



Important: Read and save these instructions. This guide to be left with equipment.



NH-EL Series

Installation and Operation Manual

Includes installation, operation, maintenance and troubleshooting information for your NH-EL Electric Steam humidifier


humidity.com

Thank you for choosing Nortec.

INSTALLATION DATE (MM/DD/YYYY)

MODEL #

SERIAL #

CYLINDER #

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Contents

1 Introduction

2 Receiving and Unpacking

3 Humidifier Components

5 NH-EL Models

6 Options and Accessories

9 Installation

10 Typical Humidifier Installation

11 Location

13 Mounting with Keyholes

14 Plumbing

15 Steam Distributor

16 Steam Lines and Condensate
Returns

21 Electrical

22 External Controls

36 Options and Accessories

38 Start Up

39 Installation Check

40 NH-EL User Interface

41 Start Up Procedure

42 Information Screens

43 Nortec Digital Controls

46 NH-EL Pre-Start Up Checklist

47 NH-EL Start Up Checklist

48 Operation

49 LED Status Lights

51 How the Humidifier Works

54 NH-EL Humidifier Configuration

62 Maintenance and Servicing

63 Required Maintenance

68 Extended Shutdown

69 NH-EL Maintenance Checklist

70 Troubleshooting

72 General Troubleshooting

75 NH-EL Warnings and Faults

81 NH-EL Wiring Diagram (Cylinder A)

82 NH-EL Wiring Diagram (Cylinder B)

83 Spare Parts

95 Warranty

Introduction



CAUTION: Servicing

- Disconnect main power before any servicing.
- The plumbing and electrical compartments contain high voltage components and wiring. Access should be limited to authorized personnel only.
- During and following operation of the humidifier, the steam and components in contact with the steam such as the cylinder, blower pack, steam lines, steam distributors, and condensate lines can become hot and can burn if touched.
- Nortec Humidity Ltd. does not accept any liability for installations of humidity equipment installed by unqualified personnel or the use of parts/components/equipment that are not authorized or approved by Nortec Humidity Ltd.



CAUTION: Electrical

- All electrical work should be done according to local electrical code.
- Electrical connection to be performed by a licensed electrician.



CAUTION: Plumbing

- Plumbing to be performed by a licensed plumber.
- Drain water from humidifier can be very hot. Do not drain to public sink.
- All plumbing work should be done according to local plumbing code.



CAUTION: Installation

- Do not mount on hot surfaces.
- Do not mount in area where freezing can occur.
- Do not mount on vibrating surface.
- Do not mount on floor.
- The NH-EL produces steam at atmospheric pressure; no devices which could block steam output should be connected to the steam outlet.
- Steam lines must be installed so that no restriction can produce back pressure in the humidifier. Failure to follow installation instructions will result in improper operation and could void warranty.
- Regardless of selecting On/Off or modulating control method, NORTEC humidifiers must have a closed circuit across its On/Off security loop control terminal to operate. NORTEC highly recommends the use of a high limit humidistat and an air proving switch in series for this function.

Receiving and Unpacking

- 1 Check packing slip to ensure ALL material has been delivered.
- 2 All material shortages are to be reported to NORTEC within 48 hours from receipt of goods. NORTEC assumes no responsibility for any material shortages beyond this period.
- 3 Inspect shipping boxes for damage and note damages on shipping waybill accordingly.
- 4 After unpacking, inspect equipment for damage and if damage is found, notify the shipper promptly.
- 5 All NORTEC products are shipped on a Free-On-Board (FOB) factory basis. Any and all damage, breakage or loss claims are to be made directly to the shipping company.

Before Installation

- 1 Ensure that available voltage and phase corresponds with humidifier voltage and phase as indicated on humidifier's specification label.
- 2 Ensure that the dedicated external fuse disconnect is of sufficient size to handle the rated amps as indicated on the specification label. Refer to local codes.
- 3 Report any discrepancy immediately to the site engineer.
- 4 Ensure sufficient clearances will be available as described in Location on page 11.
- 5 Ensure steam lines can be routed to distributor or blower pack as described in Steam Lines and Condensate Return on page 16.



