensor tip to inside surface of window glass using clear RTV silicone adhesive

OM-337

Temperature compensation transmitter or auxiliary temperature sensor
Connect wiring for a temperature compensation transmitter or an auxiliary temperature sensor by inserting wires into the terminal block plug at P14 (labeled 24VDC and TS) per the wiring diagram on the previous page. Tighten screws; maximum torque is 3 in-lb (0.34 N-m).
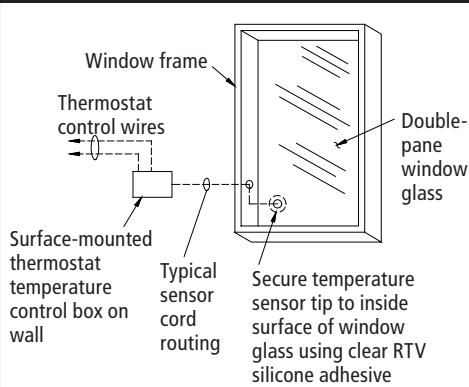
Note: Only one device can be connected at P14. You will identify the connected device during Step 2 of the installation process.

An auxiliary temperature sensor typically monitors duct or space air temperature. Mount the auxiliary temperature sensor wherever you want to monitor temperature.

A temperature compensation transmitter allows Vapor-logic4 to reduce humidifier output on cold days, reducing window condensation. Mount the temperature compensation transmitter on the inside of an outside-wall window.

To mount the temperature compensation sensor:

1. See Figure 16-2. Position the temperature compensation sensor control box on a wall adjacent to a window frame facing north or northeast.

2. Place the flat surface of the temperature sensor tip on the lower corner of glass surface.

3. Temporarily hold the sensor tip in place with strips of masking tape.

4. Apply a small amount of clear RTV silicone adhesive over and around the sensor tip (making sure the sensor tip is in contact with the window glass).

5. After adhesive cures, remove masking tape.

6. See the operation section of this manual for more information about the temperature compensation sensor.

Field wiring: Communication connections

Vapor-logic4 keypad/display

If your keypad/display is factory-mounted and connected to the Vapor-logic4 board, proceed to installing the next device required by your system.

To connect a Vapor-logic4 keypad/display to the Vapor-logic4 board, insert the male end of the provided cable into the Vapor-logic4 board at Terminal P10 (labeled Display) until you hear a click sound (see also the wiring diagram on the next page). Plug the other end of the cable into the keypad/display. This connection provides DC power and communication to the keypad/display.

If your keypad/display was shipped loose, mount the keypad/display in a location so that the provided cable is long enough to connect the keypad/display to the Vapor-logic4 board.

If a longer keypad/display cable is needed, order a replacement cable from DRI-STEEM (see the replacement parts section of this manual), or use a four-conductor straight-through cable or a six-conductor crossover cable connected to an RJ11 jack.

CAUTION! Maximum cable length is 500' (152 m).

Note required operating conditions listed on Page 3.

CAUTION! When routing keypad/display cable inside the control cabinet, route cable away from all power wiring.

Other than factory-mounted, there are three ways to mount the keypad/display. See Figure 17-2.

**Figure 17-1:
Terminal P10**

Terminal P10:
Display
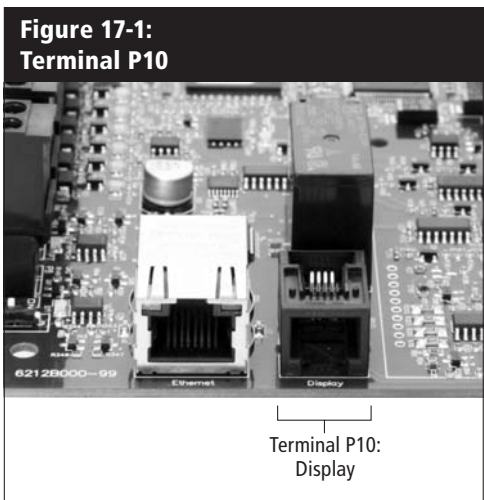
**Figure 17-2:
Mounting the keypad/display**

Mount keypad/display back directly to wall

Mount keypad/display back to junction box

Mount keypad/display back to phone plate

Field wiring: Communication connections

Figure 18-1:
Vapor-logic4 communication wiring connections
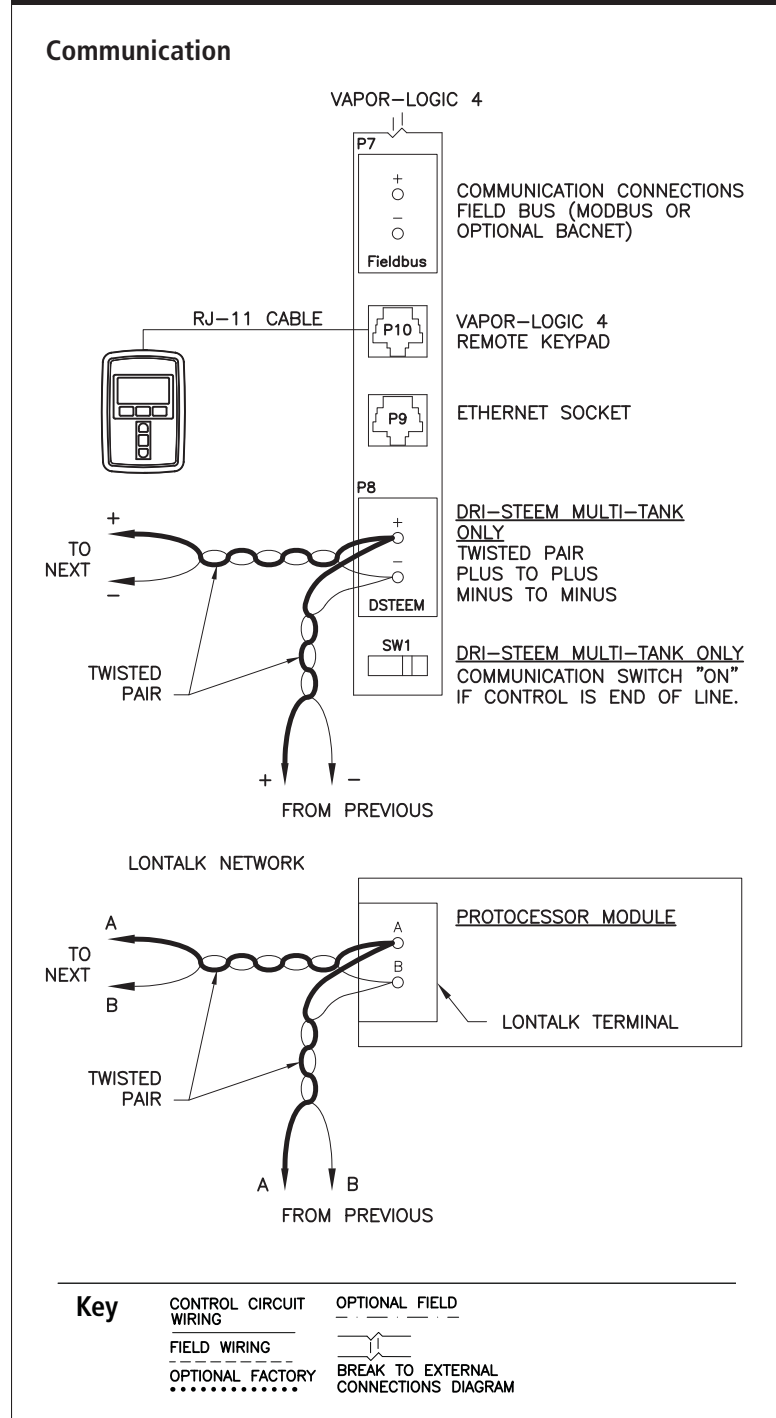
Communication

Field wiring: Communication connections

Web interface communication

Utilizing the Vapor-logic4 Web interface is optional. The humidifier can be operated using the keypad/display and/or the Web interface. When using the Web interface, the humidifier can be accessed by a computer either directly or through a network. Each Vapor-logic4 controller ships with the static IP address of **192.168.1.195**. This allows users to locate the Web interface upon start-up. After initial start-up, the IP address can remain as is, be re-assigned as another static address, or configured to automatically go out and find an IP address on the network using DHCP. See the steps below for information about connecting to the humidifier using the Web interface.

Connecting Web interface directly to a computer <u>not on a network</u>

1. **Connect the Ethernet cable.**
   Insert the male end of an RJ45 Ethernet cable into the Vapor-logic4 board at P9 (labeled Ethernet; see Figure 19-1) until you hear a click sound. Insert the other end of the cable into a computer. Since the Ethernet port on the Vapor-logic4 board is auto-sensing, either a straight-through or crossover cable will work.

2. **Check the current IP address of your computer.**
   Connecting a computer to the humidifier requires that the computer being used has the same network address range as Vapor-logic4. In order to validate this, check the IP address of the computer being used by going to the computer's Start menu and selecting Run. When the box shown below appears, type in **cmd** on the Open line and hit OK.

**Figure 19-1:
Terminal P9**

Terminal P9:
Ethernet

Vapor-logic4 default IP address
192.168.1.195.

**Figure 19-2:
Checking your IP address**

Field wiring: Communication connections

After a system prompt appears, type in **ipconfig** and then hit Enter. The current IP address of the computer should appear. If the first three segments of that IP address are different than the first three segments of the humidifier's default IP (192.168.1.xxx), you must change either your computer or Vapor-logic4's IP address such that they match each other.

Figure 20-1:
Checking your IP address
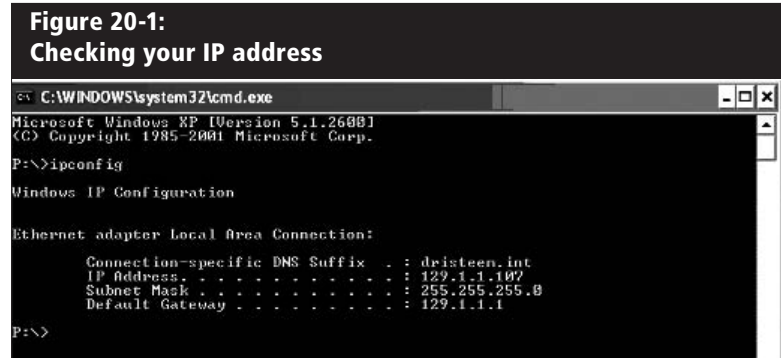
3. **Change the IP address of your humidifier or computer if necessary.**

   a. **Change the IP address of the humidifier to match your computer.**
      The most straightforward way to change the IP address of the humidifier using Vapor-logic4 is to use the keypad/display. Go to Setup/Communications/Network IP address on the keypad/display and change the IP address such that the first three segments of the computer's settings match the network address. Make sure the last digit of the IP address is different between the humidifier and the computer. Cycle power of Vapor-logic4 board for address change to take effect.

   b. **Change the IP address of your computer to match the humidifier.**
      Changing the IP address of the computer being used will likely require administrative privileges for your company's network. Please consult your IT department for this task.

Field wiring:
Communication connections

4. Connect to the humidifier.

 a. Using a computer connected to the Vapor-logic4 board, open a Web browser such as Mozilla® Firefox® or Internet Explorer®.

 b. Find the browser address bar (see Figure 21-1), delete all existing text in the browser address bar, type the Vapor-logic4 default IP address into the browser's address bar: **192.168.1.195** and press Enter.

Connecting Web interface directly to a computer <u>on a network</u>

CAUTION! Before you connect a Vapor-logic4 device to a network, please contact your IT department. Given that the Vapor-logic4 controller ships with a static IP address, it is important to ensure that there is not another device with that same IP address already on the network. Working with your IT department before network connection will help ensure the integrity of the network and the devices on that network.

If your network uses DHCP (Dynamic Host Configuration Protocol), use the keypad/display to navigate to: Setup/Communications/Network IP Address. Enable DHCP and restart the Vapor-logic4 board.

CAUTION! When DHCP is enabled, the server can dynamically change the IP address of Vapor-logic4, making existing bookmarks unusable. The most current IP address can always be found by using the keypad/display to navigate to: Set-Up/Communications/Network IP Address.

Important: DHCP cannot be enabled from the Web interface; it must be enabled using the keypad/display.

Other communication connections

For BACnet or LonTalk installation instructions, see Page 64.

For multiple-tank installation instructions, see Page 70.

Figure 21-1:
Entering the IP address

Enter the IP address in your browser's address bar
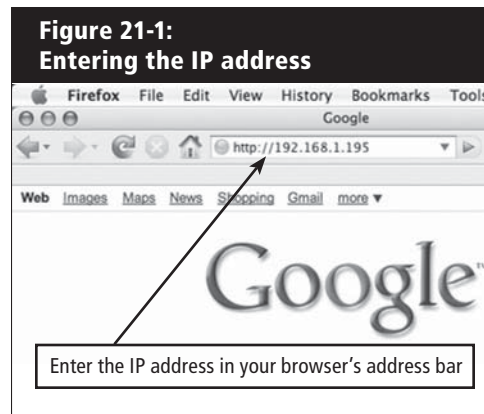
Field wiring: Programmable triac and relay

Figure 22-1:
Terminal P16
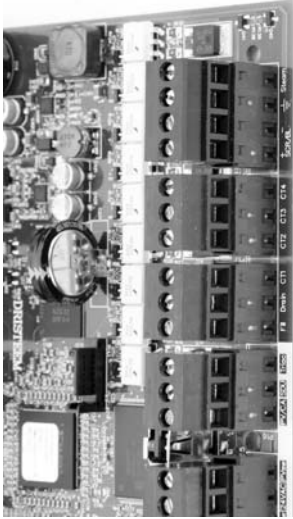
Terminal P16: (all are triacs)
Triac = Programmable output (4 AMP max.)
       (Note: Connect ground at P19)
PV/CA = Power vent/combustion air control signal
       (24 VAC output)
SDU = Space Distribution Unit (24 VAC output)

Programmable triac
Connect wiring to the output by inserting wires into the terminal block plug at P16 (labeled Triac) and into the terminal block plug at P19 (labeled ground), per the wiring diagram below. This connection allows remote activation of a device such as a fan or signal light. Output parameters are defined during Step 2 of the installation process.

CAUTION! Programmable triac (P16) is rated for 4 Amp maximum. Exceeding this maximum rating can cause the triac component on the Vapor-logic4 board to fail.

Programmable relay (dry contact)
Connect wiring for remote signaling using a programmable relay (dry contact) by inserting wires into the terminal block plug at P12 (labeled N.O., C, and N.C.), per the wiring diagram on the previous page. Tighten screws; maximum torque is 3 in-lb (0.34 N-m).

This connection allows remote activation of a device such as a fan or signal light. Output parameters are defined during Step 2 of the installation process.

CAUTION! Programmable relay (dry contact) (P12) is rated for 10 Amp maximum. Exceeding this maximum rating can cause the relay component on the Vapor-logic4 board to fail.

Figure 22-2:
Terminal P12
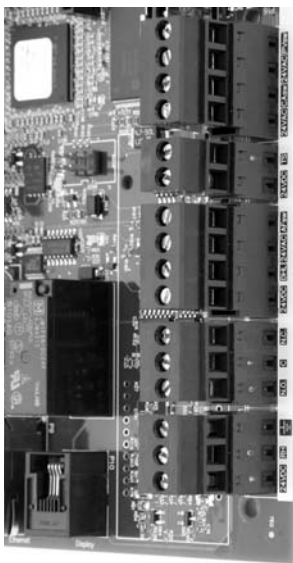
Terminal P12:
Programmable relay (dry contact) (10 AMP max. rated)
N.O. = Normally open
C = Common
N.C. = Normally closed

Programmable triac and relay
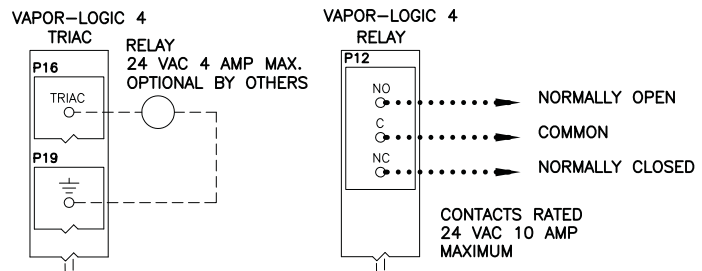
Field wiring: Area-type, SDU, combustion air, power vent

Area-type and SDU dispersion fans
Connect wiring for Area-type and Space Distribution Unit (SDU) dispersion fans by inserting the wire into the terminal block plug at P16 (labeled SDU). Tighten screws; maximum torque is 3 in-lb (0.34 N-m).

GTS combustion air switch and power vent (optional)
Connect wiring for GTS combustion air switch and/or GTS power vent by inserting wires into the terminal block plugs at P15 and P16. Tighten screws; maximum torque is 3 in-lb (0.34 N-m).

The combustion air switch is on the combustion air damper. The power vent switch indicates airflow at the power venter.

Figure 23-1: Terminal P16
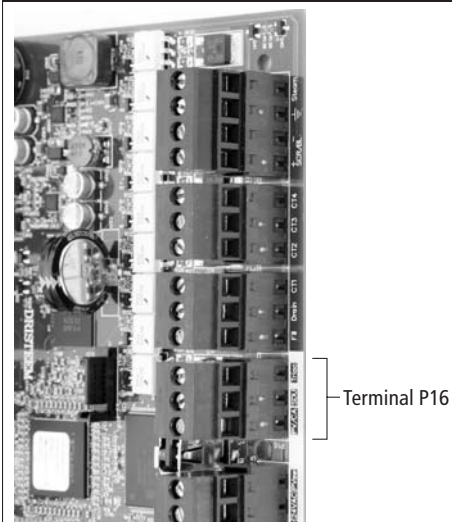
Terminal P16

Terminal P16: (all are triacs)
Triac = Programmable output
(Note: Connect ground at P19)
PV/CA = Power vent/combustion air control signal (24 VAC output)
SDU = Space Distribution Unit (24 VAC output)

Figure 23-2: Terminal P15
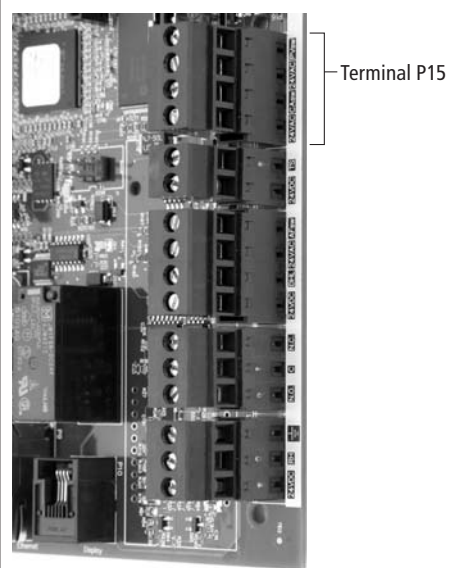
Terminal P15

Terminal P15:
24VAC = Power to combustion air switch
CAsw = Combust. air sw. (24VAC input)
24VAC = Power to power vent switch
PVsw = Power vent switch (24VAC input)

Installation Step 2: Setup

Figure 24-1:
Keypad/display screens

"A" indicates that these settings apply to Tank A. All humidifier tanks are labeled as "A" except in applications where multiple humidifiers are controlled by one controller.

"1/15" indicates the highlighted item is the first of fifteen items

```
SETUP                1/15   A
  InPut signal
  Limit controls
  Water tyPe
  Water manaGement
  Fan-based disPersion
 MAIN  |  HOME  |  BACK
```

Push Up or Down arrow to scroll through menu items; press Enter to select highlighted item

```
INPUT SIGNAL        1/4   A
  RH transmitter
  Dew Pt transmitter
  Demand signal
  Humidistat

 MAIN  |  HOME  |  BACK
```

```
RH X-MITTER         2/4   A
  Transmitter enabled
   On

  RH set Pt
   35%
 MAIN  |  HOME  |  BACK
```

To simplify the field-installation process, humidifiers are sent from the factory configured as ordered. However, some settings are unknown at the factory and need to be defined during the setup process using the Setup menu. The Setup menu is also where you make future system setting changes.

To begin the field setup process, go to the Setup menu on either the keypad/display or the Web interface. Setup menu parameters are listed in tables starting on Page 26. Options and defaults are the same whether viewed from the keypad/display or Web interface. However, labels may be abbreviated on the keypad/display.

Using the keypad/display
To access the Setup menu on the keypad/display, press the Main softkey on the Vapor-logic4 keypad (see figure below). Press the Down arrow on the keypad until Setup is highlighted. Press Enter.

After entering the Setup menu, press the Up and Down arrows to scroll through all setup parameters or to change values. Use the Enter key to select parameters.

Figure 24-2:
Using the Vapor-logic4 keypad

Typical Home screen

Press Main softkey to go to Main menu; press Up or Down arrow to move through menus and screens

Press Up or Down arrow to move through menus and screens

Press Enter to select or confirm
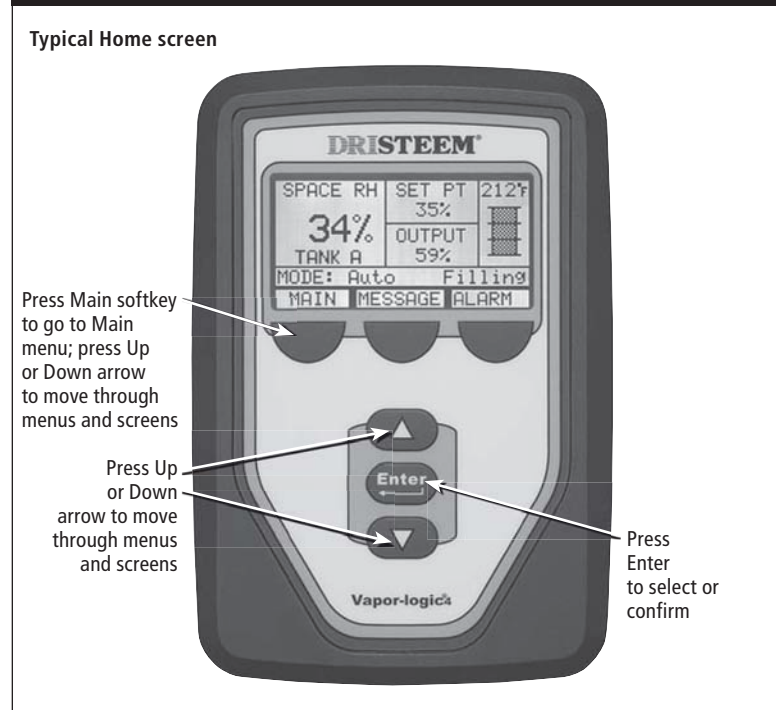
Installation Step 2: Setup

Using the Web interface
Although not required for humidifier operation, the Web interface allows convenient and remote access to Vapor-logic4.

See Page 19 for Web interface connection and IP address instructions. Follow the instructions below to complete the setup process.

Figure 25-1:
Using the Vapor-logic4 Web interface (Setup screen shown)

Installation: Setup

Table 26-1: Setup menu					
Menu item	Default value	Minimum value	Maximum value	Units	Notes
Input signal					
RH transmitter	--	--	--	--	
Transmitter enabled	--	No	Yes	--	
RH set point	35	0	100	%	
RH offset	0	-20	20	%	
PID tuning	--	--	--	--	
RH PID band	10	0	50	%	DRI-STEEM recommends using default values for offsets and PID settings when first setting up your humidifier.
Proportional gain	80	0	1000	---	
Integral gain	40	0	1000	---	
Derivative gain	0	0	1000	---	
Dew pt transmitter	--	--	--	--	
Transmitter enabled	--	No	Yes	--	
Dew point set point	50	20	80	°F	
	10	-6	26	°C	
Dew point offset	0	-20	20	°F	
	0	-11	11	°C	DRI-STEEM recommends using default values for offsets and PID settings when first setting up your humidifier.
PID tuning	--	--	--	--	
Dew point PID band	10	1	20	°F	
	5	1	20	°C	
Proportional gain	80	0	1000	--	
Integral gain	40	0	1000	--	
Derivative gain	0	0	1000	--	
Demand signal	--	--	--	--	
VDC signal	--	--	--	--	
VDC signal enabled	--	No	Yes	--	
0% output at	1.0	0.0	Maximum	VDC	
100% output at	9.0	Minimum	10.0	VDC	
mA signal	--	--	--	--	
mA signal enabled	--	No	Yes	--	
0% output at	4.0	0.0	Maximum	mA	
100% output at	20.0	Minimum	20.0	mA	
Control via Modbus	--	--	--	--	
Modbus controlled	No	No	Yes	--	Choose Modbus, BACnet, or LonTalk in this section only if your demand input signal is via Modbus, BACnet, or LonTalk. If you are interoperating (sharing operating parameters with a building automation system) using Modbus, BACnet, or LonTalk protocols, see also the Communications Setup options.
Control via BACnet	--	--	--	--	
BACnet controlled	No	No	Yes	--	
Control via LonTalk	--	--	--	--	
LonTalk controlled	No	No	Yes	--	
Humidistat	--	--	--	--	
Humidistat enabled	No	No	Yes	--	
Note: Your system may not have all of these parameters.					**More on the next page >**

Installation: Setup

Table 27-1: Setup menu (continued)					
Menu item	**Default value**	**Minimum value**	**Maximum value**	**Units**	**Notes**
Limit control					
Airflow switch	--	--	--	--	
Switch in system	Yes	No	Yes	--	
HL switch	--	--	--	--	
Switch in system	Yes	No	Yes	--	
HL transmitter	--	--	--	--	
Transmitter enabled	No	No	Yes	--	
Duct HL set point	80	5	95	% RH	
Duct HL span	5	0	20	% RH	Span (throttle span) is an offset below the high limit set point where the humidifier reduces output but does not turn off until the device high limit set point is reached.
Duct HL offset	0	-20	20	% RH	
Water type					
Potable enabled	--	No	Yes	--	**CAUTION!** Changing the water type setting from potable or softened to DI/RO, or from DI/RO to potable or softened requires humidifier hardware changes.
Softened enabled	--	No	Yes	--	
DI/RO enabled	--	No	Yes	--	
Note: Your system may not have all of these parameters.					**More on the next page >**

Installation: Setup

Table 28-1: Setup menu (continued)					
Menu item	**Default value**	**Minimum value**	**Maximum value**	**Units**	**Notes**
Water management					
Drain valve	--	--	--	--	CAUTION! Changing drain valve settings requires changing the drain valve.
Type	Model-specific*	Damper	Motorized	--	
Actuator	Electric	Manual	Electric	--	
Status	Normally closed (N.C.)	Normally closed (N.C.)	Normally open (N.O.)	--	
Auto drain/flush	--	--	--	--	CAUTION! Auto drain/flush requires a humidifier with an electric drain valve.
Drain/flush enabled	--	No	Yes	--	When enabled, the humidifier automatically drains and then flushes the tank at user-defined intervals.
Usage	Model-specific*	0	2,200,000	lbs	Select amount of water to be converted to steam before auto drain/flush starts.
		0	1,000,000	kg	
Schedule enabled	--	--	--	--	
Allowed days	--	--	--	--	Select days of week auto drain/flush is allowed once usage requirement is met.
Sunday	Yes	No	Yes	--	
Monday	Yes	No	Yes	--	
Tuesday	Yes	No	Yes	--	
Wednesday	Yes	No	Yes	--	
Thursday	Yes	No	Yes	--	
Friday	Yes	No	Yes	--	
Saturday	Yes	No	Yes	--	
Time to drain/flush	0	0	23	--	Select time of day (24 hour clock) auto drain/flush starts once usage requirement is met.
Drain duration	Model-specific*	0	120	Minutes	Select number of minutes for drain valve to remain open during auto drain/flush. Default value is based on tank and valve size.
Flush duration	Model-specific*	0	15	Minutes	Select number of minutes for fill valve to remain open during flushing.

Note:
* See the Appendix in this manual for model-specific default values.
• Your system may not have all of these parameters.

Installation: Setup

Table 29-1: Setup menu (continued)					
Menu item	**Default value**	**Minimum value**	**Maximum value**	**Units**	**Notes**
Water management (continued)					
Skim	--	--	--	--	
Skim enabled	Yes	No	Yes	--	Enabled as default except on DI water systems.
Skim duration	Model-specific*	0	120	Seconds	
End of season drain	--	--	--	--	
EOS enabled	Yes	No	Yes	--	Enabled as default except on DI water systems. If enabled, the humidifier tank drains after the humidifier has been idle for a user-defined time.
Idle time for EOS	72	1	168	Hours	Select number of hours humidifier is idle before end of season draining starts.
Aquastat	--	--	--	--	The minimum aquastat setting prevents tank water freezing. Higher settings keep tank water warm, reducing time required to bring water to boiling after a call for humidity.
Aquastat enabled	--	No	Yes		
Aquastat set point	50	40	180	°F	
	10	4	82	°C	
Service interval	--	--	--	--	
Service interval	Model-specific*	0	2,200,000	lbs	Select amount of water to be converted to steam before service interval is met.
	Model-specific*	0	1,000,000	kg	
Fan-based dispersion					**CAUTION!** Changing fan-based dispersion settings can require component changes for system to operate correctly.
SDU	--	--	--	--	An SDU is a space distribution unit, which disperses steam using a fan housed in a cabinet.
SDU on system	--	No	Yes	--	
Area-type	--	--	--	--	An Area-type dispersion unit is a caged fan mounted on top of the humidifier tank.
Area-type on system	--	No	Yes	--	
Time delay	--	--	--	--	Select number of minutes fan-based dispersion unit operates after water in tank stops boiling. A delay keeps the fan running until all steam is dispersed.
Output time delay	5	1	30	Minutes	

Note:
* See the Appendix in this manual for model-specific default values.
• Your system may not have all of these parameters.

Installation: Setup

Table 30-1: Setup menu (continued)					
Menu item	**Default value**	**Minimum value**	**Maximum value**	**Units**	**Notes**
Remote temp sensor					**CAUTION!** Changing temperature sensor settings can require component changes for system to operate correctly.
Temp compensation	--	--	--	--	
Temp comp enabled	--	No	Yes	--	
Temp monitor	--	--	--	--	
Temp monitor enabled	--	No	Yes	--	
Temp sensor offset	--	--	--	--	Used to calibrate temperature monitoring sensor and temperature compensation sensor
Temp sensor offset	0	-20	20	°F	
	0	-11	11	°C	
Communications					**CAUTION!** Changing communications settings can require component changes for system to operate correctly.
BACnet	--	--	--	--	
BACnet enabled	--	No	Yes	--	
BACnet baud rate	38400	9600	76800	--	
BACnet address	99	0	255	--	
Modbus	--	--	--	--	
Modbus enabled	--	No	Yes	--	
Modbus baud rate	9600	4800	38400	--	
Modbus address	99	0	255	--	
LonTalk	--	--	--	--	
LonTalk enabled	--	No	Yes	--	
Network IP address	--	--	--	--	
Network IP address	192.168.1.195	192.168.1.195	255.255.255.255	--	
Enable DHCP	No	No	Yes	--	Use keypad/display to access this menu item. This item is not available when using the Web interface.
Note: Your system may not have all of these parameters.					**More on the next page >**

Installation: Setup

Table 31-1: Setup menu (continued)					
Menu item	**Default value**	**Minimum value**	**Maximum value**	**Units**	**Notes**
Programmable outputs					
Dry contact	--	--	--	--	**CAUTION!** Programmable dry contact (P12) is rated for 10 Amp maximum.Exceeding this maximum rating can cause the dry contact (relay) component on the Vapor-logic4 board to fail.
All alarms	Yes	No	Yes	--	A dry contact activates whenever there is an alarm.
Selected alarms/messages	No	No	Yes	--	A dry contact activates whenever there are alarms or messages selected from the setup list.
Heat on-off enabled	No	No	Yes	--	A dry contact activates when the humidifier is heating.
Steam yes-no enabled	No	No	Yes	--	A dry contact activates when the tank temperature reaches boiling.
24 VAC triac	--	--	--	--	**CAUTION!** Programmable triac (P16) is rated for 4 Amp maximum. Exceeding this maximum rating can cause the triac component on the Vapor-logic4 board to fail.
All alarms	No	No	Yes	--	A triac activates whenever there is an alarm.
Selected alarms/messages	No	No	Yes	--	A triac activates whenever there are alarms or messages selected from the setup list.
Heat on-off enabled	No	No	Yes	--	A triac activates when the humidifier is heating.
Steam yes-no enabled	No	No	Yes	--	A triac activates when the tank temperature reaches boiling.
Set date and time					
Date	--	1/1/2007	1/1/2099	mm/dd/yy	
Time	--	0:00	23:59	Hours:Minutes	24 hour clock
Language					
Display in English	--	No	Yes	--	Select one language for both keypad/display and Web interface communications.
Display in French	--	No	Yes	--	
Display in German	--	No	Yes	--	
Note: Your system may not have all of these parameters.					

Installation: Setup

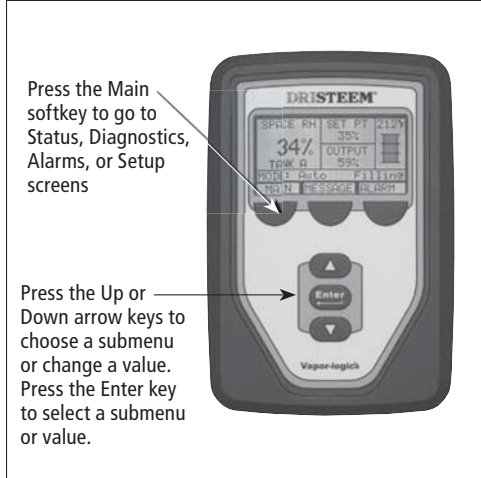| Table 32-1: Setup menu (continued)					
Menu item	**Default value**	**Minimum value**	**Maximum value**	**Units**	**Notes**
Units					
Display inch-pound	--	No	Yes	--	
Display SI	--	No	Yes	--	
Security					
Require password	No	No	Yes	--	
Set password	None	0	9999	--	Enter a four-digit password using numbers only.
Time-out	5	1	120	Minutes	The number of inactivity minutes Vapor-logic4 remains in read-write mode before returning to read-only mode
Capacity adjust					
Capacity calibration	100.0	0.0	245.0	%	**CAUTION!** Changing the capacity calibration setting changes reported, not actual, humidifier output information.
Idle time					
Idle time	5	1	120	Minutes	Select number of minutes keypad/display remains idle before returning to the Home screen.
Reset to defaults					
Reset to defaults	--	--	--	--	Select this if you want to reset all humidifier settings to factory defaults. **CAUTION!** This action cannot be reversed.
Note: Your system may not have all of these parameters.					

Installation: Step 3

Start-up

To start up your humidifier, go to the Start-up Checklist in your humidifier tank's installation, operation, and maintenance manual.

Operation: Using menus and screens

Vapor-logic4 keypad/display has the following menus and screens:
- Home screen
- Main menu, and four submenus:
  – Status
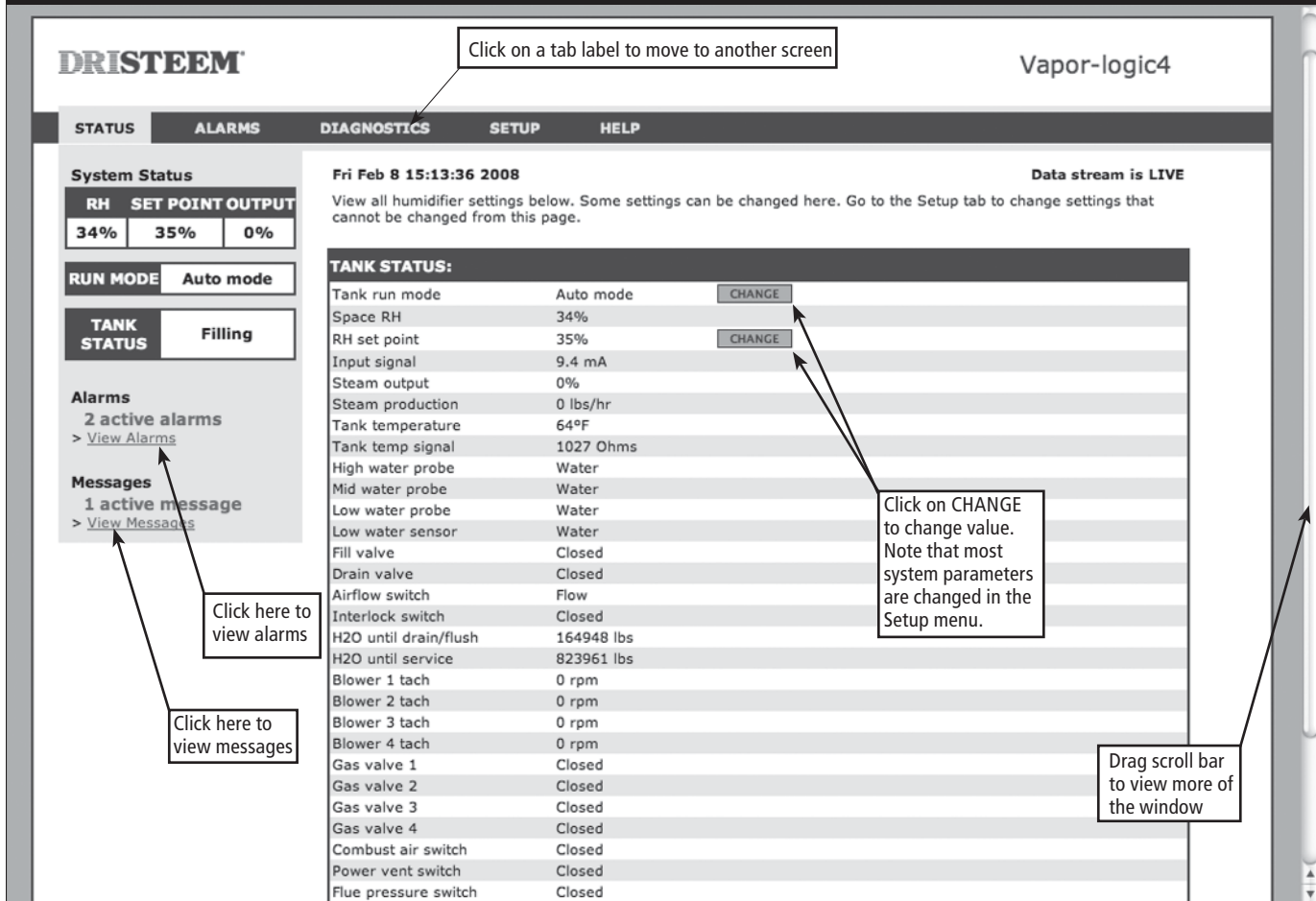 – Diagnostics
  – Alarms
  – Setup

Press the Main softkey to go to the Main menu selection screen. Press the Up and Down arrow keys to choose a submenu and press Enter to select.