Figure 1: Specification Label Location

Humidifier Components

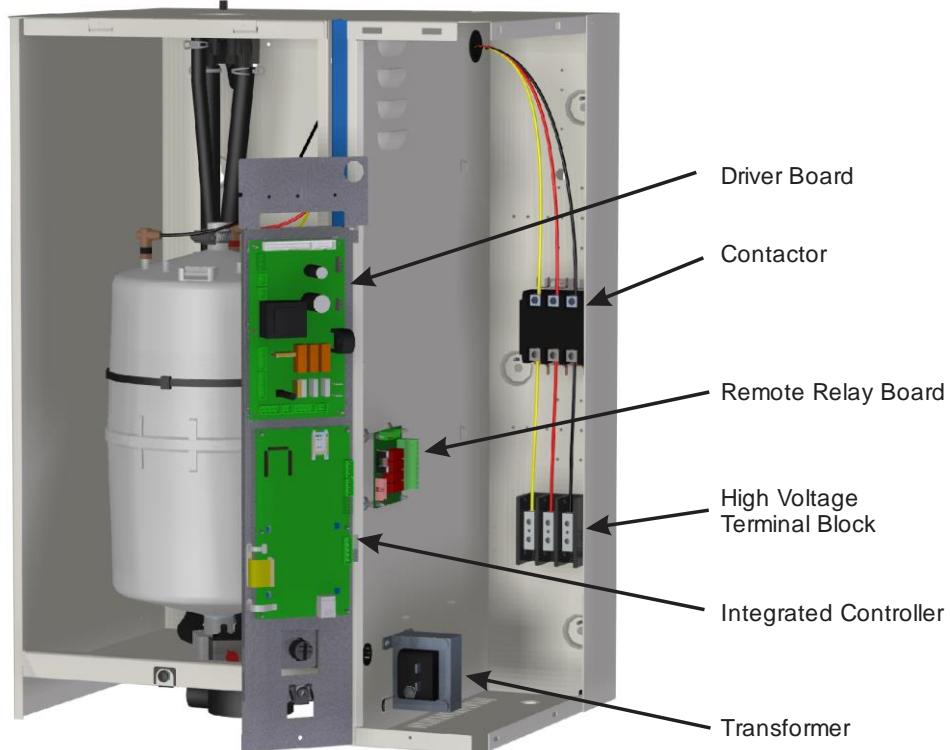
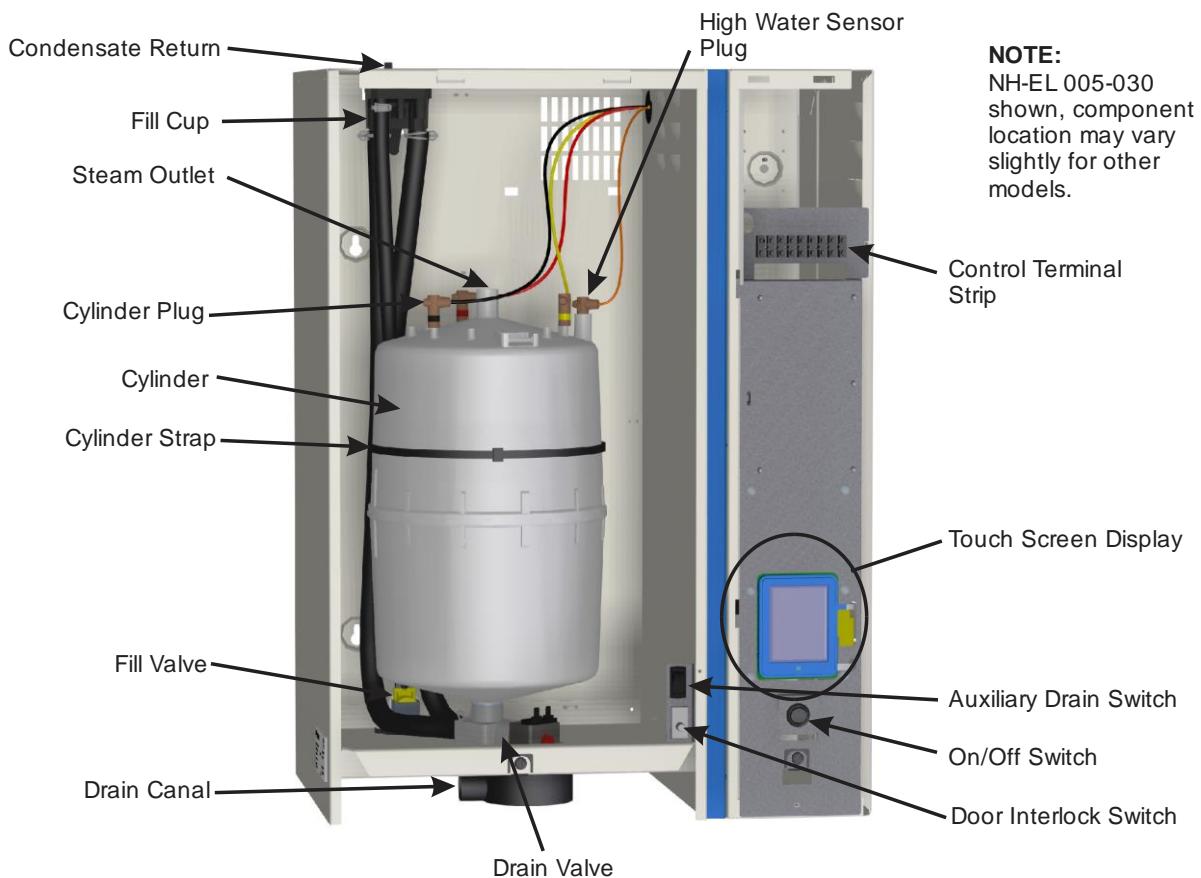