Vapor-logic4 Web interface has the following screens:
- Status
- Diagnostics
- Alarms
- Setup
- Help

Click on tab labels to go to other screens. The highlighted tab indicates the current screen.

Figure 34-1:
Using the keypad/display

Press the Main softkey to go to Status, Diagnostics, Alarms, or Setup screens

Press the Up or Down arrow keys to choose a submenu or change a value. Press the Enter key to select a submenu or value.

Figure 34-2:
Using the Vapor-logic4 Web interface (Status screen shown)

Click on a tab label to move to another screen

DRISTEEM   Vapor-logic4

STATUS   ALARMS   DIAGNOSTICS   SETUP   HELP

System Status

RH	SET POINT	OUTPUT
34%	35%	0%

RUN MODE | Auto mode

TANK STATUS | Filling

Alarms
2 active alarms
> View Alarms

Messages
1 active message
> View Messages

Fri Feb 8 15:13:36 2008   Data stream is LIVE

View all humidifier settings below. Some settings can be changed here. Go to the Setup tab to change settings that cannot be changed from this page.

TANK STATUS:

Tank run mode	Auto mode	CHANGE
Space RH	34%	
RH set point	35%	CHANGE
Input signal	9.4 mA	
Steam output	0%	
Steam production	0 lbs/hr	
Tank temperature	64°F	
Tank temp signal	1027 Ohms	
High water probe	Water	
Mid water probe	Water	
Low water probe	Water	
Low water sensor	Water	
Fill valve	Closed	
Drain valve	Closed	
Airflow switch	Flow	
Interlock switch	Closed	
H2O until drain/flush	164948 lbs	
H2O until service	823961 lbs	
Blower 1 tach	0 rpm	
Blower 2 tach	0 rpm	
Blower 3 tach	0 rpm	
Blower 4 tach	0 rpm	
Gas valve 1	Closed	
Gas valve 2	Closed	
Gas valve 3	Closed	
Gas valve 4	Closed	
Combust air switch	Closed	
Power vent switch	Closed	
Flue pressure switch	Closed	

Click here to view alarms

Click here to view messages

Click on CHANGE to change value. Note that most system parameters are changed in the Setup menu.

Drag scroll bar to view more of the window

The Home screen (keypad/display)

Vapor-logic4 returns to the Home screen on the keypad/display after a user-defined period of idleness. The Home screen displays the items most frequently viewed: Actual space RH or dew point, RH or dew point set point, tank/system output or steam demand, humidifier mode, and tank activities such as filling skimming, heating, boiling, and draining.

There is a tank level indicator on the right side of the screen. See the table below for a description of tank level indicators.

Above the tank level indicator is a tank temperature display showing actual tank temperature.

Changing mode and set point from the Home screen

Mode and Set point can be changed from the Home screen. Press the Up or Down arrow key until the Set point or Mode is highlighted, press Enter, press Up or Down arrow key to change value, press Enter to confirm. All other parameters shown on the Home screen are for viewing only and cannot be changed. Go to the Setup menu to change these items.

Tank activities defined

- **Filling:** Fill valve remains open until water reaches operating level.
- **Skimming:** Fill valve is open to allow water to flow through the overflow port, skimming off precipitated minerals. (Potable and softened water systems only.)
- **Draining:** Tank is draining.
- **Flushing:** Fill and drain valve are open to flush tank. (Potable and softened water systems only.)
- **Heating:** Water in tank is heating.
- **Boiling:** Water in tank is boiling and there is a demand for humidity.
- **Hot:** Water is at boiling temperature and there is no demand for humidity.
- **Warm:** Water temperature is equal to or greater than 100 °F (38 °C) and not boiling.
- **Cold:** Water temperature is less than 100 °F (38 °C).
- **EOS drain:** Humidifier is in end-of-season drain.
- **Empty:** There is no water in the humidifier and there is no demand for humidity.

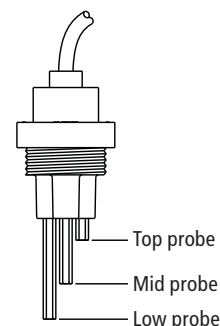Figure 35-1:
Keypad/display Home screen

```
SPACE RH  | SET PT  |212°F
          |  35%    |
 34%      |─────────|
          | OUTPUT  |
TANK A    |  59%    |
MODE: Auto        Filling
MAIN  | MESSAGE | ALARM
```

Figure 35-2:
Water level control for standard water systems

Top probe
Mid probe
Low probe

Tank-level icons indicate water level at the water level control probe. See Page 51 for more information about water level control.

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Table 35-1:
Tank-level indicators

| Icon | Indicates in: | |
	Potable or softened water systems (see Figure 35-2)	DI/RO water systems
	Water level is above the top probe.	Water is above low water level.
	Water level is between the mid and top probes.	N/A
	Water level is between the low and mid probes.	N/A
	Water level is below the low probe (heat is disabled).	Water is below low water level (heat is disabled).

The Status screen

Using either the keypad/display or the Web interface, the Status screen is where all humidifier parameters can be viewed.

See the tables on the following pages for Status screen item descriptions for both the keypad/display and Web interface.

**Figure 36-1:
Keypad/display screens**

"A" indicates these settings apply to Tank A. All humidifier tanks are labeled as "A" except in applications where multiple humidifiers are controlled by one controller.

"1/4" indicates the highlighted item is the first of four items

```
MAIN MENU        1/4   A
  Tank status
  Diagnostics
  Alarms
  Tank setup

        HOME
```

Push Up or Down arrow to scroll through menu items; press Enter to select highlighted item

```
TANK STATUS      2/24 A
  Mode
   Auto

  Space RH
   34% RH
  MAIN    HOME     BACK
```

```
TANK STATUS      3/24 A
  Space RH
   34% RH

  RH set Point
   35% RH
  MAIN    HOME     BACK
```

**Figure 36-2:
Web interface Status screen**

Drag scroll bar to view more of the window

The Status screen

Table 37-1: Status menu					
Menu item	Default value	Minimum value	Maximum value	Units	Notes
Tank run mode	Standby	--	--	--	• Operating mode of humidifier. Choose from Auto, Local standby, Master standby, Drain tank, Test I/O, or Test heat. • In **Auto mode,** the humidifier operates normally. All humidifier components are monitored and controlled. If there is a call for humidification, the system reacts. • In **Standby mode,** the humidifier is offline. All humidity control inputs appear but are not acted upon; however, if the tank temperature falls below the freeze protect set point, the drain valve opens. • In **Master standby mode,** the master controller of a multiple-tank system is in Standby mode and, therefore, demand is 0 for all humidifiers in the multiple-tank system. • In **Drain tank mode,** the automatic drain valve (if so equipped) opens and the tank drains. All humidifier operation is suspended, and the drain valve remains open until the unit is taken out of Drain tank mode. • See the Diagnostics section for information about **Test outputs** and **Test run** modes.
Space RH	--	0	100	%	
RH set point	35	0	100	%	
Input signal	--	0	10	VDC	
	--	0	20	mA	
Dew point	--	20	80	°F	
	--	-6	26	°C	
Dew point set point	50	20	80	°F	
	10	-6	26	°C	
Steam demand	--	0	100	%	Displays steam demand as a percent of capacity
Steam output	--	0	100,000	lbs/hr	
	--	0	100,000	kg/h	
Duct RH	--	0	100	%	
Duct HL switch	--	Open	Closed	--	
Duct HL set point	80	0	100	%	
Duct HL signal	--	0	20	mA	
Tank temperature	--	-240	265	°F	
	--	-151	129	°C	
Tank temp signal	--	0	2200	Ohms	
Aux temperature	--	-20	160	°F	
	--	-29	71	°C	
Aux temp signal	--	4	20	mA	
Note: Your system may not have all of these parameters.					More on the next page >

The Status screen

Table 38-1: Status menu (continued)					
Menu item	Default value	Minimum value	Maximum value	Units	Notes

High probe signal	--	0	1000	counts	Systems using potable or softened water control water levels electronically using a three-rod probe. The controller initiates the following events when the probes are in contact with water:
					    High probe: Fill valve closes
					    Mid probe: Fill valve opens
					    Low probe: Low water cut-off
					The display indicates the probe is in contact with water by indicating "Water" or "No water."
					
					The high, mid, and low probe signal counts, displayed on the Status screen, indicate:
					<400 = Probe is properly reading water
					400-800 = Faulty water probe (causes a "Faulty water probe" alarm)
					800-1200 = Probe requires maintenance (causes a "Clean probes" message)
					>1200 = Probe is dry

High water probe	--	No water	Water	--	
Mid probe signal	--	0	1000	counts	
Mid water probe	--	No water	Water	--	
Low probe signal	--	0	1000	counts	
Low water probe	--	No water	Water	--	
DI low water switch	--	No water	Water	--	
Airflow switch	--	Flow	No flow	--	
Interlock switch	--	Open	Closed	--	
Water until drain/flush	--	0	2,200,000	lbs	Displays amount of water to be converted to steam before automatic drain sequence (ADS) can begin
	--	0	1,000,000	kg	
Water until service	--	0	2,200,000	lbs	Displays amount of water to be converted to steam before next recommended maintenance service
	--	0	1,000,000	kg	
Blower 1 tach	--	0	7000	rpm	Displays rotation speed of Blower 1 (GTS systems only)
Blower 2 tach	--	0	7000	rpm	Displays rotation speed of Blower 2 (GTS systems only)
Blower 3 tach	--	0	7000	rpm	Displays rotation speed of Blower 3 (GTS systems only)
Blower 4 tach	--	0	7000	rpm	Displays rotation speed of Blower 4 (GTS systems only)
Gas valve 1	--	Open	Closed	--	GTS systems only
Gas valve 2	--	Open	Closed	--	GTS systems only
Gas valve 3	--	Open	Closed	--	GTS systems only
Gas valve 4	--	Open	Closed	--	GTS systems only
Combust air switch	--	Flow	No Flow	--	GTS systems only
Power vent switch	--	Open	Closed	--	GTS systems only
Flue pressure switch	--	Open	Closed	--	GTS systems only
Low water sensor	--	No water	Water	--	GTS systems only
Note: Your system may not have all of these parameters.					

The Diagnostics screen

The Diagnostics screen provides access to system messages, system data, humidifier information, and test functions.

See the following pages for more information about the Diagnostics screen.
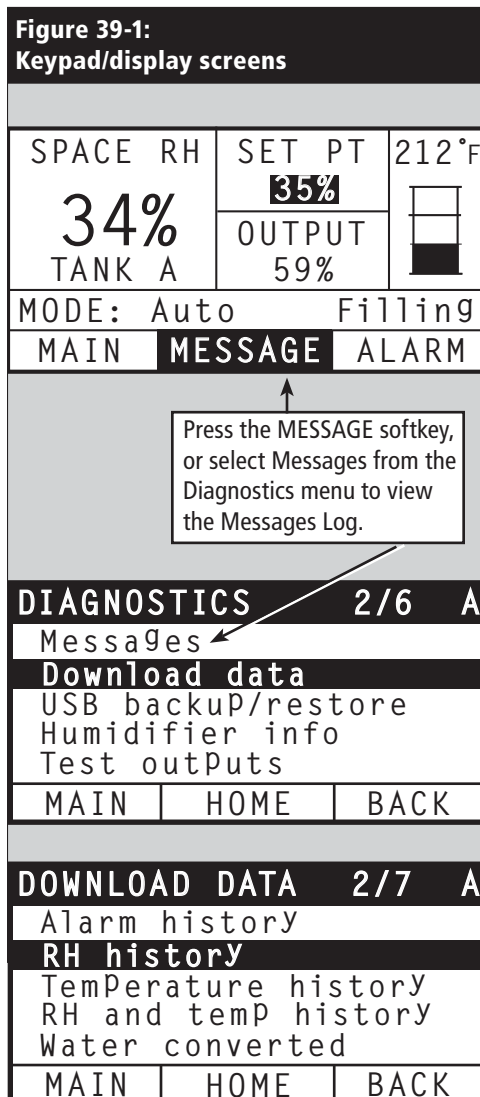
System messages and the Messages Log
When a system event occurs (e.g., when regularly scheduled unit servicing becomes due), a system message is added to the Messages Log ("Service unit"). The Messages Log displays the message name, date and time of occurrence, plus whether the message is active, has been cleared by an operator, or auto-cleared by Vapor-logic4. Active messages display first in the Messages Log, followed by cleared messages, listed in order of occurrence. The Messages Log displays up to ten messages. As new messages enter the log, the oldest, cleared messages leave the log first.

Messages auto-cleared by Vapor-logic4 describe events that have resolved on their own. For example, a "No airflow" message appears when there is no airflow in the duct. If airflow returns, the "No airflow" message auto-clears, but stays in the Messages Log (per the rules described above) to let the operator know there was an airflow interruption.

The keypad/display highlights the Message softkey label when there is a system message. When this occurs, press the Message softkey to view the Messages Log.

The Web interface displays a link to system messages in the upper left corner of the screen. Click on the link to view system messages (see the next page).

See Pages 60-63 for more information about downloading data, USB backup and restore, and test modes.

Figure 39-1:
Keypad/display screens

Press the MESSAGE softkey, or select Messages from the Diagnostics menu to view the Messages Log.

The Diagnostics screen

Figure 40-1:
Vapor-logic4 Web interface Diagnostics screen

The Diagnostics screen

Table 41-1: Diagnostics menu			
Menu item	Minimum value	Maximum value	Notes
Download data			
Alarm history	--	--	Download system data here. Select individual data sets or select "Download all" to download all data sets.
RH history	--	--	
Temperature history	--	--	
RH and temp history	--	--	
Message history	--	--	
Water converted	--	--	
Energy used	--	--	
Download all data	--	--	
USB backup/restore			
Back up settings	No	Yes	Humidifier settings can be backed up to or restored from a USB flash drive.
Restore settings	No	Yes	
Humidifier info			
Factory string	--	--	Displays as-shipped configuration string
Current string	--	--	Displays current configuration string
Serial number	--	--	Displays humidifier serial number
Firmware version	--	--	Displays current firmware version of Vapor-logic4 control board
Test outputs			
Fill valve	--	--	Cycles output to verify operation.
Drain valve	--	--	
Fan control	--	--	
Programmable triac	--	--	
Dry contact relay	--	--	
Note: Your system may not have all of these parameters.			**More on the next page >**

The Diagnostics screen

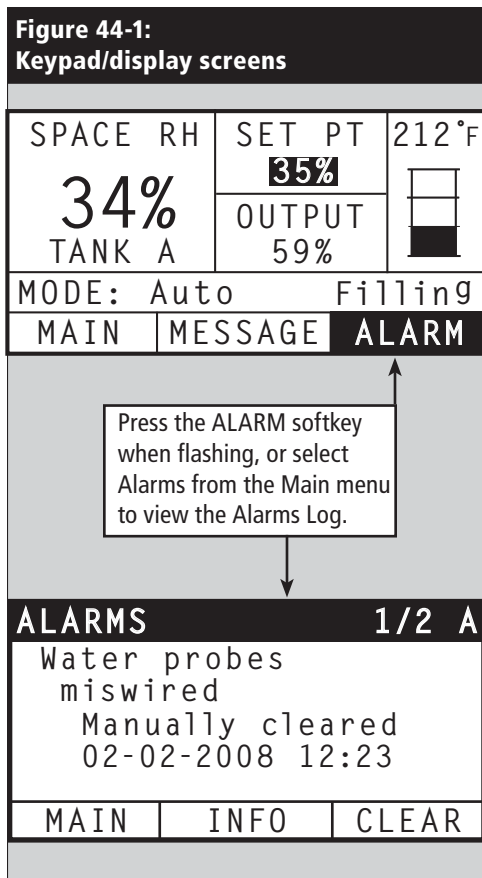| Table 42-1: Diagnostics menu (continued)					
Menu item	**Default value**	**Minimum value**	**Maximum value**	**Units**	**Description**
Test outputs (continued)					
Contactor 1, 2, 3, or 4	--	--	--	--	Cycles output to verify operation.
SSR control	--	--	--	--	
Ignition module 1, 2, 3, or 4	--	--	--	--	
Blower speed control	--	--	--	--	
Power vent control	--	--	--	--	
Steam valve	--	--	--	--	
Test run*					
Test run percent	0	0	100	%	Set demand percent value between 0 and 100 to test.
Test run time	0	0	30	minutes	Set test run time duration between 0 and 30 minutes.
Start					
Stop					
Note: * Humidifier test run will not occur if safety circuits (for example, duct high limit switch, airflow proving switch, or safety interlock switch) are not operating correctly. * Your system may not have all of these parameters. **More on the next page >**					

The Diagnostics screen

Table 43-1: Diagnostics menu (continued)		
Message	**Description**	**Does message auto-clear?**
Messages		
Replace contactors	Contactors have reached normal life span. Replace contactors.	No
Service unit	Regularly scheduled unit servicing is due.	No
Drain pending	Auto drain/flush will occur at next scheduled time.	Yes
No airflow	No duct airflow	Yes
I-lock open	Interlock safety switch is open.	Yes
Freeze drain	Tank has drained to prevent freezing.	Yes
EOS active	The humidifier is draining or has drained and remains inactive until receiving another call for humidity.	Yes
Temp comp on	Humidifier output has been reduced because temperature compensation sensor reads a temperature on the inside-pane of an outside-wall window that could cause condensation.	Yes
Clean probes	Water level control probes need cleaning. Check tank for cleaning.	No
Duct HL trip	Duct relative humidity has risen above the high limit set point, or high limit switch has opened.	Yes
Duct HL span	Duct high limit humidistat has entered the throttle span range and is approaching duct high limit set point.	Yes
No fieldbus sig	There is no signal at the BACnet or Modbus field connection on the Vapor-logic4 board.	Yes
Insufficient water	The low water probe is not in contact with water when there is a demand for humidity.	Yes
Boiling temp calibrated	Indicates actual humidifier boiling temperature at time of reading. This reading is taken after power-up by the tank sensor at the time of first steam creation.	Yes
Notes: • The Messages Log displays message name, date and time of occurrence, plus "Active," "Cleared" or "Auto-cleared." • Active messages display first in the Messages Log, followed by cleared messages (auto-cleared and/or manually-cleared) listed in order of occurrence. • The Messages Log displays a maximum of 10 messages. Cleared messages leave the log first. • If a message event occurs and is not manually or auto cleared during unit operation, the message will stay there until there is demand and the unit is running.		