Figure 2: NH-EL Humidifier Components

Description of Components

Table 1: Humidifier Components

Component	Function of Component
Auxiliary Drain	Drains water from cylinder by activating drain valve. Note that initiating a drain in this manner will not induce Drain Water Cooling.
Condensate Return	Provides a connection to return condensate to humidifier.
Contactor	Turns On/Off power to cylinder electrodes.
Control Terminal Strip	Terminal strip for connecting external controls and blower pack to humidifier.
Cylinder Plug	Power connectors to electrodes in cylinder.
Cylinder strap	Securely holds cylinder in place.
Cylinder	Holds electrodes in water. Current between electrodes generates heat used to generate steam.
Touch Screen Display	User interface for configuring the humidifier.
Door Interlock Switch	Prevents contactor from engaging when door is removed (pull out to override this safety feature while troubleshooting).
Drain Canal	Combines cylinder drain water and fill cup overflow into a single drain outlet.
Drain Valve	Drains water from cylinder.
Driver Board	Provides input and output connections to humidifier components.
Fill Cup	Provides an air gap for backflow prevention.
Fill Valve	Controls flow of water into humidifier.
High Voltage Terminal Block	Primary power connection from remote disconnect to humidifier.
High Water sensor Plug	Used to detect max water level in cylinder.
On/Off Switch	Turns power On/Off to humidifier controller. Note: Turn off humidifier disconnect to shut off primary power to the humidifier.
Remote Relay Board (option)	Provides a terminal strip to dry contacts which open/close to indicate the humidifier is on, humidifying, needs service, or is in a fault condition.
Steam Outlet	Connect to steam line with steam hose.
Integrated Controller	Controls all functions of the humidifier's operation and provides user interface for configuration of the humidifier.
Transformer	Steps primary voltage down to 24 VAC for the controller and internal components such as the fill valve and drain valve.

NH-EL Models

The NH-EL with its Integrated Controller and state-of-the-art features and options is the most advanced electrode steam humidifier available. As well as controlling the operation of the humidifier, the Integrated Controller can be connected directly to BACnet and to the Internet. The NH-EL is available in capacities ranging from 5 lb/hr (2 kg/hr) to 200 lb/hr (90 kg/hr). NH-EL humidifiers are packaged in three different cabinets depending on capacity. Figure 3: NH-EL Sizes shows the configuration and relative size of the three different cabinets. NH-EL models up to 100 lb/hr (45 kg/hr) are also available with a built on blower pack. Table 3 provides specifications for the NH-EL product line.

NH-EL 005-030



NH-EL 050-100



NH-EL 150-200

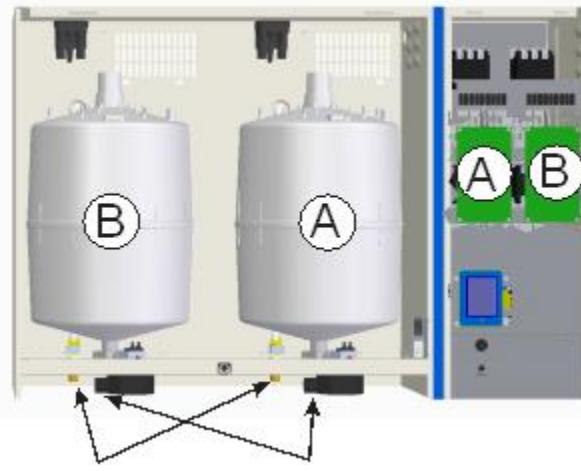


Figure 3: NH-EL Sizes

Double Unit (NH-EL 150-200)

NH-EL double units have two cylinders to provide increased capacity. The construction and installation of double units is identical to units with a single cylinder with the following exceptions:

- Double units have two driver boards (designated A and B). One driver board controls each cylinder. (See Figure 3: NH-EL Sizes).
- Double units can operate both cylinders in series or parallel from a single set of control signals or independently based on two sets of control signals (see Double Mode (**NH-EL 150-200 only**) on page 56 for configuration instructions).
- **Independent Operation** - If configured for independent operation then 2 sets of control wiring must be provided. Control wiring for each cylinder must be connected to the cylinder's corresponding driver board/terminal strip and each cylinder performs independent of the other.
- **Parallel Operation** - If configured for parallel operation then only one set of control wiring is required and the cylinders operate in parallel. The advantage is even wear on both cylinders.
- **Series Operation** – If configured for series operation, then only one set of control wiring is required and the cylinders operate in series. Cylinder A's output range is 0-50% and Cylinder B's output range is 50-100%. The advantage is the lower turndown ratio of one cylinder.
- Double units have one primary power connection but have individual fill, drain, and steam outlet connections for each cylinder.

Options and Accessories

NORTEC provides a complete line of options and accessories for every humidification application. The following options and accessories are available and may have been delivered with your NH-EL humidifier. Refer to the installation instructions that came with the accessories for the proper installation and operation.

Table 2: Options and Accessories

Option / Accessory	Application
Steam Distributors	Adding steam into air ducts.
Remote Blower Pack	Adding steam into a space remote from the humidifier.
SAME Steam Distribution Manifold	Adding steam into air ducts where short absorption is required.
Digital or Analog Control Humidistats	Controlling the output of the humidifier based on sensed RH (can be mounted in the space being humidified or in the duct).
Digital RH Transducers	Communicating RH in a space or duct to the humidifier.
Digital or Analog High Limit Humidistats	Preventing over humidification in a duct by shutting down or throttling down the humidifier when duct RH gets high.
Air Proving Switches	Ensuring humidification only occurs when air is moving in a duct.
Fill Cup Extension	Increasing the steam back pressure capability of an NH-EL.
Drain Water Cooling (Extreme)	Cooling drain water to less than 120 °F (49 °C).
Foam Detection Kits	Increasing the range of water quality in which an NH-EL can operate.

Table 3: NH-EL Specifications

Phase	Capacity lb (kg)	Volts	NH-EL Part No.	Amps	Max Ext Fuse	KW	Stand- ard Cylinder	Fill gal (l) per min	Net/Full Weight lb (kg)	
1	5 (2.3)	110-120	2573379	15.6	20	1.9	202	0.13 (0.5)	45/55 (21/25)	
		208	2573380	18.3	25	3.8	202	0.13 (0.5)		
		220-240	2573382	15.9	20	3.8	202			
		277	2573383	13.7	20	3.8	202			
		440-480	2573385	7.9	15	3.8	204			
		550-600	2573386	6.3	15	3.8	204			
	10 (4.5)	208	2573388	36.6	45	7.6	321	0.13 (0.5)	45/65 (21/30)	
		220-240	2573389	31.7	40	7.6	321			
		277	2573390	27.5	35	7.6	321			
		440-480	2573392	15.9	20	7.6	309			
		550-600	2573393	12.7	20	7.6	309			
3	20 (9)	208	2573394	21.1	30	7.6	303	0.13 (0.5)	45/80 (21/37)	
		220-240	2573395	18.3	25	7.6	303			
		440-480	2573397	9.2	15	7.6	311			
		550-600	2573398	7.3	15	7.6	311			
	30 (13.5)	208	2573399	31.7	40	11.4	421	0.3 (1.2)	85/150 (39/68)	
		220-240	2573400	27.5	35	11.4	421			
		440-480	2573402	13.7	20	11.4	411			
		550-600	2573403	11.0	15	11.4	411			
	50 (22.5)	208	2573404	51.9	70	18.7	621	0.5 (2.0)		
		220-240	2573405	45.0	60	18.7	621			
		440-480	2573407	22.4	30	18.7	605			
		550-600	2573408	18.0	25	18.7	605			
	75 (34)	208	2573409	77.9	100	28.1	621	0.5 (2.0)		
		220-240	2573410	67.4	90	28.1	621			
		440-480	2573412	33.8	45	28.1	605			
		550-600	2573413	27.0	35	28.1	605			
	100 (45)	208	2573414	94.4	125	34.0	621	0.9 (3.3)		
		220-240	2573415	90.0	125	37.4	621			
		440-480	2573417	45.0	60	37.4	605			
		550-600	2573418	36.0	45	37.4	605			
3	150 (68)	208	2573419	155.8	200	56.1	621	0.5** (2.0**)	120/245 (55/112)	
		220-240	2573420	135.0	175	56.1	621			
		440-480	2573422	67.4	90	56.1	605			
		550-600	2573423	54.0	70	56.1	605			
	200 (90)	208	2573424	188.7	250	68.0	621	0.9** (3.3**)		
		220-240	2573425	180.0	225	74.8	621			
		440-480	2573427	90.0	125	74.8	605			
		550-600	2573428	72.0	90	74.8	605			