The Alarms screen

Figure 44-1:
Keypad/display screens


```
SPACE RH   SET PT  212°F
           35%
  34%
TANK A   OUTPUT
           59%
MODE: Auto      Filling
 MAIN  | MESSAGE | ALARM
```

Press the ALARM softkey when flashing, or select Alarms from the Main menu to view the Alarms Log.

```
ALARMS              1/2 A
 Water probes
  miswired
    Manually cleared
    02-02-2008 12:23

 MAIN  |  INFO  | CLEAR
```

The Alarms menu displays system alarms. Using the keypad/ display, go to the Alarms menu by pressing the Alarms softkey (which will be flashing if there is an Alarm), or by pressing the Home softkey and then the Alarms softkey. Using the Web interface, click on the View Alarms link in the upper left corner of any screen.

System alarms are listed in the Alarms Log. The Alarms Log displays the alarm name, date and time of occurrence, plus whether the alarm is active, has been cleared by an operator, or auto-cleared by Vapor-logic4. The Alarms Log lists active alarms at the top of the list, followed by cleared alarms. The Alarms Log holds 30 alarms. As alarms are cleared, they move down the list below active alarms. When the Alarms list reaches 30 alarms, new alarms add to the top of the list and the oldest, cleared alarms leave the list. Alarm information is retained in nonvolatile memory if the Vapor-logic4 board loses power.

See the table on the next page for alarms and their descriptions

Alarm causes and recommended actions are listed in the troubleshooting section in this manual.

Figure 44-2:
Vapor-logic4 Web interface Alarms screen

The Alarms screen

Table 45-1: Alarms menu		
Alarm label	**Description**	**Does alarm auto-clear?**
Tank temp sensor failed	Tank temp sensor has failed.	No
RH signal out of range	RH signal is out of range.	Yes
Dew point sig. out of range	Dew point signal is out of range.	Yes
Demand signal	Demand signal is out of range.	Yes
Duct RH signal out of range	Duct RH signal is out of range. Sensor my be faulty.	Yes
Aux temp sens out of range	Auxiliary temp sensor signal is out of range.	Yes
Water probe miswired	Water probe head is miswired or faulty.	Yes
Faulty water probe	Water probe readings are suspect, likely caused by scale on probe.	No
Excess fill time	Fill valve has been on too long during initial tank fill. Bottom probe is not in contact with water.	Yes
Excess refill time	Re-filling is taking too long. Top probe is not in contact with water.	Yes
Tank not draining	Drain valve has been open for the prescribed amount of time based on the humidifier model, and water is still touching the low water probe.	Yes
Tank overtemp	Fault occurs at boiling temperature plus 25 °F (13 °C). All units are put into a keep-cool state where fill and drain cycles operate to keep tank cool. **Note:** Resolve issue, then clear alarm, shut down humidifier, and restart.	No
Excess water no demand	Humidifier continues to add water when there is no demand, signifying unit continues to make steam. All units are put into a keep-cool state where fill and drain cycles operate to keep tank water from boiling. **Note:** Resolve issue, then clear alarm, shut down humidifier, and restart.	No
No SDU airflow	Airflow proving switch in the SDU (space distribution unit, a fan-based dispersion assembly) indicates no airflow. No steam is produced while alarm is active.	Yes
No power vent airflow	Pressure switch indicates there is no airflow at the power venter.	Yes
No combustion airflow	Switch indicates the combustion air damper is closed.	Yes
Blocked flue	Flue pressure switch indicates positive pressure in flue. GTS will not ignite when this fault is active.	Yes
Burner 1, 2, 3, or 4 fault	Burner tried one or more times to light and did not succeed. Once this fault is active, Vapor-logic4 locks out the burner and does not try to light it again until fault is cleared. Other burners can run.	No
Ignition mod. 1, 2, 3, or 4 fault	Ignition module has not opened the gas valve. Once this fault is active, Vapor-logic4 locks out the ignition module and does not try to start it again until fault is cleared. Other ignition modules can run.	No
Blower 1, 2, 3, or 4 fault	Blower is turning at less than the specified minimum RPM. Unit not allowed to run.	Yes
Gas valve 1, 2, 3, or 4 fault	Gas valve is on when it should be off. Unit not allowed to run.	Yes
Low water	Low water probe is in contact with water and low water sensor is not in contact with water.	Yes
Low input signal current	Demand signal by others current is below minimum threshold.	Yes
Notes: • See the troubleshooting section in this manual for alarm possible causes and recommended actions. • The Alarms Log displays alarm name, date and time of occurrence, plus "Active," "Cleared" or "Auto-cleared." • Active alarms display first in the Alarms Log, followed by cleared alarms (auto-cleared and/or manually-cleared) listed in order of occurrence. • The Alarms Log displays maximum 30 alarms. Cleared alarms leave the log first. • If an alarm event occurs and is not manually or auto-cleared during unit operation, the alarm will stay there until there is demand and the unit is running.		

The Setup screen
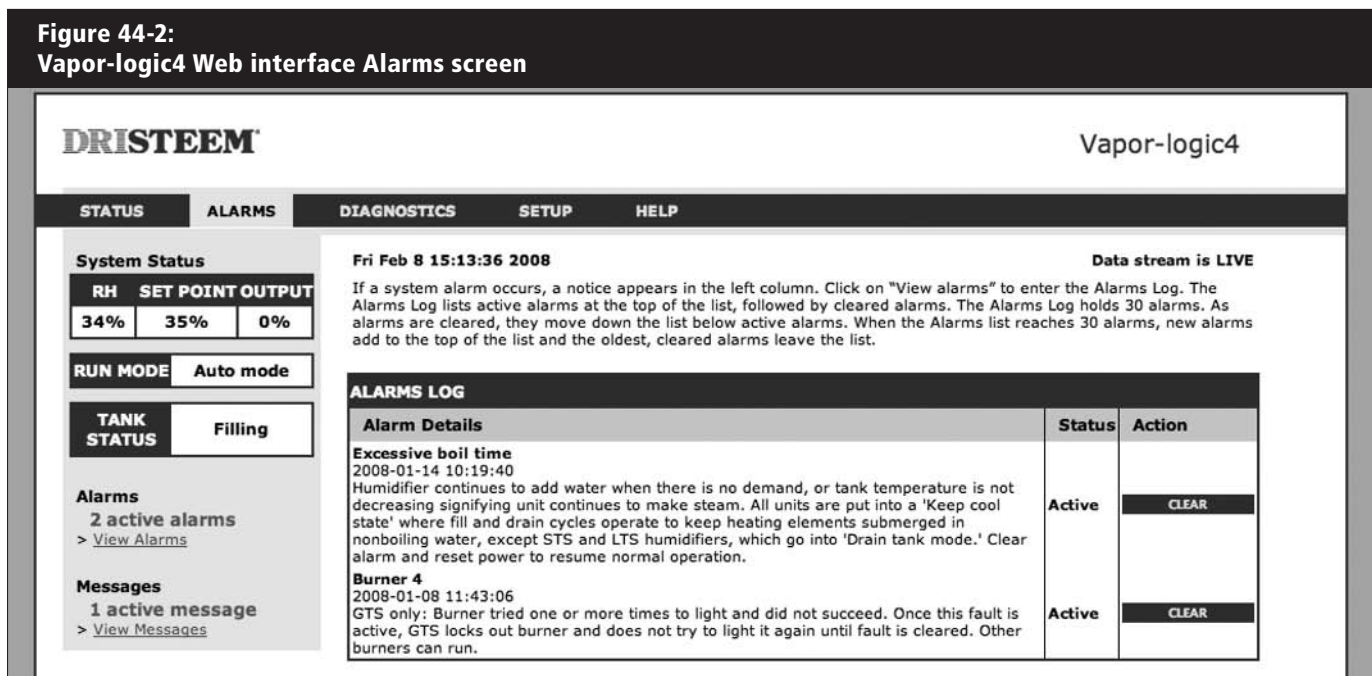
The Setup menu is where system parameters can be changed. This menu is used primarily during initial installation, but can also be used for making changes or adjustments as needed during operation. Note that while all parameters can be changed, many changes also require a corresponding hardware change. Vapor-logic4 firmware will warn you of this during the setup process.

See the Pages 24-32 for more information about the Setup screen.

PID tuning

Improve humidifier response time with PID tuning

When your system has a humidity or dew point transmitter, you can adjust and control the set point through the keypad/display or Web interface using a proportional, integral, and derivative (PID) control loop.

With a PID loop, you can tune your system for maximum performance using the proportional (K_p), integral (K_i), and derivative (K_d) gain terms. These gain factors work in the following way: The overall demand in a PID system is made up of three distinct parts—the proportional, the integral, and the derivative. Each of these parts is calculated and then multiplied by its corresponding gain factor. These gain factors are the setup variables you have access to from the Setup menu. By making a gain factor larger, you increase its overall influence on system demand. Once each PID component is multiplied by its gain factor, all three terms are added together to determine the overall demand percentage.

The proportional term

The proportional term is the difference between the RH set point and the actual humidity multiplied by the proportional gain. For example, with a K_p of 80 and the actual humidity 5% below the RH set point, the proportional contribution to the demand is: $5 \times 80 \times 0.085 = 33\%$ (the 0.085 is an internal scalar used to increase the usable span of K_p).

There is a problem with using only proportional gain to control the RH. In almost all applications there is some constant load on the humidifier just as there is a constant load on heating equipment. If the proportional term is all that is used, the actual humidity must be less than the set point for the humidifier to be on.

What happens is the humidifier finds a happy medium where the actual humidity is something less than the set point, which allows the humidifier to continue to run. This difference between the set point and the actual running humidity level is called the droop. This droop can be corrected using the next term, the integral.

K_p = Proportional gain factor

K_i = Integral gain factor

K_d = Derivative gain factor

PID tuning

The integral term

The integral term is an accumulation of RH error over time multiplied by the integral gain. Every 1/10 second when the demand is updated, the instantaneous RH error (RH set point – actual RH) is added to a temporary variable that accumulates the error. This accumulated error is multiplied by the integral gain to create the integral term. The integral gain affects how fast the humidifier corrects a droop condition. The higher the integral gain (Ki), the faster the reaction. (An integral gain of zero disables this variable and allows the unit to run on the proportional term only.)

With an integral gain term greater than zero and an actual humidity below set point, the demand increases slightly with each update. If the actual humidity is above set point, the demand decreases slightly. The amount it increases or decreases depends on the magnitude of the RH error and the integral gain value. The closer you are to the set point, the smaller the addition or subtraction.

When looking at this control scheme, an interesting pattern occurs. The total demand signal for the humidifier is the sum of the proportional part, the integral part, and the derivative part. As the actual humidity approaches the set point, the integral portion makes up the majority of the demand, and the proportional part makes up very little. Once the set point is reached and the unit stabilizes, the entire demand is made up of the integral part because the proportional part is zero.

If the actual humidity goes over the set point, the integral term starts to decrease. In addition, the proportional term becomes negative and actually starts to subtract from the total system demand. These two terms work in conjunction with each other to bring the humidifier back to set point.

PID tuning

The derivative term

The derivative term is the measured change in error over time multiplied by the derivative gain (differentiating error with respect to time).

If the actual measured RH is below set point and is rising, the derivative term subtracts from the demand in anticipation of the approaching set point.

If the actual measured RH is below set point and is falling, the derivative term adds to the demand in anticipation of the need to get the demand up faster and start climbing toward set point.

If the actual measured RH is above set point and falling, the derivative term adds to the overall demand in anticipation of the approaching set point. It generally is used to increase damping and, in some cases, improves the stability of the system.

However, in the majority of control situations, the derivative term is not needed and is simply set to zero. The proportional term and integral term provide tight, accurate control without the addition of the derivative term.

PID band

The last user-controlled term in the PID equation is the PID band. The PID band defines the range of measured RH values (°F/°C for dew point control) where the PID loop is in operation. The PID loop is in operation when the measured RH is in the range of (RH set point – PID band) to (RH set point + PID band). If the measured RH is below the PID band, the PID calculations are suspended and the demand is set to 100%. Conversely, if the measured RH is above the PID band, the demand is set to 0%.

For example, if starting with an RH set point of 35% and a PID band of 10%, the PID loop operates when the actual humidity is in the range of 25% to 45%. If the actual humidity is lower than 25%, the humidifier is full on. If the actual humidity is above 45%, the humidifier demand is 0%. The PID band aids in speeding the response time of the system. It allows the RH to get somewhat close to the set point and then lets the PID loop precisely control the RH when it is within the PID band. The default value for the PID band is 10%.

Large spaces where the humidification system influences the RH very slowly typically benefit from a smaller PID band. Small spaces where the humidification system can quickly influence the RH typically benefit from a larger PID band. Rarely should it be set to less than 10%.

PID tuning

PID setup tips

A large PID band (10% to 20%) yields tighter and more stable control with longer response times. A small PID band produces quicker response times, but control may become unstable if the RH regularly goes outside the band.

As a rule, start with a PID band of 10%. When the humidifier is operating at steady state, make sure the RH does not go outside the PID band. The intent of the PID band is to quickly get the RH into a controllable range. To increase or decrease the effect of the proportional term on system performance, adjust the proportional gain (Kp).

However, for the majority of systems, the factory default setting of 80 is sufficient. Generally speaking, a large integral gain (Ki) quickens the system response but may cause it to oscillate and become unstable. A small integral gain yields tighter, more stable control at the expense of a long response time.

These principles can be applied in the following examples: If a system eventually reaches the desired RH level but takes a long time to do so without overshooting the set point, faster response can be achieved by increasing the integral gain. If the measured RH oscillates above and below the set point numerous times before finally reaching set point, decrease the integral gain.

Typically, if a large adjustment is made to the integral gain, better response is achieved by decreasing the magnitude of the change. Then, modify the proportional gain slightly in the same direction the integral gain was changed. RH history data, available for download from the Diagnostics menu, can aid when doing PID loop tuning.

Water level control

Probe system

Standard or softened water systems use conductivity probes to measure and control water level for optimum operating efficiency. Water conductivity must be at least 100 µS/cm for the probe system to operate. The three-probe system is monitored by the Vapor-logic4 board, which performs all the necessary logic and timing functions to provide total water level control and safety shutdown.

Vapor-logic4 automatically maintains the water level between the upper two probes A and B (see figure on this page). When the water level falls below probe B, the fill valve opens until the water level reaches the upper probe A. Water must remain in contact with the probe surface for three seconds for Vapor-logic4 to determine that the water is at the probe's level.
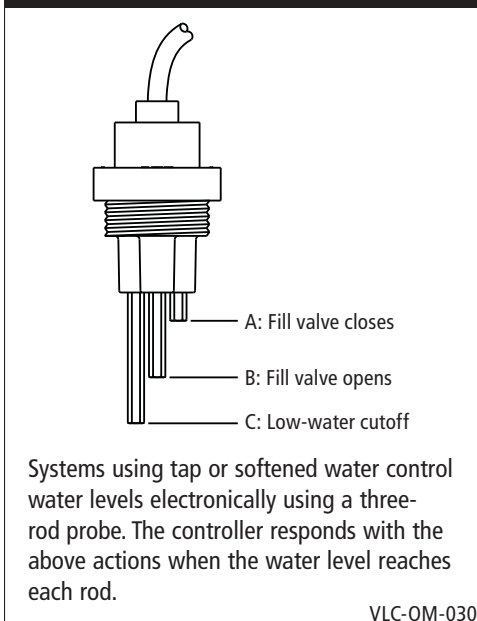
Conversely, water must stay out of contact with the probe surface for three seconds for Vapor-logic4 to determine that the water is below the probe's level. This three-second delay ensures that turbulence does not cause an incorrect level reading.

Each time the fill valve energizes, the Vapor-logic4 system tests the probe system. If the signal from the probe assembly begins to deteriorate, the "Clean probes" message appears in the Messages Log. Once the probe system reaches its maximum usable life, the humidifier shuts down and the "Faulty water probe" alarm appears.

An adjustable skim time allows for an extended skim period (0 to 120 seconds) to reduce mineral accumulation. When skimming, the fill valve remains energized after the water level reaches the upper probe, A, for the amount of time specified by the skim duration. The skim duration is adjustable in one-second intervals through the Setup menu.

Probe C provides low water protection for the heating outputs. If the water level falls below probe C, the heating outputs are disabled.

Figure 51-1:
Water level control for standard water systems

A: Fill valve closes
B: Fill valve opens
C: Low-water cutoff

Systems using tap or softened water control water levels electronically using a three-rod probe. The controller responds with the above actions when the water level reaches each rod.

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Water level control

Figure 52-1:
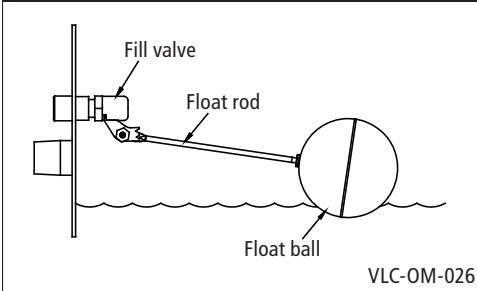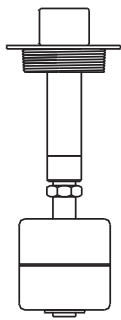**Water level control for DI/RO water systems**

VLC-OM-026

Figure 52-2:
Low water cutoff switch for DI/RO water systems

A zero mark on top of the float indicates proper float placement on stem. Switch is normally open when float ball is at its lowest point on the stem.

OM-3009

Float valve system

DI/RO water systems (except for steam injection) use a float valve system to control water levels for optimum operating efficiency. DI/RO systems are used where water/steam purity is important, where demineralized water is needed to improve performance or lessen maintenance requirements, or where a potable water source has minimal or no conductivity, thus requiring a float rather than a probe to sense water levels.

The float valve system consists of a fill float and a low water cutoff float.

The fill float regulates how much water is added to the tank via a float ball, float arm, and mechanical valve. The valve is adjusted to fill the evaporating chamber within ¼" (6 mm) of the overflow port allowing heated, and therefore expanded, water at startup to fill the external P-trap.

The low water cutoff float has an electrical switch that closes when a ready water condition is reached. This float switch provides low water protection for the heating outputs. If the water falls below the float, the heating outputs are disabled.

CAUTION! Damage caused by chloride corrosion is not covered by your DRI-STEEM warranty. Chloride corrosion can result from improperly functioning deionizing (DI) beds.

Duct high limit options

Duct high limit options

When a duct high limit option is ordered, DRI-STEEM provides either a duct high limit switch or a duct high limit humidity transmitter (4 to 20 mA output, 0 to 100% RH range) for duct mounting.