**** Note: Per cylinder basis.**

Table 4: NH-EL Space Specifications

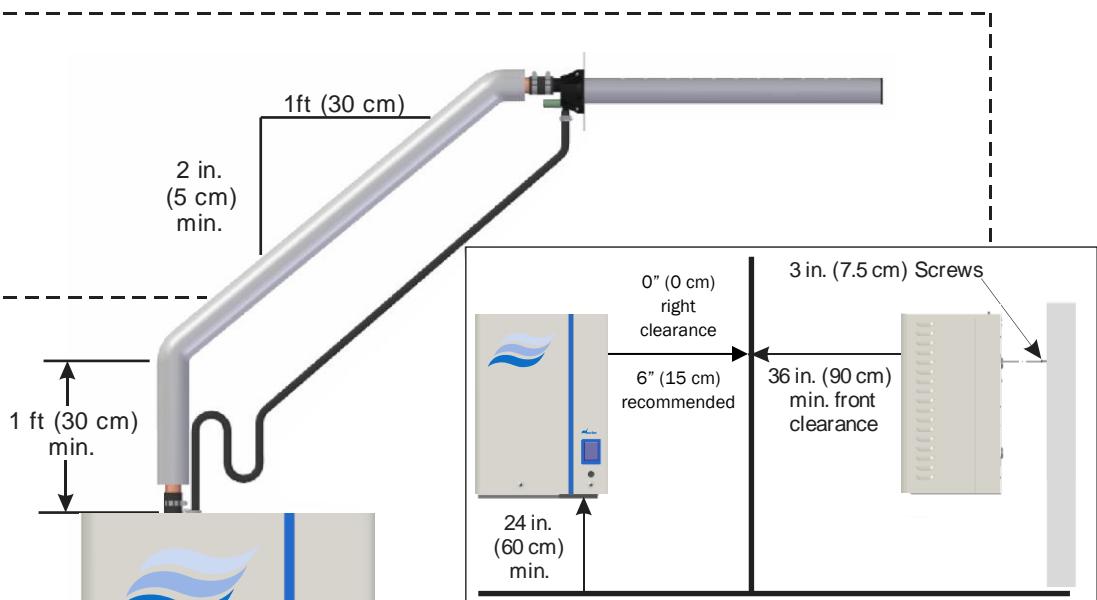
Phase	Capacity lb (kg)	Volts	NH-EL Space Part No.	Amps	Max Ext Fuse	KW	Stand- ard Cylinder	Fill gal (l) per min	Net/Full Weight lb (kg)	
1	5 (2.3)	110-120	2573429	17.2	25	2.0	202	0.13 (0.5)	83/93 (38/42)	
	10 (4.5)	208	2573430	19	25	4.0	202	0.13 (0.5)		
		220-240	2573431	16.5	25	4.0	202			
		277	2573432	14.2	20	4.0	202			
		440-480	2573434	8.2	15	4.0	204			
		550-600	2573435	6.6	15	4.0	204			
	20 (9)	208	2573436	37.3	45	7.8	321	0.13 (0.5)	83/103 (38/47)	
		220-240	2573437	32.3	40	7.8	321			
		277	2573438	28	35	7.8	321			
		440-480	2573440	16.2	20	7.8	309			
		550-600	2573441	13	20	7.8	309			
3	20 (9)	208	2573442	21.8	30	7.8	303	0.13 (0.5)	83/118 (38/54)	
		220-240	2573443	18.9	25	7.8	303			
		440-480	2573445	9.5	15	7.8	311			
		550-600	2573446	7.6	15	7.8	311			
	30 (13.5)	208	2573447	32.4	40	11.7	421	0.3 (1.2)	123/188 (56/85)	
		220-240	2573448	28.1	35	11.7	421			
		440-480	2573450	14	20	11.7	411			
		550-600	2573451	11.3	15	11.7	411			
	50 (22.5)	208	2573452	52.6	70	18.9	621	0.5 (2.0)		
		220-240	2573453	45.6	60	18.9	621			
		440-480	2573455	22.7	30	18.9	605			
		550-600	2573456	18.3	25	18.9	605			
	75 (34)	208	2573457	78.6	100	28.3	621	0.5 (2.0)		
		220-240	2573458	68	90	28.3	621			
		440-480	2573460	34.1	45	28.3	605			
		550-600	2573461	27.3	35	28.3	605			
	100 (45)	208	2573462	95.1	125	34.5	621	0.9 (3.3)		
		220-240	2573463	90.6	125	37.7	621			
		440-480	2573465	45.3	60	37.7	605			
		550-600	2573466	36.3	45	37.7	605			

Installation

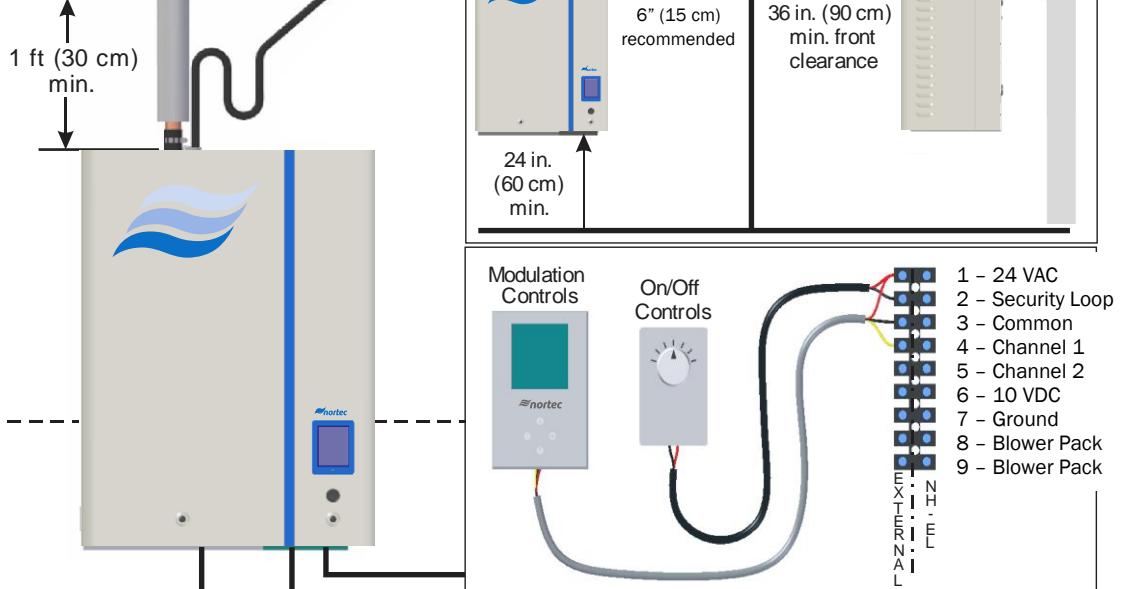
- 10 Typical Humidifier Installation**
- 11 Location**
- 13 Mounting with Keyholes**
- 14 Plumbing**
- 15 Steam Distributor**
- 16 Steam Lines and Condensate Return Instructions**
- 21 Electrical**
- 22 External Controls**
 - 22 Control Wiring
 - 22 Control Location
 - 24 On/Off Control Wiring
 - 25 Keep Warm Wiring
 - 26 Modulating Control Wiring
 - 28 Transducer Control Wiring
 - 29 Double Unit Control Wiring
- 33 Remote Fault Option Wiring**
- 34 Multi Mode Wiring**
- 35 Modbus Digital Control**
- 36 Options and Accessories**
 - 37 Fill Cup Extension
 - 37 Extreme Drain Water Cooling
 - 37 Condensate Cooling (External)
 - 37 Foam Protection
 - 37 Internal Fusing
 - 37 Remote Fault Indication

Typical Humidifier Installation

Mounting
Pg 13

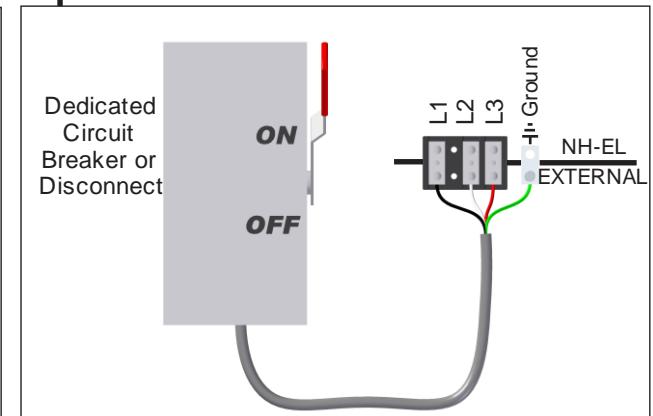
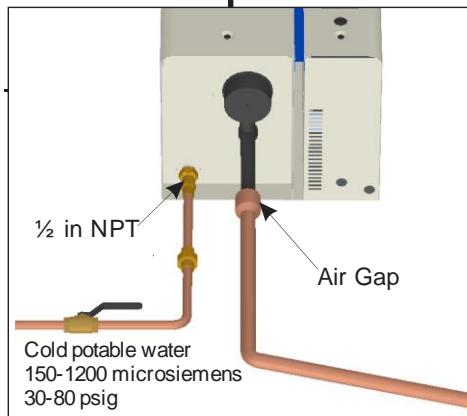


Steam
Distribution
Pg 15



Controls
Pg 22

Plumbing
Pg 14



Electrical
Pg 21

Figure 4: Typical Humidifier Installation

Location

- Mount on a suitable wall or vertical surface. Do not sit the unit on the floor to allow clearances required for plumbing and electrical connections.
- Clearance dimensions shown are for reference only and are the minimum required for maintenance of the humidifier. Consult local and national codes before final location and installation. NORTEC does not accept responsibility for installation code violations.
- Install only in areas with ambient temperature 41-104 °F (5 – 40 °C) relative humidity 5 - 95% (non condensing).
- When possible install the humidifier below the steam distributor. Take care to provide proper steam line routing and proper condensate traps.
- DO NOT locate the humidifier any further than absolutely necessary from the steam distributor location. Net output will be reduced as a result of heat loss through the steam line.
- When possible, mount the NH-EL humidifier at a height convenient for servicing.



Note: Do not mount on hot surfaces, where freezing can occur, vibrating surface, or floor.