The duct high limit switch prevents duct saturation by turning off the humidifier when reaching the device set point. When this occurs, a "Duct HL trip" message appears in the Messages Log and autoclears when duct RH drops below the duct high limit set point.

The modulating high limit transmitter operates in conjunction with the room/duct controlling transmitter or demand signal through the Vapor-logic4 control system to prevent excess humidification in the duct. Vapor-logic4 starts lowering the humidifier output when the duct relative humidity is within a user-defined percentage (default is 5%) of the duct high limit set point. This value is called the duct high limit span and is defined during Setup.

When duct relative humidity enters this range, a "Duct HL span" message appears in the Messages Log and the Message label lights on the keypad/display. If necessary, the reduction of the humidifier output continues until maximum high limit set point is reached, shutting off the humidifier completely. If this occurs, a "Duct HL trip" message appears in the Messages Log.

When the high relative humidity starts to decrease in the duct, Vapor-logic4 slowly starts to increase steam production. When the duct relative humidity decreases to greater than the defined percentage below the duct high limit set point, the control transmitter or signal by others demand signal is restored as the primary controller, returning the control system to normal operation, and the messages in the Messages Log automatically clear.

Temperature compensation control option, auxiliary temp. sensor

Temperature compensation control option

When selected as an option, DRI-STEEM provides a temperature compensation transmitter. The temperature compensation transmitter continually monitors interior window glass temperature and transmits this temperature to Vapor-logic4.

Vapor-logic4 assumes a 70 °F (21 °C) room temperature and uses the glass temperature and the RH in the space being controlled to calculate the dew point (°F or °C) for the space.

If the window temperature falls below the dew point, Vapor-logic4 automatically decreases the RH set point so moisture does not form on windows. The Home screen displays the modified RH set point, and an asterisk (*) appears next to the modified RH set point, denoting that temperature compensation has taken control of the RH set point. The "Temp comp on" message appears in the Messages Log and the Message softkey label becomes highlighted. When the interior window glass temperature rises above the dew point, Vapor-logic4 restores system control to the normal RH set point for the space, and the "Temp comp on" message automatically clears.

The temperature compensation control option is available only when the system is equipped with an RH transmitter. It is not available when a remote humidistat, dew point transmitter, or building automation system is used to control the humidifier.

The transmitter provided with Vapor-logic4 is calibrated for –20 °F to 160 °F (–29 °C to 71 °C) with output from 4 to 20 mA. For example, a temperature reading of 70 °F (21 °C) should produce a measurement of 12 mA. You can calibrate the sensor by adjusting the offset in the auxiliary temp sensor section of the Setup menu.

Auxiliary temperature sensor

When selected as an option, DRI-STEEM provides a temperature sensor for monitoring temperature in a duct or space. Temperature from this sensor can be viewed from the Status menu ("Aux temperature"). Temperature history data can also be downloaded from the download data section of the Diagnostics menu.

Tank preheating and aquastat

Tank preheat feature

The tank preheat feature heats the water in the tank to near boiling to allow a rapid response to a demand signal. If the tank is cold when a small demand signal is present, the Vapor-logic4 controller overrides the demand signal and heats until the tank temperature reaches 195 °F (91 °C). At this point, control is returned to the original demand signal.

Preheating allows the system to respond quickly to small demand requests. When preheating, the word "Heating" appears on the Home screen.

Aquastat operation

The aquastat set point is the minimum tank temperature the Vapor-logic4 controller maintains when there is no call for humidity or when safety circuits are not satisfied (e.g., high limit or airflow proving switch). The aquastat set point is adjusted through the water management section of the Setup menu. This feature shortens the tank preheat time, providing a rapid response to a call for humidity.

For example, if the aquastat is set at 180 °F (82 °C) when a call for humidity occurs, the tank only needs to warm up 32 °F (18 °C) (in addition to the energy required to cause a phase change from water to steam) to reach the boiling point and start producing steam. However, if the aquastat is at its minimum default setting of 40 °F (4 °C) and the tank is in an average-temperature occupied room, the tank will be about 70 °F (21 °C). In this situation, when a call for humidity occurs, the tank needs to warm up 142 °F (79 °C) to reach the boiling point and begin producing steam. When an aquastat call is heating the tank, the word "Heating" appears on the Home screen.

Freeze protection, fan operation, sensor offsets

Freeze protection

Freeze protection is similar to aquastat operation with some exceptions. The freeze protect set point is fixed at 40 °F (4 °C). Its purpose is to prevent the tank from freezing in cold environments. Unlike aquastat, if a condition exists that prevents the heaters, burners, and valves from firing (such as an alarm, an external interlock switch is open, or the humidifier is in Standby mode), instead of remaining idle, the controller switches to manual drain run mode and the tank drains to prevent freezing. Change mode to Auto to resume operation.

When the tank is heating to prevent freezing, the word "Heating" appears on the Home screen. When the tank is draining or has drained to prevent freezing, the "Freeze drain" message appears in the Messages Log and the Message softkey label becomes highlighted.

Fan-based dispersion operation

If your humidifier is equipped with a Space Distribution Unit (SDU) or an Area-type fan, it is enabled after the Vapor-logic4 controller receives a call for humidity and the tank water is approaching boiling temperature.

When the humidifier no longer receives a call for humidity, it stops heating and the SDU or Area-type fan continues to run for the time delay period (as defined in the fan-based dispersion section Setup menu).

Sensor offsets

All external transmitters shipped with Vapor-logic4 can be field calibrated from the Setup menu. For example, if the system is equipped with an RH transmitter, there is an RH offset setting.

The factory default for all transmitter offset settings is zero. The sensors that have this adjustment capability are the humidity, duct high limit, temperature compensation, and dew point transmitters.

Automatic drain sequence operation

Automatic drain sequence for potable water (not softened)

When configured to run a potable water humidifier with an automatic drain valve, Vapor-logic4 uses an automatic drain sequence (ADS) to reduce mineral accumulation in the tank and drain line, which decreases tank maintenance.

The automatic drain sequence starts by opening the drain valve to empty the tank. When the drain duration ends, the fill and drain valves remain open to flush the tank. When the flush duration ends, the automatic drain sequence is complete and the humidifier resumes normal operation. The default drain and flush durations are model-specific and can be adjusted in the water management section of the Setup menu.

Automatic draining and flushing parameters are defined in the water management section of the Setup menu. First, automatic draining and flushing must be enabled. Second, the amount of water converted to steam before an automatic drain sequence begins must be defined (Usage). Defaults for this value are model-specific, and are calculated based on operating 200 hours at 100% of capacity. Go to the Setup menu to view or change this setting for your humidifier. Third, days of the week when the automatic drain sequence can occur must be defined. This means that once the Usage requirement is met, the automatic drain sequence can occur on the first allowed day (allowed days default is all days). Last, time of day when the automatic drain sequence occurs must be defined (default value is midnight).

For example, if you use factory default settings for the automatic drain sequence, the first automatic drain sequence will occur at midnight on any day of the week once the model-specific usage requirement has been met. If you want to change these settings, go to the water management section of the Setup menu.

Note that the automatic drain sequence is designed for a standard water system with electric drain and fill valves. Humidifiers using DI/RO water do not require automatic draining and flushing, but this feature can be enabled if the humidifier has electric drain and fill valves.

Draining, skimming

Draining when using softened water

When using softened water draining occurs for a one-minute duration after a period of time based on 1000 hours of 100% operation to remove residue from the drain valve mechanism. End of season draining occurs as described below.

Skim timer

With a potable or softened water configuration, the Vapor-logic4 controller has a skim timer. This timer is activated at the end of each fill cycle. The timer keeps the fill valve open (for a user-determined amount of time after the tank has filled) to skim minerals off the water surface. The skim time is adjusted through the Setup menu.

End of season drain

If there is no call for humidity for a user-defined time period, the humidifier performs an end of season (EOS) drain where the drain valve remains open for ten hours to allow the tank to drain and then closes. If the humidifier receives a call for humidity after the ten-hour end of season drain-down period has begun, the controller stops the end of season draining, the tank refills, and the humidifier resumes normal operation. The user-defined inactivity time period (idle time) is defined in the end-of-season drain section of the Setup menu. This option is available only on units equipped with electric drain and fill valves.

Service interval, date/time, battery backup

Service interval

The Vapor-logic4 controller tracks the amount of water converted to steam by the humidifier. When the amount of water converted to steam exceeds the service interval (a user-defined amount of water in pounds or kilograms adjusted in the Setup menu), the "Service unit" message appears in the Messages Log.

The humidifier continues to operate after the message appears. The message notifies the user that the service interval was reached and the humidifier should be cleaned. The message remains in the Messages Log until it is cleared or until the Messages Log adds 10 new messages (the maximum number of messages the log holds).

Setting date and time

The Vapor-logic4 controller contains a real-time clock that is used for several features including the drain and flush sequence and alarm logging. If you need to reset the date or time, go to the Setup menu. The date and time will need to be reset whenever the Vapor-logic4 controller has been powered off for more than 72 hours, such as when starting up at the beginning of the humidification season.

Battery backup, nonvolatile memory

If there is a power outage, date and time settings will be saved for 72 hours. Alarms, unit configuration, and usage timers will remain in nonvolatile memory indefinitely.

Security, downloading data, and data backup and restore

Security/password

To control who can change Vapor-logic4 settings, enable the security function and define a password in the Setup menu. Enter four digits, numbers only, and define the time-out period (minutes of inactivity before Vapor-logic4 reverts to read-only mode). The Web interface and the keypad/display can have separate passwords.

Important: Write down this password and keep in a secure location.

Downloading historical data

Vapor-logic4 retains the following data sets:
- RH history (seven rolling days of data acquired at one-minute intervals)
- Temperature history (seven rolling days of data acquired at one-minute intervals)
- RH and temperature history (seven rolling days of data acquired at one-minute intervals)
- Water converted (pounds/kilograms of water converted to steam since last reset)
- Energy used (kW hours or therms used since last reset)

To download data, go to the download data section of the Diagnostic screen.

Data backup and restore

Vapor-logic4 data can be backed up to a USB flash drive. The backup file contains all information relative to the humidifier, including firmware, user settings, model number, serial number, and the configuration string.

Backup files use the serial number in the backup file name so that the file is easily matched to a particular humidifier.

To create a backup file:
1. Insert a USB flash drive into the USB port on the Vapor-logic4 board.
2. Go to Diagnostics/USB backup-restore/Back up settings
3. Select Yes. The backup process is complete when LED-2 (see Figure 62-1) illuminates.

To restore from a backup file:
1. Insert the USB flash drive with that humidifier's backup file into the USB port on the Vapor-logic4 board.
2. Go to Diagnostics/USB backup-restore/Restore settings
3. Select Yes. Note that the serial number of the humidifier and backup file must match to complete the restore process.

Firmware updates

Uncompressing firmware updates

1. Obtain the firmware update file from your DRI-STEEM representative or distributor. The update file will be titled DRI-STEEM_vl4_update_ver_x.x.x.zip. Save this file and note the location where you have saved the file.

    Note: xxx.zip (zipped) files are compressed to reduce download times and allow multiple files in one download. Zipped files are unusable until unzipped.

2. Double click on the file (DRI-STEEM_vl4_update_ver_x.x.x.zip); Windows Explorer opens a folder named **vl4_update**. This folder contains the firmware update file.

    IMPORTANT: Do not change the name of the **vl4_update** folder.

    Note: If Windows Explorer does not open when you double-click on **DRI-STEEM_vl4_update_ver_x.x.x.zip**, see "Unzipping a file without Windows XP" to the right.

3. Prepare a reliable USB flash drive for Step 4 as follows:

    • Make sure it has at least 16 MB of free space.
    • Make sure it is not partitioned into multiple drives.
    • Remove or disable programs that encrypt files stored on the USB flash drive.

4. Copy the **vl4_update** folder to the root directory (not into a folder) of the USB flash drive.

    In Figure 61-1, the USB flash drive's root directory is listed in the **Address** field. The root directory has only a backslash after the colon.

    IMPORTANT: If the USB flash drive already contains a folder named **vl4_update**, either delete or rename it before saving the new **vl4_update** update folder to the USB flash drive. Do not overwrite its contents.

Figure 61-1:
Copying the vl4_update folder
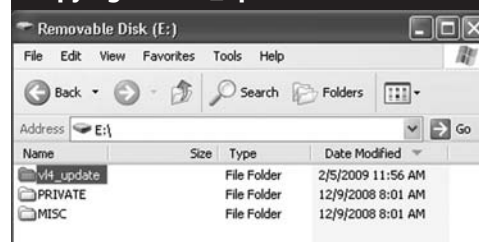
Copy the vl4_update folder from the new down-loaded DRI-STEEM_vl4_update_ver_x.x.x.zip folder to the root directory of a USB flash drive.

Unzipping a file without Windows XP

The instructions above are for unzipping the **DRI-STEEM_vl4_update_ver_x.x.x.zip** file with Windows XP, which has built-in support for Zip files. If the instructions above do not unzip the file, you may need to download an unzip utility. One such utility is available for free at http://www.winzip.com/prod_down.htm

Firmware updates

Figure 62-1:
LED-2 location on Vapor-logic4 board

LED-1 (power indicator)
LED-2
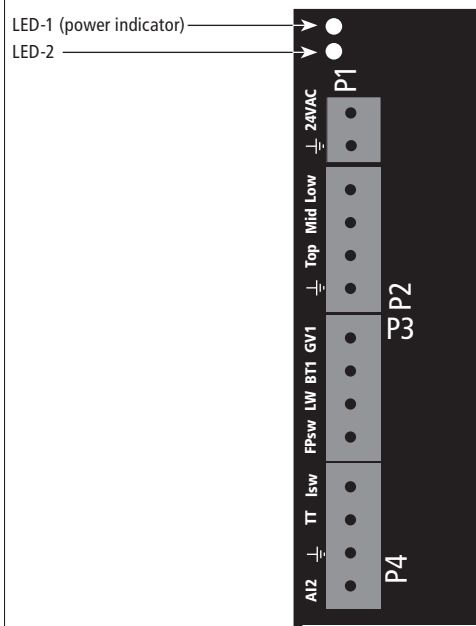
WARNING

Electric shock hazard

All circuits must be energized for this firmware update procedure. Contact with energized circuits can cause severe personal injury or death as a result of electric shock.

To prevent shock when grounding to the electrical subpanel, touch the subpanel along its edge, away from wires and components.

mc_072209_1320

Cycling power with USB flash drive inserted

Every time power is cycled while the USB flash drive is inserted, the update process repeats and must be allowed to complete before the USB flash drive is removed or power is cycled again. Doing either one prematurely could corrupt the update and render the board inoperable. If in doubt, wait five minutes after power is turned on before cycling power or removing the USB flash drive.

Installing firmware updates

Note: For mission-critical applications, DRI-STEEM recommends that you have a spare Vapor-logic4 board on hand before updating.

1. Check the Vapor-logic4 firmware version on the keypad/display or Web interface:

   Keypad/display: Select **Diagnostics** in the Main menu, select **Humidifier info**, scroll down to **Firmware version**.

   Web interface: Click **Diagnostics** in the toolbar, click **Humidifier info**, see **Firmware version** below.

   If the firmware version is less than v01.03.00, **do not continue with this procedure**. Follow the procedure (available from your DRI-STEEM representative or distributor) for updating firmware less than v01.03.00.

2. Place the humidifier system in Standby mode.

3. **IMPORTANT:** To prevent static damage to the USB flash drive and controller, ground yourself by briefly touching the humidifier's electrical subpanel before touching any part of the controller board or doing Step 4. See the Warning at left.

4. Insert the USB flash drive loaded with the unzipped firmware update folder into the Vapor-logic4 board USB port.

   CAUTION: Between Steps 5 and 6, do not remove the USB flash drive or cycle the power before LED-2 (see Figure 62-1) and the keypad/display begin to blink. Doing either one prematurely could corrupt the update and render the board inoperable.

5. Disconnect power to the Vapor-logic4 board, wait 5 seconds, and reconnect power.

6. Wait for the keypad/display and LED-2 to begin blinking, then remove the USB flash drive.

   The Vapor-logic4 firmware update is now installed. See "Cycling power with USB flash drive inserted" at left.

7. Verify the update by checking the Vapor-logic4 firmware version, as explained in Step 1.

   The firmware version displayed should match the version number of the **vl4vx.x.x** file in the **vl4_update** folder on the USB flash drive.

   Not all USB drives perform equally. If a USB flash drive fails to update the Vapor-logic4 firmware, perform the following procedure with a different USB flash drive:

   a. Repeat Steps 3 and 4 on Page 61.
   b. Repeat Steps 2 through 7 on this page.

8. Update the clock/calendar to today's date.

9. Verify humidifier operation, and return it to service.

Test outputs, test run

Test outputs

When completing an installation or repair, cycle all outputs, such as fill valve, drain valve, etc., to verify operation. Go to the test outputs section of the Diagnostics menu and scroll through each connected output to verify operation. During testing, the humidifier mode changes to Standby and the tank status changes to Test.

Test run

Vapor-logic4 has a test run capability to confirm system functionality. This capability allows a technician to simulate a demand for steam production when there isn't one (such as when performing routine maintenance). To confirm functionality, go to the test run section of the Diagnostics menu. Set system demand percent and set test run time duration. During testing, the humidifier mode changes to Standby and the tank status changes to Test.
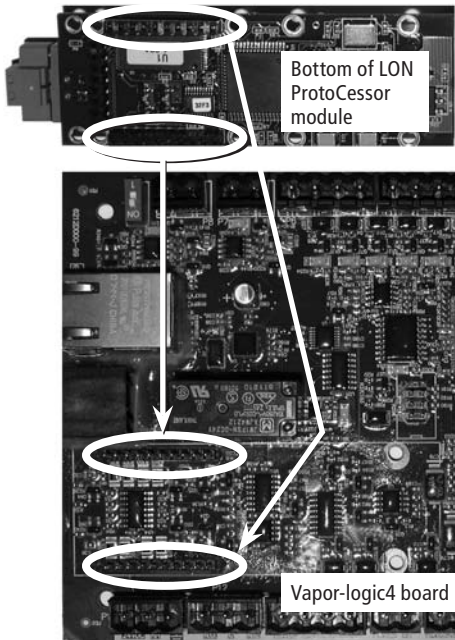
mc_102108_1350

Modbus, BACnet, LonTalk interoperability

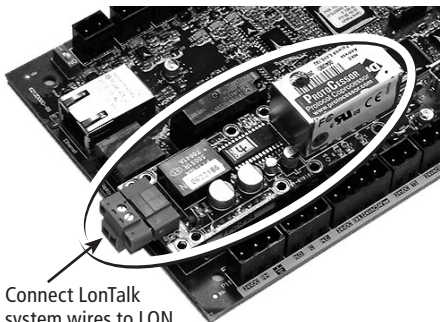## Figure 64-1: LON ProtoCessor module installation

1. **Remove LON ProtoCessor module from box.**

2. **Insert LON ProtoCessor module into pins on Vapor-logic4 board.**

Bottom of LON ProtoCessor module

Vapor-logic4 board

3. **Connect wiring from LonTalk system to LON ProtoCessor module on Vapor-logic4 board.**

Connect LonTalk system wires to LON ProtoCessor module here.