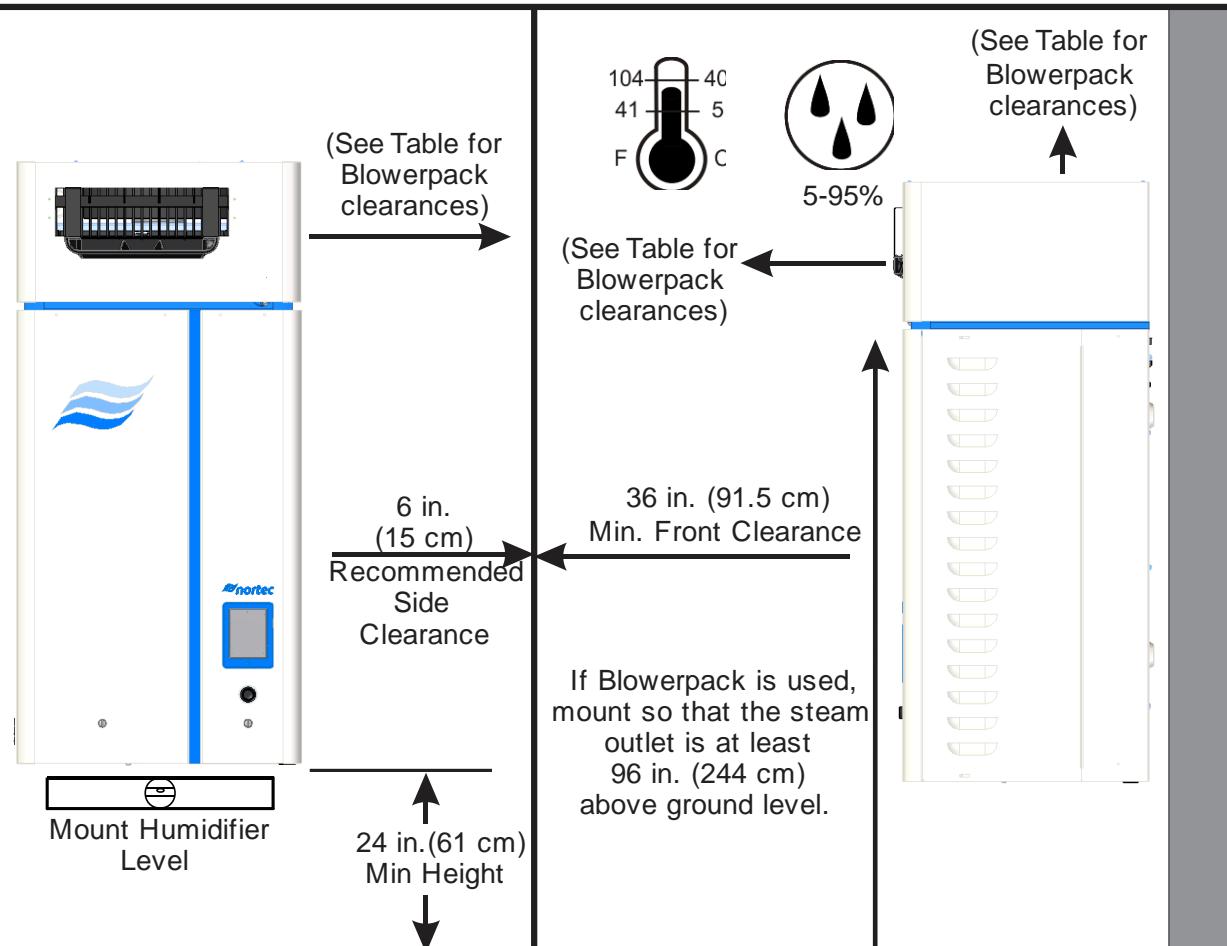


Figure 5: Mounting Location / Clearance

Table 5: Clearances for Blower Packs on Low Speed*

<i>Humidifier Capacity lbs/hr (kg/hr)</i>	<i>Minimum No. of Blower Packs</i>	<i>Min. Frontal Clearance Inches (cm)</i>	<i>Min. Overhead Clearance Inches (cm)</i>	<i>Min. Left side Clearance Inches (cm)</i>	<i>Min. Right side Clearance Inches (cm)</i>
30 (13.6)	1	132 (336)	12(31)	12 (31)	12 (31)
100 (45.4)	1	Not recommended	Not recommended	Not recommended	Not recommended

Table 6: Clearances for Blower Packs on High Speed*

<i>Humidifier Capacity lbs/hr (kg/hr)</i>	<i>Minimum No. of Blower Packs</i>	<i>Min. Frontal Clearance Inches (cm)</i>	<i>Min. Overhead Clearance Inches (cm)</i>	<i>Min. Left side Clearance Inches (cm)</i>	<i>Min. Right side Clearance Inches (cm)</i>
30 (13.6)	1	120 (305)	12(31)	12 (31)	12 (31)
100 (45.4)	1	248 (630)	36 (91)	30 (76)	30 (76)