NOTE: Orient the LON ProtoCessor module as shown, with wire connectors end at the side of the Vapor-logic 4 board.

Introduction

Using defined system variables, Vapor-logic4 can communicate with building automation systems using Modbus, its native language, or by using optional BACnet or LonTalk. These variables are defined in the tables on the following pages.

Configuring and installing interoperability

1. Modbus is preconfigured, and is the default. To enable BACnet or LonTalk, use either the keypad/display or the Web interface and go to the Communications section of the Setup menu. (Note: This step is completed at the factory when a humidification system is ordered with interoperability.)

   Note: For retrofit BACnet or LonTalk installations, contact your local DRI-STEEM representative or DRI-STEEM to purchase a BACnet or LonTalk upgrade.

2. If connecting to a Modbus or BACnet system, connect Modbus or BACnet system wiring to terminal P7 on the Vapor-logic4 board (positive to positive, negative to negative).

3. If connecting to a LonTalk system, all wiring is connected at the factory when a humidification system is ordered with LonTalk. If installing LonTalk as a retrofit (see Figure 64-1):

   1. Turn off power to the unit.

   2. Touch the units bare metal frame before handling module. Hold onto frame while handling module.

   3. While handling the module hold module by edge. Avoid touching the components or circuit board.

   4. Plug LON ProtoCessor module into mounting pins as shown with LonTalk connector at the edge of the board.

   5. Connect LonTalk system wires to LON ProtoCessor module as shown is Step 3 at right.

   6. Turn on power to the unit.

   7. Use either the keypad/display or Web interface go to the Communications section of the Setup menu to enable LonTalk communication.

   Note: Make sure all pins are seated in the connector. Make sure the LON ProtoCessor module is installed as shown at right, with LonTalk connector at the edge of the board.

4. Set up communication with Vapor-logic4 using your Modbus, BACnet, or LonTalk network manager, referencing the tables on the following pages.

Modbus, BACnet, LonTalk interoperability

Table 65-1: Interoperability variable and object names									
Variable name and BACnet object name	**Read Only (RO) or Read Write (RW)**	**Modbus register number***	**BACnet Object Type and Instance**	**LonTalk variable names****	**Description**	**Units**		**Range**	
						I-P units	SI units	I-P units	SI units
Read-only analog variables									
Space_RH	RO	IR-1	AI-01	nvoSpaceRH	Read the relative humidity content of the air in the space being humidified.	%	%	0 to 100	0 to 100
Space_dew_point	RO	IR-2	AI-02	nvoSpaceDewPoint	Read the dew point of the air in the space being humidified.	°F	°C	20 to 80	-6 to 26
Duct_RH	RO	IR-3	AI-03	nvoDuctRH	Read the relative humidity content of the air in the duct.	%	%	0 to 100	0 to 100
Steam_demand_mass	RO	IR-4	AI-04	nvoSteamDmndMass	Read the steam demand in pounds or kilograms per hour.	lbs/hr	kg/h	0 to 100,000	0 to 100,000
Steam_demand_percent	RO	IR-5	AI-05	nvoSteamDemand%	Read the steam demand as a percentage of the humidifier's total capacity.	%	%	0 to 100	0 to 100
Aux_temp	RO	IR-6	AI-06	nvoAuxTemp	Read the temperature of the auxiliary temperature sensor.	°F	°C	-20 to 160	-29 to 170
Tank_temp	RO	IR-7	AI-07	nvoTankTemp	Read the temperature of the water in the humidifier's evaporating chamber.	°F	°C	-240 to 265	-151 to 129
Steam_output_mass	RO	IR-8	AV-1	nvoSteamOutMass	Read the estimated amount of steam the humidifier is producing in pounds or kilograms per hour.	lbs/hr	kg/h	0 to 100,000	0 to 100,000
Steam_output_percent	RO	IR-9	AV-2	nvoSteamOutput%	Read the estimated amount of steam the humidifier is producing as a percentage of the humidifier's total capacity.	%	&	0 to 100	0 to 100
Water_until_ADS	RO	IR-10	AV-3	nvoWaterUntilADS	Read the pounds or kilograms of water remaining to be converted to steam before the next automatic drain sequence (ADS) cycle.	lbs	kg	0 to 2,200,000	0 to 1,000,000
Water_until_service	RO	IR-11	AV-4	nvoWaterTilSrvc	Read the pounds or kilograms of water remaining to be converted to steam before the next service cycle.	lbs	kg	0 to 2,200,000	0 to 1,000,000

* See note 1 on Page 69.
** See note 2 on Page 69.

More on the next page >

Modbus, BACnet, LonTalk interoperability

Table 66-1: Interoperability variable and object names (continued)								
Variable name and BACnet object name	**Read Only (RO) or Read Write (RW)**	**Modbus register number***	**BACnet Object Type and Instance**	**LonTalk variable names****	**Description**	**Units**		**Range**	
						I-P units	SI units	I-P units	SI units
Setup variables									
Run_mode	Write	HR-1	MSV-01	nviRunMode	Set the current mode of the unit or system. The defined options are: 1 Auto 2 Local standby 3 System standby 4 Manual drain	--	--	1 to 4	1 to 4
	Read	HR-1	MSV-01	nvoRunMode	Read the current mode of the unit or system. The defined options are: 1 Auto 2 Local standby 3 System standby 4 Manual drain 5 Test outputs 6 Test run	--	--	1 to 6	1 to 6
Space_RH_set_point	Write	HR-2	AV-05	nviSpaceRHsetPt	Set or read the humidity set point for the space being humidified.	%	%	0 to 100	0 to 100
	Read	HR-2	AV-05	nvoSpaceRHsetPt		%	%	0 to 100	0 to 100
Space_dew_point_set_point	Write	HR-3	AV-06	nviSpaceDewPtSP	Set or read the dew point set point for the space being humidified.	°F	°C	20 to 80	-6 to 26
	Read	HR-3	AV-06	nvoSpaceDewPtSP		°F	°C	20 to 80	-6 to 26
Duct_high_limit_set_point	Write	HR-4	AV-07	nviDuctHLsetPt	Set or read the duct high limit set point.	%	%	0 to 100	0 to 100
	Read	HR-4	AV-07	nvoDuctHLsetPt		%	%	0 to 100	0 to 100
Fieldbus_demand_mass	Write Only	HR-5	AV-08	nviFbusDemndMass	Set the steam output (as demanded via the fieldbus) as a percentage of the humidifier's total capacity.	lbs/hr	kg/h	0 to 100,000	0 to 100,000
Fieldbus_demand_%	Write Only	HR-6	AV-09	nviFldBusDemand%	Set the steam output (as demanded via fieldbus) in pounds or kilograms per hour. If the request exceeds the unit's capacity, the unit will run at 100% capacity.	%	%	0 to 100	0 to 100
PID_band	RW	HR-7	AV-10	nciPIDband	Set the PID band.	%	%	0 to 50	0 to 50
PID-Kp	RW	HR-8	AV-11	nciPIDkp	Set the PID-Kp (proportional gain) factor.	--	--	0 to 1000	0 to 1000
PID-Ki	RW	HR-9	AV-12	nciPIDki	Set the PID-Ki (integral gain) factor.	--	--	0 to 1000	0 to 1000
PID-Kd	RW	HR-10	AV-13	nciPIDkd	Set the PID-Kp (derivative gain) factor.	--	--	0 to 1000	0 to 1000

*   See note 1 on Page 69.
** See note 2 on Page 69.

Modbus, BACnet, LonTalk interoperability

Table 67-1: Interoperability variable and object names (continued)									
Variable name and BACnet object name	**Read Only (RO) or Read Write (RW)**	**Modbus register number***	**BACnet Object Type and Instance**	**LonTalk variable names****	**Description**	**Units**		**Range**	
						I-P units	**SI units**	**I-P units**	**SI units**
Read-only digital I/O									
Airflow_proving_switch	RO	DI-1	BI-01	nvoAirflowSwitch	0=Open; 1=Closed	--	--	--	--
Duct_HL_switch	RO	DI-2	BI-02	nvoDuctHLswitch	0=Open; 1=Closed				
Safety_interlock	RO	DI-3	BI-03	nvoSafetyI-lock	0=Open; 1=Closed				
Combustion_air_damper_ (GTS)	RO	DI-4	BI-04	nvoCombustAirDmp	0=Damper Closed; 1=Damper Open				
Flue_pressure_switch_(GTS)	RO	DI-5	BI-05	nvoFluePressurSw	0=Open; 1=Closed				
Power_vent_switch_(GTS)	RO	DI-6	BI-06	nvoPowerVentSwch	0=Vent Off; 1=Vent On				
Low_water_sensor_ (GTS)	RO	DI-7	BI-07	nvoLowWaterSensr	0=No Water; 1=Water				
Fill_valve	RO	DI-8	BO-01	nvoFillValve	0=Closed; 1=Open				
Drain_valve	RO	DI-9	BO-02	nvoDrainValve	0=Not Draining; 1=Draining				
Faults and alarms									
Active_messages_exist	RO	DV-1	BV-01	nvoMessages	Flags all active messages	--	--	--	--
Active_auto_cleared_alarms_ exist	RO	DV-2	BV-02	nvoAlarms1	Flags all auto-cleared alarms				
Active_manually_cleared_ alarms_exist	RO	DV-3	BV-03	nvoAlarms2	Flags all manually cleared alarms				
Clear_all_faults	RW	DV-4	BV-04	nviClearAllFaults	When set will clear all active faults				
Alarm_tank_temp_sensor_ failed	RW	DV-5	BV-05	nvoAlrmTnkTmpSen	See Alarms menu.				
Alarm_tank_overtemp	RW	DV-6	BV-06	nvoAlrmOvertemp	See Alarms menu.				
Alarm_RH_signal_out_of_ range	RW	DV-7	BV-07	nvoAlrmRHsignal	See Alarms menu.				
Alarm_dew_pt_sig_out_of_ range				nvoAlrmDewPtSgnl	See Alarms menu.				
Alarm_demand_sig_out_ of_range				nvoAlrmDemndSgnl	See Alarms menu.				
Alarm_duct_RH_sig_out_ of_range	RW	DV-8	BV-08	nvoAlrmDuctRHsig	See Alarms menu.				
Alarm_aux_temp_sens_out_ of_rnge	RW	DV-9	BV-09	nvoAlrmAuxTemp	See Alarms menu.				
Alarm_water_probe_ miswired	RW	DV-10	BV-10	nvoAlrmProbeWire	See Alarms menu.				
Alarm_water_probe_failed	RW	DV-11	BV-11	nvoAlrmProbeFail	See Alarms menu.				

*   See note 1 on Page 69.
** See note 2 on Page 69.

Modbus, BACnet, LonTalk interoperability

Table 68-1: Interoperability variable and object names (continued)									
Variable name and BACnet object name	**Read Only (RO) or Read Write (RW)**	**Modbus register number***	**BACnet Object Type and Instance**	**LonTalk variable names***	**Description**	**Units**		**Range**	
						I-P units	SI units	I-P units	SI units
Faults and alarms (cont.)									
Alarm_excess_fill_time	RW	DV-12	BV-12	nvoAlrmFillTime	See Table 45-1, Alarms menu	--	--	--	--
Alarm_excess_refill_time	RW	DV-13	BV-13	nvoAlrmRefilTime					
Alarm_tank_not_draining	RW	DV-14	BV-14	nvoAlrmNoDrain					
Alarm_excess_water_no_demand	RW	DV-15	BV-15	nvoAlrmXessWater					
Alarm_no_SDU_airflow	RW	DV-16	BV-16	nvoAlrmNoSDUair					
Alarm_no_power_vent_airflow	RW	DV-17	BV-17	nvoAlrmPrVentAir					
Alarm_no_combustion_airflow	RW	DV-18	BV-18	nvoAlrmNoCombAir					
Alarm_blocked_flue	RW	DV-19	BV-19	nvoAlrmBlockdFlu					
Alarm_burner_1_failed	RW	DV-20	BV-20	nvoAlrmBurner1					
Alarm_burner_2_failed	RW	DV-21	BV-21	nvoAlrmBurner2					
Alarm_burner_3_failed	RW	DV-22	BV-22	nvoAlrmBurner3					
Alarm_burner_4_failed	RW	DV-23	BV-23	nvoAlrmBurner4					
Alarm_ignition_module_1_failed	RW	DV-24	BV-24	nvoAlrmIgnitMod1					
Alarm_ignition_module_2_failed	RW	DV-25	BV-25	nvoAlrmIgnitMod2					
Alarm_ignition_module_3_failed	RW	DV-26	BV-26	nvoAlrmIgnitMod3					
Alarm_ignition_module_4_failed	RW	DV-27	BV-27	nvoAlrmIgnitMod4					
Alarm_blower_1_failed	RW	DV-28	BV-28	nvoAlrmBlower1					
Alarm_blower_2_failed	RW	DV-29	BV-29	nvoAlrmBlower2					
Alarm_blower_3_failed	RW	DV-30	BV-30	nvoAlrmBlower3					
Alarm_blower_4_failed	RW	DV-31	BV-31	nvoAlrmBlower4					
Alarm_gas_valve_1_failed	RW	DV-32	BV-32	nvoAlrmGasValve1					
Alarm_gas_valve_2_failed	RW	DV-33	BV-33	nvoAlrmGasValve2					
Alarm_gas_valve_3_failed	RW	DV-34	BV-34	nvoAlrmGasValve3					
Alarm_gas_valve_4_failed	RW	DV-35	BV-35	nvoAlrmGasValve4					
Alarm_low_water	RW	DV-36	BV-36	nvoAlrmLowWater					
Alarm_low_signal_current	RW	DV-37	BV-37	nvoAlrmDrivemA					
* See note 1 on Page 69. ** See note 2 on Page 69.									
								More on the next page >	

Modbus, BACnet, LonTalk interoperability

Table 69-1: Interoperability variable and object names (continued)									
Variable name and BACnet object name	**Read Only (RO) or Read Write (RW)**	**Modbus register number***	**BACnet Object Type and Instance**	**LonTalk variable names****	**Description**	**Units**		**Range**	
						I-P units	SI units	I-P units	SI units
Messages									
Message_replace_contactors	RW	DV-38	BV-38	nvoMsgReplCntctr	See Table 43-1, Diagnostics menu	--	--	--	--
Message_service_unit	RW	DV-39	BV-39	nvoMsgSrviceUnit					
Message_drain_pending	RW	DV-40	BV-40	nvoMsgDrainPend					
Message_no_duct_airflow	RW	DV-41	BV-41	nvoMsgNoDuctAir					
Message_interlock_open	RW	DV-42	BV-42	nvoMsgIlockOpen					
Message_freeze_prevent_ draining	RW	DV-43	BV-43	nvoMsgFreezDrain					
Message_end-of-season_ active	RW	DV-44	BV-44	nvoMsgEOSactive					
Message_temp_comp_on	RW	DV-45	BV-45	nvoMsgTempCompOn					
Message_clean_probes	RW	DV-46	BV-46	nvoMsgCleanProbe					
Message_duct_HL_trip	RW	DV-47	BV-47	nvoMsgDuctHLtrip					
Message_duct_HL_span	RW	DV-48	BV-48	nvoMsgDuctHLspan					
Message_insufficient_water	RW	DV-49	BV-49	nvoMsgH2Ocutout					
Message_boiling_temp_ calibrated	RW	DV-50	BV-50	nvoMsgBoilTempCl					

Notes:
1. Modbus Input Registers (IR1-IR11) 16 bit read only
   Modbus Holding Registers (HR1-HR10) 16 bit read/write
   Modbus Discrete Input Registers (DI1-DI9) single bit read only
   Modbus Coil Registers (DV1-DV50) single bit read/write
2. nvi LonTalk SNVT's are write-only; nvo are read-only

Multiple-tank operation

Introduction: One master controller, multiple slave tanks

Vapor-logic4 has the capability to operate multiple DRI-STEEM humidifier tanks under the control of one Vapor-logic4 controller. This is called operating in multi-tank mode.

A multi-tank system has one master controller controlling up to 16 humidifier slave tanks. The master controller receives the demand signal, and controls slave tank steam production based on:
— Priority group
— Wear leveling
— Fault status

The master controller also gives permission to slave humidifier tanks to perform functions such as draining and flushing.

The master controller must be field-wired to all required control input signals and be programmed with the system capacity.

The control interface in a multi-tank group can be the Vapor-logic4 keypad or the Web interface. There is one Vapor-logic4 keypad per multi-tank group. This keypad ships attached to the tank with the master control board. The keypad or Web interface can be connected to any humidifier in the multi-tank group or to a separate master controller that is not tank mounted. Maximum cable length from the keypad to any control board in the multi-tank group is 500' (152 m).

Priority groups

All humidifier tanks in a multi-tank group are assigned to a priority group. There are four priority groups: 0, 1, 2, and 3.

The purpose of priority groups is to identify tanks as trim tanks or redundant tanks, and/or to define fuel or other preferences. The default configuration assigns all tanks to priority group 1 where all tanks operate with equal priority.

Multiple-tank operation

Trim tanks

A tank functioning as a trim tank is assigned to priority group 0 and always operates before tanks in priority groups 1, 2, or 3.

The function of a trim tank is to be the first tank in a multi-tank group to respond to system demand changes. Multi-tank groups requiring a rapid response to changes in system demand typically have an electric element humidifier with SSR control as the trim tank.

Redundant tanks

The system capacity of a multi-tank group is the combined capacity of tanks in groups 0, 1, and 2. A tank functioning as a redundant tank is assigned to priority group 3 and operates only if one or more of the tanks in groups 0, 1, or 2 is not available and the multi-tank group cannot meet the demand for steam production. Placing a tank in priority group 3 ensures that it only runs as a redundant tank.

Because a redundant tank operates infrequently, assigning master controller status to the redundant tank in a multi-tank group reduces system down time while the master controller tank receives servicing.

Tank wear leveling

The master controller monitors tank wear and assigns steam production to tanks to equalize wear as much as possible within the multi-tank group.

Fault tolerance

All tanks in a multi-tank group periodically send a status message to all other tanks in the multi-tank group. If this message is not received by the other tanks within a defined time period, the tank is assumed to be unavailable to the remaining tanks in the group. The newly unavailable tank will be taken off the list of available tanks and the system will respond appropriately. If the unavailable tank is the master controller, the remaining slaves will continue to run for a short time at the level they were last told to run, and then quit.

Priority groups

Vapor-logic4 assigns humidifiers a priority group number. These numbers identify tank function as follows:

0 = Trim tank
1 = Default tank configuration
3 = Redundant tank

Note that Priority Group 2 is currently unassigned.

Multiple-tank operation

Configuring multi-tank systems

Humidifier tanks ordered as a multi-tank group are configured at the factory. The configuration process includes:
• Assigning letter names to tanks
• Assigning priority group numbers
• Configuring the master controller

Wiring a multi-tank group of humidifiers

This section describes making wiring connections for multi-tank systems. To wire a multi-tank group of humidifiers:

1. Determine which control board is the master controller. The master controller ships connected to the keypad/display. The master controller is labeled as Tank A on the keypad/display.

2. Connect all required control inputs to the master controller board by following the instructions in the installation wiring section of this manual.

3. Wire all control boards of the multi-tank group together using twisted pair wire. Connect controller boards together at terminal block P8. Connect positive to positive terminals, and negative to negative terminals. On the last board in the series of connected boards, change the switch labeled "SW1" (located on the Vapor-logic4 board next to P8) to the On position.

4. Connect the keypad/display and/or Web interface cable to any control board in the multi-tank system.

Multiple-tank operation

### Using the keypad/display with a multi-tank group

The keypad/display communicates with every humidifier tank's controller in the multi-tank group. When a multi-tank group is operating normally, the keypad/display shows the Multi-tank System Home screen. See the screens below for information about display screens in a multi-tank system.

Multi-tank System
Home screen

Select other tanks in
the multi-tank system here.
Tank A screen always
shows system parameters.

```
┌──────────────┬──────────────┬─────────┐
│  SPACE  RH   │  SET  PT     │         │
│              │    35%       │         │
│    34%       ├──────────────┤         │
│              │  OUTPUT      │         │
│  TANK  A     │    0%        │         │
├──────────────┴──────────────┴─────────┤
│       MULTI-TANK  HOME                 │
├──────────────┬──────────────┬─────────┤
│              │  MESSAGE     │  ALARM  │
└──────────────┴──────────────┴─────────┘
```

Individual tank screen

Press the Main softkey
to view or change Tank
B settings. Note here
that Tank B has 0%
output and is filling.

```
┌──────────────┬──────────────┬─────────┐
│  DEMAND      │  OUTPUT      │ 173°F   │
│              │              │         │
│    23%       │    0%        │         │
│              │              │         │
│  TANK  B     │              │         │
├──────────────┴──────────────┴─────────┤
│  MODE:  Auto          Filling          │
├──────────────┬──────────────┬─────────┤
│  MAIN        │  MESSAGE     │  ALARM  │
└──────────────┴──────────────┴─────────┘
```

Troubleshooting introduction

1. Review issues, possible causes and recommended actions.

The troubleshooting guide on the following pages presents issues, possible causes and recommended actions for typical issues.

2. Review tank or dispersion manuals.

If you have a tank-related or dispersion-related issue, you may also need to refer to those specific product manuals.

3. If you're still having issues, call DRI-STEEM.

If the troubleshooting guide does not help you solve your issue, call DRI-STEEM with the following information available:

- Product name and serial number
  You'll find this information on the humidifier or control cabinet.
- Issue definition
  Example: water leaking, low humidity, high humidity, etc.
- Alarms or Messages Log items (if applicable)
  Example: Tank temp, probe wiring, etc.
- Time issue began
  Example: Always, after remodel, after a change in weather, etc.
- System changes
  Example: Pressure, new boiler, new service, new controller, relocation, change in maintenance, etc.

Calling DRI-STEEM technical support

Have the following information ready before calling technical support.

Humidifier model number _____

Humidifier serial number _____

Issue definition _____

Alarms Log items _____

Messages Log items _____

Time issue began _____

Recent system changes _____

Troubleshooting guide

	Issue	Possible causes	Actions
Power issues	Green power indicator light is off.	• No control voltage	• Check for proper supply voltage.
		• Heater fuses open	• Check heater fuses for voltage present at transformer.
		• Transformer secondary circuit breaker tripped	• Check for wiring shorts; reset breaker.
	No remote indication of alarm light No remote activation of fan	• Dry contact or triac connection not programmed from Setup menu	• Go to the programmable outputs section of Setup menu to program dry contact and/or 24 VAC triac.
		• Field wiring not installed	• Provide field wiring to a remote fault indicator from the dry contact connection point on terminal block P12 or from the triac connection point on terminal block P16.
		• Field-supplied remote fault indicator lamp is burned out	• Check if at remote indicator light is burned out; replace if needed.
		• Remote fault Vapor-logic4 dry contact is not switching	• Check dry contact continuity (Vapor-logic4 terminal P12) for contact closure.
	No readable information on keypad/display	• No power or incorrect voltage to Vapor-logic4 board	• Check main power supply. • Reset control transformer circuit breaker if tripped. • Reset thermal cutout if tripped. • Low limit thermostat is not satisfied (outdoor enclosure only).
		• Modular communication cable is disconnected	• Connect modular cable.
	Keypad/display does not energize.	• Nonexistent supply voltage to unit	• Check main fuse. • Check main line safety switches. • Check heater fuses.
		• Nonexistent 24 VAC supply	• Check for proper supply. • Verify proper transformer voltage characteristics. • Verify proper wiring of transformer. • Check for control circuit voltage, 24 VAC. If voltage is not present, check transformer circuit breaker. Reset if needed.
		• Humidifier over-temperature thermostat open	• Reset manual switch located above heater below terminal cover.
	Display is completely black.	• Keypad/display is overheated	• Cool the keypad.
		• Communication cable not connected	• Connect cable.
		• Defective cable	• Replace cable.
		• Defective keypad	• Replace.
		• Defective control board	• Contact DRI-STEEM.

More on the next page >

Troubleshooting guide

Table 76-1:
Troubleshooting guide (continued)

	Issue	Possible causes	Actions
Transmitter or humidistat issues	**Alarm:** RH signal out of range	When transmitter or humidistat alarms appear, possible causes are: • Open, shorted, or incorrect wiring • Incorrect signal • Ground loop • Signal exceeds range limits. Correct input signals are: 4-20 mA, or 0-10 VDC	• Check voltages at board terminals. At terminal P11 -- RH signal: 2-10 VDC. -- Dew point signal: 2-10 VDC. -- Demand signal: 0-10 VDC. At terminal P13 -- Duct high limit signal: 0-24 VDC, 2-10 VDC. At terminal P14 -- Auxiliary temp sensor or temperature compensation sensor: 2-10 VDC. • Check output on transmitter: -- If there is no output, replace transmitter. -- Verify output is 4-20 mA. -- Calibrate transmitter or humidistat if necessary. • Isolation control board by others may not be compatible. Consult DRI-STEEM.
	Alarm: Dew point signal out of range		
	Alarm: Demand signal out of range		
	Alarm: Duct RH signal out of range		
	Alarm: Aux temp sens out of range		
	Alarm: No SDU airflow	• SDU blower or airflow proving switch is incorrectly wired	• Check SDU for proper wiring.
		• SDU blower cover is off	• Install cover.
		• SDU blower motor is inoperable (SDU fan does not start)	• Replace SDU blower.
		• Breaker tripped	• Reset breaker.

Troubleshooting guide

	Table 77-1: Troubleshooting guide (continued)		
	Issue	**Possible causes**	**Actions**
Water level control probe issues	**Alarm:** Water probe miswired **Alarm:** Faulty water probe	• Incorrect installation	• Verify proper wiring of probe system. **Do not use shielded (screened) wiring.** • Verify probe wiring is not routed with high voltage wiring. • Verify wiring between control cabinet and humidifier does not exceed the recommended 50' (15 m) limit. • Verify fill and drain plumbing was installed per the instructions in the humidifier's manual. • Verify piping from the humidifier to the dispersion assembly is installed correctly, that there are no elbows or restrictions in the piping, and that the length of the piping is not too long. See instructions in the humidifier's manual. • Verify there is a P-trap installed on the tank and/or that the P-trap is not plugged. • Verify that there is a machine ground between control cabinet and humidifier tank.
		• Dirty or oxidized probes	• Clean probe, removing oxidation and/or minerals or replace if needed. • Drain tank water to below the probe; reset system and restart.
		• Deterioration of probe rod assembly	• Replace probe rod assembly.
		• Low conductivity water supply	• If conductivity is less than 100 μS/cm add ¼-½ tab sodium bicarbonate (i.e., Alka Seltzer) to increase conductivity. Consult DRI-STEEM for further advice.
		• Humidifier interlock switches and/or over-temperature thermostat	• Verify that switch or thermostat is wired. • Verify interlock switch is set correctly and humidifier cover is on. • Reset over-temperature thermostat if tripped.
		• Missing probe rod	• Replace missing probe rod if possible; otherwise, replace probe assembly.
			More on the next page >

Troubleshooting guide

Table 78-1:
Troubleshooting guide (continued)

Issue	Possible causes	Actions
Alarm: Excessive fill time	**Tank is not full.**	
	• Fill and drain valve wiring reversed	• Correct wiring.
Alarm: Excessive refill time	• Low water supply pressure	• Verify water pressure is 25 psi [552 kPa] minimum.
	• In-line strainer plugged	• Clean as needed.
	• Humidifier cover interlock switch improperly wired	• Correct wiring.
	• Fill valve not open.	• If 24 VAC is present across fill valve coil, replace valve.
	• Fill valve not wired properly to control board	• Verify proper fill valve wiring at terminal P17 (fill, drain). • Test operation by going to the Test section under the Diagnostics menu.
	• Inlet water needle valve closed or plugged	• Check if needle valve is open and free of sediment.
	• Fill valve with incorrect operating voltage	• Verify valve coil is 24 VAC.
	• Plugged fill valve	• Remove fill valve and check for foreign material plugging the valve.
	• Fill valve is installed backward	• Check arrow direction on valve; or "In" should be visible on fill valve body.
	• Excessive water hammer can bend a needle valve and make it difficult to open	• Replace valve, if needed. • Install a water supply line shock arrester.
	• Orifice after fill valve may be plugged	• Service valve strainer and orifice assembly.
	• Drain valve leaking water	• Verify drain is in the Auto position and is closed.
	• Missing probe rod	• Replace missing probe rod if possible; otherwise, replace probe rod assembly.
	Tank is full.	
	• Probe is malfunctioning	• Clean or replace probe.
	• Water conductivity is low. Standard water units require water conductivity to be 100 µS/cm minimum	• Add add ¼-½ tab sodium bicarbonate (i.e., Alka Seltzer) to increase water conductivity. Consult DRI-STEEM for further advice.
	• No tank ground	• Install tank ground.
	• Fill valve is stuck open	• Check valve for foreign matter.
	• Fill valve is installed backward	• Check arrow direction on valve; or "In" should be visible on fill valve body.
	• Excessive condensate is draining into the tank	• Consult DRI-STEEM to increase the amount of water that can be converted to steam before receiving a fault.
Fill valve cycles on and off frequently (several times per minute)	• Malfunctioning level control system	• If needed, clean probes. • Check water conductivity. Minimum conductivity for proper operation of level control system is 100 µS/cm. • Verify that probe wiring is correct.
	• Drain valve not fully closed	• If an obstruction does not allow drain valve to fully close, clean valve. • If there is a broken or weak return spring on drain valve, replace the valve. • Check if 24 VAC is present at valve. If so, check wiring of Vapor-logic4 control board terminal P17 (drain).
	• Poor tank ground	• Verify good machine ground.

Filling issues (vertical label, left margin)

Troubleshooting guide

Table 79-1: Troubleshooting guide (continued)			
	Issue	**Possible causes**	**Actions**
Filling issues	Unit does not fill with water.	• Malfunctioning fill valve	• Unplug probe head. Fill valve should open. If fill valve does not open, verify proper 24 VAC to fill valve. If voltage is present and valve does not open, replace valve or valve coil. • Verify that coil is 24 VAC. • Verify that valve stem moves freely.
		• No water supply to fill valve	• Check if water supply line strainer is plugged. • Verify that manual water line shut-off valve is open and that pressure exists. • Check that in-line needle valve is open.
		• Unit is not in Auto Mode	• Change mode to Auto.
		• Vapor-logic4 control is in end-of-season drain mode	• Check for humidification demand signal at control board.
		• Inlet water needle valve is closed	• Check needle valve.
		• Unit is in freeze protection draining	• Change mode to Auto.
		• Fill valve stuck in closed position	• Recycle power to recycle fill valve closing and opening.
		• Malfunctioning level control system	• See below.
	Fill valve does not close	• Open drain valve	• If automatic drain valve is locked in the manual open position, reset to automatic. • Replace valve if there is a broken return spring on the drain valve. • Clean or replace drain valve if an obstruction in the valve does not allow complete closure. • Close manual drain valve if it is open. • If Vapor-logic4 shorted output to fill valve coil, replace board or drain coil.
		• Malfunctioning level control system	• Check that probe plug is plugged in fully. • If needed, clean probe rods. • If water conductivity is less than 100 µS/cm, add ¼-½ tab sodium bicarbonate (i.e., Alka Seltzer) to tank water. If this solves the issue, you have low-conductivity water; consult DRI-STEEM for further advice. • Replace board if Vapor-logic4 control board is defective. • Verify that system is in auto mode. • Verify that probe is wired correctly.
		• Fill valve is stuck	• Check if fill valve is installed backwards. If yes, repipe. • If there is a faulty internal spring or diaphragm in the fill valve, replace valve. • Check if there is an obstruction that does not allow valve to seat properly. Clean or replace valve as needed. • Check for control voltage across fill valve coil. (Check wiring and controls.) • Install water inlet shock arrestor.
			More on the next page >

Troubleshooting guide

	Issue	Possible causes	Actions
Draining issues	**Alarm:** Tank not draining	• Tank drain outlet	• If the humidifier tank drain outlet is plugged, clean.
		• Water detection probes	• Clean probe or replace probe rod assembly.
		• Drain valve wiring	• Check drain valve wiring. • Check to be sure drain valve is wired to Terminal P17 (drain) on control board. • Reset Vapor-logic4.
		• Fill valve	• Check for voltage present at the valve. If present, clean or replace valve. • Replace fill valve if water is leaking through.
		• System programmed for manual drain	• Run a test cycle to see if the system activates drain output.
		• Drain line backing up with water • Drain line plugged	• Insufficient drain line pitch. • Insufficient drain line size. See tank manual for drain piping size and pitch requirements.
	Unit does not perform automatic drain sequence	• Humidifier may not have automatic drain system, or automatic drain is disabled	• Inspect unit to verify that an automatic drain valve was furnished. • Go to Setup menu to verify that auto drain/flush is enabled.
		• Drain fault, plugged drain valve, or plugged drain pipe	• Clean drain valve piping.
		• Malfunctioning automatic drain sequence	• Go to Setup menu and check auto drain/flush settings.
		• No power to the automatic drain valve	• Check if 24 VAC is present at terminal block P17 (drain) and at drain valve.
		• Defective automatic drain valve	• If voltage is present at the valve and it still does not open, replace valve.
	Unit does not perform end of season drain	• Input signal always has a demand	• Reduce demand signal.
		• Vapor-logic4 setup	• Verify in Setup menu Vapor-logic4 is set for end of season drain.
		• Drain valve	• Valve not wired, or incorrectly wired, to control board. • Check 24 VAC across valve coil during test cycle.

Table 80-1:
Troubleshooting guide (continued)

Troubleshooting guide

Table 81-1: Troubleshooting guide (continued)			
	Issue	**Possible causes**	**Actions**
Heating issues	**Alarm:** Tank temperature sensor failed	• Open, shorted, or incorrect wiring of sensor	• Check wiring terminals for correct wiring and voltages. 1000 Ohms = 68 °F (20 °C); 1702 Ohms = 212 °F (100 °C).
		• Humidifier interlock switches and/or over-temperature thermostat	• Verify that switch or thermostat is wired. • Verify interlock switch is set correctly and humidifier cover is on. • Reset over-temperature thermostat if tripped.
	Alarm: Tank overtemp	• Unit has overheated; temperature is at 25 °F (14 °C) over boiling temperature	• Check for proper water level in tank.
		• Faulty sensor	• Replace sensor.
	Reduced or no output (even though water level is correct)	Electric units: • Heater malfunctioning	• Verify that proper voltage is being applied to heaters. • Verify heater amperage matches wiring diagram. • If heater contactor is not functioning, replace.
		Electric units: • Malfunctioning control system	• Check if heater fuses are blown and replace if required. • Check if auxiliary limit controls are not allowing system to operate, e.g., duct humidistats, airflow proving switch, etc. Reset, replace or calibrate as needed. (Airflow switch, terminal P13 (24VAC and AFsw) measures 24 VAC if open. On-off high limit, terminals P13 (24VDC and DHL), measures 24 VDC if open.) • Check if the heater over-temperature thermostat has tripped. Reset if necessary.
		GTS, STS or LTS units: • Dirty heat exchanger	• Clean.
		GTS units: • Dirty burners • Low gas pressure	• Clean or adjust as appropriate. See tank manual for instructions.
			More on the next page >

Troubleshooting guide

	Table 82-1: **Troubleshooting guide (continued)**		
	Issue	**Possible causes**	**Actions**
Heating issues	Heater burnout	• Water level is too low	• Replace probes.
		• Improper wiring	• Verify proper voltage applied to heater. • Verify proper electrical connections.
		• Mineral buildup on heaters	• The humidifier may be undersized. Increase humidifier capacity or replace with larger humidifier. Consult DRI-STEEM. • Inspect tank for severe mineral buildup on or around heater. Increase skim duration, frequency of drain cycle, and/or frequency of cleaning. Use softened makeup water.
		• Contactors failed to open	• Replace.
		• SSR failed closed	• Replace SSR controller.
		• Heater corrosion	• Inspect heater for surface corrosion or pitting. Before replacing burned-out heater verify chloride content in supply water is very low.
	Tank does not heat up.	• Over-temperature thermostat switch located under heater wiring cover tripped	• Reset thermostat switch.
		• Humidifier cover interlock switch (Vaporstream models only)	• Humidifier cover not wired; adjust interlock switch.
		• Combustion air switch or power vent switch (GTS only)	• Check venting system and combustion dampers. • Verify wiring and connections on switches are properly connected.
		• Incorrect or nonexistent control voltage	• Check for proper supply voltage on electrical diagram. • Verify proper transformer voltage characteristics. • Verify proper wiring of transformer. • Check for control circuit voltage on electrical diagram. If voltage is not present, troubleshoot boards and wiring system for potential short circuit.
		• Incorrect or nonexistent supply voltage to the unit	• Check main line fuse. • Check main line safety switch. • Check heater fuses and wiring diagram.
		• Duct RH above high limit set point	• Check for duct airflow. • Verify operation of duct high limit switch or transmitter.
		• No demand signal	• Check signal by others. • Check for miswired connection. • Verify in the Setup menu that humidifier is configured for demand signal.
		• Humidifier is in Standby mode	• Change mode to Auto.
	Humidifier tank has proper water level and is always warm.	• Aquastat	• This is normal; the aquastat is maintaining a certain tank water temperature within range of 40 °F to 180 °F (4 °C to 82 °C). • Readjust aquastat temperature to a lower set point.
		• SSR power controller	• SSR control devices shorted closed; check/replace. • Phase-to-phase wiring crossed.
		• Contactor	• Contactor shorted closed; replace.
			More on the next page >

Troubleshooting guide

	Issue	Possible causes	Actions
Humidity set point issues	Humidity is below desired level.	• Unit is operating but fails to meet required humidity level	• Unit undersized; replace with a larger unit or add additional humidifier. • Skim duration is too long. • If drain valve does not close fully, determine the cause and clean, repair, or replace as needed. • If drain pipe water seal is allowing steam to go down the drain, fill P-trap with water or repair as needed. • If there is an improper water seal height, increase to the recommended height (see humidifier tank manual for water seal height). • If there is excessive internal steam pressure, determine the cause of the high pressure (e.g., high duct static pressure, undersized orifices in dispersion tubes, water, or crushed vapor hose) and correct as required. • Replace leaking gasket or vapor hose. • Recalibrate if controls are out of calibration. • If fill valve is stuck open, repair or replace. • If zone valve will not open, repair or replace.
		• No call for humidity from humidistat or from control and high limit humidity transmitters	• Interconnecting steam piping to the dispersion assembly is too long and/or uninsulated (do not insulate steam hose). • Low or no signal strength from humidistat. Check for proper wiring. • Check humidity transmitters (4 to 20 mA output). • Adjust set point if RH or dew point set point is too low.
		• Excessive outside air volume	• Verify proper operation of fans, dampers, VAV systems, etc.
		• Heating elements not operating	• Verify that humidistat is calling for humidity. • Check for control voltage if limit controls (airflow proving switch, zone valves, etc.) are not allowing unit to operate. • Check fuses and replace if they are blown. • Check if the heater over-temperature has been tripped. Reset if necessary.
		• Humidity control input type not the same as Vapor-logic4 firmware	• Check Vapor-logic4 control board connections P11 and P13. Consult DRI-STEEM.
		• Vapor-logic4 not in Auto mode	• Change mode to Auto.

Troubleshooting guide

Table 84-1: **Troubleshooting guide (continued)**			
	Issue	Possible causes	Actions
Humidity set point issues	Humidity above set point.	• High entering relative humidity	• Dehumidify.
		• Unit oversized	• Consult DRI-STEEM.
		• Reduced airflow	• Check fans, dampers, VAV systems, etc.
		• Improperly located humidistat or humidity transmitters	• Relocate, using guidelines in Appendix section of this manual.
		• Malfunctioning controls	• Check for incorrect supply voltage. • Check for incorrect control signal. • Check for improper wiring hookup. • If humidity controller or transmitter are out of calibration or malfunctioning, repair or recalibrate. • Check if SSR/contactor shorted. Repair or replace as needed.
		• Contactor/SSR is stuck closed	• Remove power from humidifier immediately. Contact DRI-STEEM.
	Hunting (humidity swings above and below desired set point)	• Malfunctioning control system	• If there is a faulty or inaccurate humidity controller or transmitter, repair or replace. • Check for proper Vapor-logic4 control settings: RH set point, high limit set point, cycle rate, PID tuning, etc. • Relocate poorly located control components. See humidity control placement information in Appendix B recommendations. • On SSR units: Control wire and power wires must be physically separated from each other. If they are not, an induced control voltage can occur, causing erratic operation. • Verify that keypad/display modular cable is isolated from power wiring.
		• Air volume varies rapidly	• Stabilize.
		• Air temperature is varying rapidly	• Stabilize to ±1 °F (±1 °C).
		• Proportional band is too small and/or integral gain (Ki) is too large	• If RH swings outside PID band, increase PID band using the Setup menu. • Decrease integral gain (Ki) using the Set Up menu.
		• On-off control is not adequate	• If controlling the humidifier with an on-off signal, consider changing to controlling with a modulating signal.
			More on the next page >

Troubleshooting guide

| Table 85-1: Troubleshooting guide (continued)			
	Issue	**Possible causes**	**Actions**
Gas-to-steam (GTS) humidifier issues	**Alarm:** Blocked flue	• Blocked flue sensor is open	• Check venting system for obstructions. • Check air line to flue switch for obstructions. • Windy conditions cause downdrafts in venting system. Install a high wind vent cap or isolate as recommended by local codes.
	Alarm: Gas valve [number] fault	• Failed ignition module • Miswired gas valve	• Check ignition module. Replace if necessary. • Check gas valve wiring.
	Alarm: Burner [number] fault	• No gas supply to unit	• Verify that gas service valve is on and receiving minimum pressure to manifold per rating plate.
		• Gas valve is off or there is no power to the valve	• Check for 24 VAC from the ignition module to the gas valve. • Check that gas valve plug is seated properly.
		• Broken ignitor	• Verify that ignitor glows. Replace if necessary.
		• Gas valve outlet pressure is too low	• Verify outlet pressure is set per rating plate.
		• Blower inlet is dirty or obstructed	• Clean inlet and check for obstructions.
		• Flame sensor not sensing flame	• Check flame sensor wiring. • Check polarity at incoming power. Switch if necessary. • Stray fiber from burner touching flame sensor. Use a screwdriver to gently push down fibers near flame sensor. • Flame sensor is cracked. Replace.
		• Polarity reversed at power block	• Check polarity.
	Alarm: Ignition module [number] fault	• Ignition sequence engaged without power to gas valve	• Verify ignition sequence. • Replace ignition module.
		• Gas valve/ignite/sensing electrode is out of sequence	• Verify wire connections to these components.
	Alarm: Blower [number] fault	• The blower is incorrectly wired, or the blower failed to meet demand speed	• Check for proper blower wiring. • Replace blower.
	Alarm: No power vent airflow	• The power venter air flow switch is open	• Check for proper power vent wiring. • Repair or replace power venter.
	Alarm: No combustion airflow	• The combustion air damper is open	• Check for proper combustion air damper wiring. • Repair or replace damper motor.
			More on the next page >

Replacement parts

Table 86-1: Vapor-logic4 replacement parts		
Description	**Quantity**	**Part number**
Main board	1	408495-001
Keypad/display (includes printed circuit board, LCD display screen, membrane switch, front and back of plastic cover)	1	408495-010
Keypad/display communication cable (contact DRI-STEEM for lengths other than 27" (686 mm) and 60" (1524 mm)	27" (686 mm)	408490-014
	60" (1524 mm)	408490-009
Molex connector plug, 2-position	1	406246-002
Molex connector plug, 3-position	1	406246-003
Molex connector plug, 4-position	1	406246-004
LonTalk card	1	408642
BACnet MSTP	1	191515

Figure 86-1:
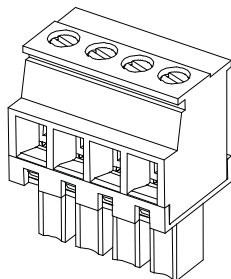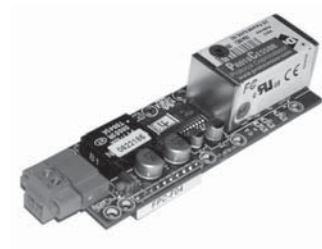**Vapor-logic4 replacement parts**

Main board
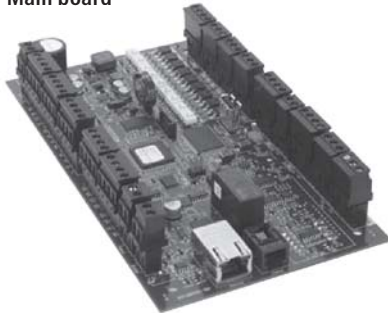
Keypad display

Molex connector plug (4-position shown)

LonTalk card

Appendix:
Control input signals

DRI-STEEM offers three control options for all its humidification systems controlled by Vapor-logic4: On-off control, demand signal control, and transmitter control.

On-off control

On-off control—the simplest control scheme—does exactly what its name implies: the output device turns fully on, then fully off.

The humidistat that controls the humidifier has a differential between the on and off switch points. The differential is established at a range sufficient to prevent output short cycling. In other words, the humidity level has to fall below set point before the humidistat closes and energizes the humidifier. Once the humidifier is energized, the humidistat stays closed until the humidity is above set point. This creates an operating range that prevents the humidifier from running for very short periods of time.

In applications where there are multiple contactor outputs, such as an electric element humidifier, contactors for each heat stage are pulled in one at a time with a one-second delay between them. In applications with a variable output stage, such as a GTS humidifier, the outputs are ramped up until they reach 100%.

Modulating demand signal control

With modulating demand signal control, a modulating humidistat or a building automation system sends a signal to the Vapor-logic4 controller, which then sends a signal to the humidifier to produce a directly proportional steam output. For example, if a humidistat operating between 4 mA and 20 mA sends a 4 mA signal, the humidifier produces no output; a 12 mA signal causes the humidifier to run at 50% of capacity; and a 20 mA signal causes the humidifier to run at 100% capacity.

With a humidistat provided by DRI-STEEM producing this signal, the humidity set point is set at the humidistat. The keypad/display then is used for maintaining and troubleshooting the humidification system, with humidifier control stemming from the humidistat itself. With a building automation system (BAS) providing the signal, the humidity set point is established by the BAS, and the humidifier responds to the BAS commands.

Appendix: Control input signals

Calculation of transmitter % RH

$$\% \text{ RH} \ = \ \frac{(\text{mA reading}) - 4}{0.16}$$

Example: $\dfrac{12 \text{ mA} - 4}{0.16} \ = 50\% \text{ RH}$

Transmitter control

With transmitter control, the Vapor-logic4 board receives a signal that corresponds to the actual humidity level measured in the space being controlled. (With a transmitter provided by DRI-STEEM, the signal is 4 to 20 mA, which corresponds to 0 to 100% RH). The Vapor-logic4 controller employs an internal PID loop that uses this humidity measurement along with a user-defined humidity set point to calculate a demand level. This demand level is the level at which the humidifier will run. For more information about the PID control loop, see Page 47.

Appendix:
Sensor placement

Recommended sensor locations

Sensor or transmitter location has a significant impact on humidifier performance. In most cases, we recommend that you do not interchange duct and room humidity devices. Room humidity devices are calibrated with zero or little airflow; whereas duct humidity devices require air passing across them.

Recommended sensor locations (see figure below):

A Ideal—ensures the best uniform mix of dry and moist air with stable temperature control.

B Acceptable—room environment may affect controllability such as when sensor is too close to air grilles, registers, or heat radiation from room lighting.

C Acceptable—provides uniform mixture of dry and moist air, but if extended time lag exists between moisture generation and sensing, make sure control contractor extends sampling time.

D Acceptable—(behind wall or partition) for sampling entire room if sensor is near an air exhaust return outlet. Typical placement for sampling a critical area.

E Not acceptable—these locations may not represent actual overall conditions in the space.

F Not acceptable—do not place sensors near windows, door passageways, or areas of stagnant airflow.

G Best location for duct high limit humidistat or humidity sensor.

Other factors that affect humidity control

Unsatisfactory humidity control may involve more than the controller's capability to control the system. Other factors that play an important role in overall system control are:

- Size of the humidification system relative to load
- Overall system dynamics associated with moisture migration time lags
- Accuracy of humidistats and humidity transmitters and their location
- Dry bulb temperature accuracy in space or duct
- Velocities and airflow patterns in ducts and space environments
- Electrical noise or interference

Figure A-3-1:
Recommended sensor location

DC-1084
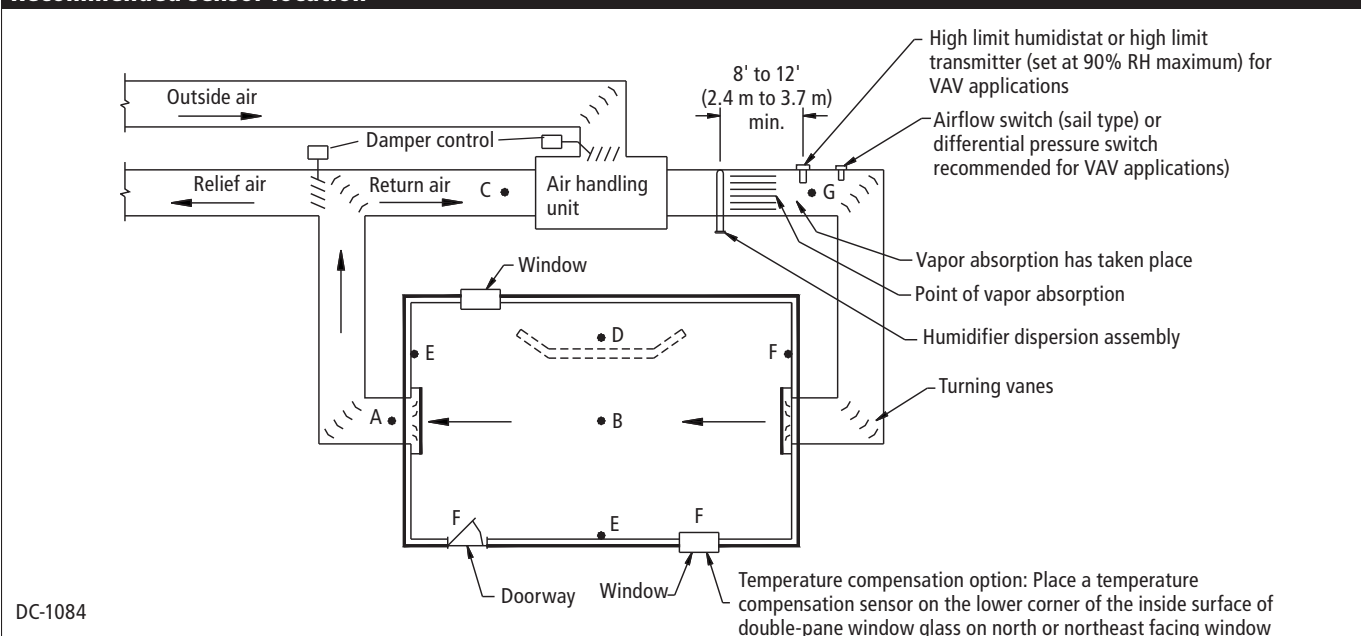
Appendix:
GTS model-specific
default setup values

Table A-4-1: GTS model-specific default setup values													
GTS model	Water type	EOS drain enabled?	Drain valve type*	Water usage before auto drain/flush				Drain duration	Flush duration	Skim duration	EOS drain duration	Water usage before service	
				Tube dispersion systems		Area-type dispersion systems							
				lbs	kg	lbs	kg	Minutes	Minutes	Seconds	Minutes	lbs	kg
GTS-100	Potable	Yes	Electric motorized	25,000	11,300	25,000	11,300	40	1	25	75	75,000	34,000
	Softened	Yes	Electric motorized	75,000	34,000	25,000	11,300	40	1	25	75	75,000	34,000
	DI/RO	No	Ball	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	150,000	68,000
		Yes	Electric damper	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30	150,000	68,000
GTS-200	Potable	Yes	Electric motorized	25,000	11,300	25,000	11,300	40	1	25	75	150,000	68,000
	Softened	Yes	Electric motorized	150,000	68,000	25,000	11,300	40	1	25	75	150,000	68,000
	DI/RO	No	Ball	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	300,000	136,100
		Yes	Electric damper	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30	300,000	136,100
GTS-300	Potable	Yes	Electric motorized	30,000	13,600	30,000	13,600	45	1	30	90	225,000	102,000
	Softened	Yes	Electric motorized	225,000	102,000	30,000	13,600	45	1	30	90	225,000	102,000
	DI/RO	No	Ball	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	450,000	204,100
		Yes	Electric damper	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35	450,000	204,100
GTS-400	Potable	Yes	Electric motorized	30,000	13,600	30,000	13,600	45	1	30	90	300,000	136,100
	Softened	Yes	Electric motorized	300,000	136,100	30,000	13,600	45	1	30	90	300,000	136,100
	DI/RO	No	Ball	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	600,000	272,200
		Yes	Electric damper	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35	600,000	272,200
GTS-500	Potable	Yes	Electric motorized	45,000	20,400	45,000	20,400	65	2	45	130	375,000	170,100
	Softened	Yes	Electric motorized	375,000	170,100	45,000	20,400	65	2	45	130	375,000	170,100
	DI/RO	No	Ball	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	750,000	340,200
		Yes	Electric damper	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	750,000	340,200
GTS-600	Potable	Yes	Electric motorized	45,000	20,400	45,000	20,400	65	2	45	130	450,000	204,100
	Softened	Yes	Electric motorized	450,000	204,100	45,000	20,400	65	2	45	130	450,000	204,100
	DI/RO	No	Ball	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	900,000	408,200
		Yes	Electric damper	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	900,000	408,200
GTS-700	Potable	Yes	Electric motorized	50,000	22,700	50,000	22,700	80	2	55	160	525,000	238,100
	Softened	Yes	Electric motorized	525,000	238,100	50,000	22,700	80	2	55	160	525,000	238,100
	DI/RO	No	Ball	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,050,000	476,300
		Yes	Electric damper	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60	1,050,000	476,300
GTS-800	Potable	Yes	Electric motorized	50,000	22,700	50,000	22,700	80	2	55	160	600,000	272,200
	Softened	Yes	Electric motorized	600,000	272,200	50,000	22,700	80	2	55	160	600,000	272,200
	DI/RO	No	Ball	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,200,000	544,300
		Yes	Electric damper	N/A	N/A	N/A	N/A	N/A	N/A	N/A	60	1,200,000	544,300

Notes:
* GTS units in an outdoor enclosure always have an electric damper drain valve. All GTS drain valves are normally closed except for GTS units in an outdoor enclosure, which have normally open drain valves.
EOS = End-of-season

Notes:

Expect quality from the industry leader

For over 40 years, DRI-STEEM has been leading the industry with creative and reliable humidification solutions. Our focus on quality is evident in the construction of the Vapor-logic4, which has a Two-year Limited Warranty.

For more information

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800-328-4447

For the most current product information, visit our Web site: www.dristeem.com

Continuous product improvement is a policy of DRI-STEEM Corporation; therefore, product features and specifications are subject to change without notice.

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Firmware Version 1.1.0
Form No. VL4-IOM-0809
Part No. 890000-713 Rev C

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DRI-STEEM Corporation ("DRI-STEEM") warrants to the original user that its products will be free from defects in materials and workmanship for a period of two (2) years after installation or twenty-seven (27) months from the date DRI-STEEM ships such product, whichever date is the earlier.

If any DRI-STEEM product is found to be defective in material or workmanship during the applicable warranty period, DRI-STEEM's entire liability, and the purchaser's sole and exclusive remedy, shall be the repair or replacement of the defective product, or the refund of the purchase price, at DRI-STEEM's election. DRI-STEEM shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or reinstallation of any defective product. The Limited Warranty does not include cylinder replacement for electrode steam humidifiers.

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The original user may extend the term of the DRI-STEEM Limited Warranty for a limited number of months past the initial applicable warranty period and term provided in the first paragraph of this Limited Warranty. All the terms and conditions of the Limited Warranty during the initial applicable warranty period and term shall apply during any extended term. An extended warranty term of an additional twelve (12) months or twenty four (24) months of coverage may be purchased. The extended warranty term may be purchased until eighteen (18) months after the product is shipped, after which time no extended warranties are available.

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