NOTES:Nominal Conditions 72 °F (22.2 °C), 43% RH.**Low speed not recommended for 100 lbs/hr humidifier. Consult factory for recommendations.**Blower Pack should not be installed near cold surfaces or where dew point may be reached.**Higher humidity or lower room temperature may result in longer absorption distances.*

Mounting with Keyholes

- 1 The NH-EL Series humidifier is wall mounted using keyholes located on the back of the unit cabinetry.
- 2 Use #12 x 3 in. (7.5 cm) screws mounted into 2x4 studs or better. Two screws are needed for a single unit (NH-EL 010 to 100). Three screws are needed for a double unit (NH-EL 150 to 200).
- 3 Keyholes are spaced 16 in. (40.6 cm) apart center to center for large units and 11.9 in. (27.2 cm) apart for small units. Insert screws into the studs until there is 1/4 in. of screw exposed. Be sure the screws are level to each other.
- 4 Raise the unit and place the screws through the keyholes. Make sure the unit is level, then tighten the screws to secure the unit in place.
- 5 Place "L" Shaped brackets on top of the unit, with holes inline with the studs. Using the appropriate sized wood screw, fasten the "L" brackets to the studs, securing the unit from any upward motion. See Figure 6: Mounting with Keyholes.



Note: Use screws longer than 3" (7.5 cm) if drywall or other spacer is present.

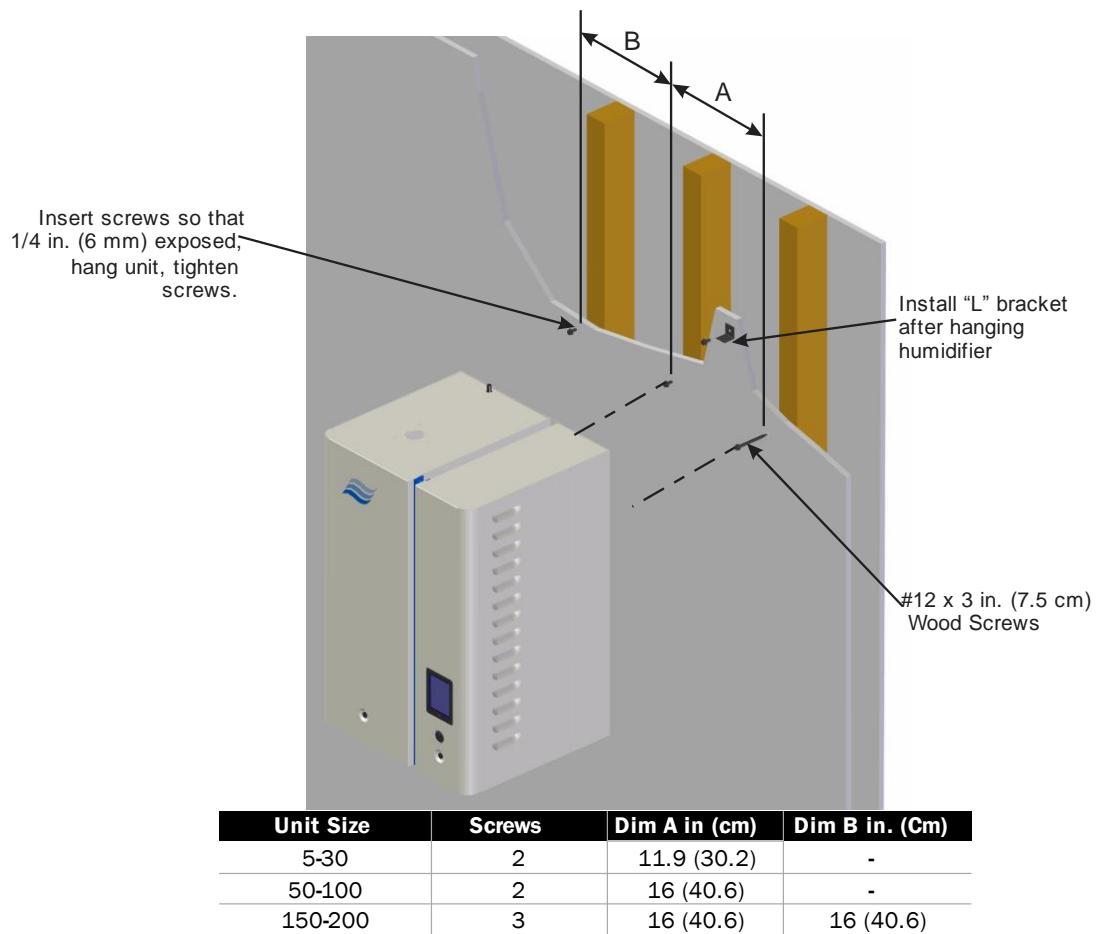


Figure 6: Mounting with Keyholes

Plumbing

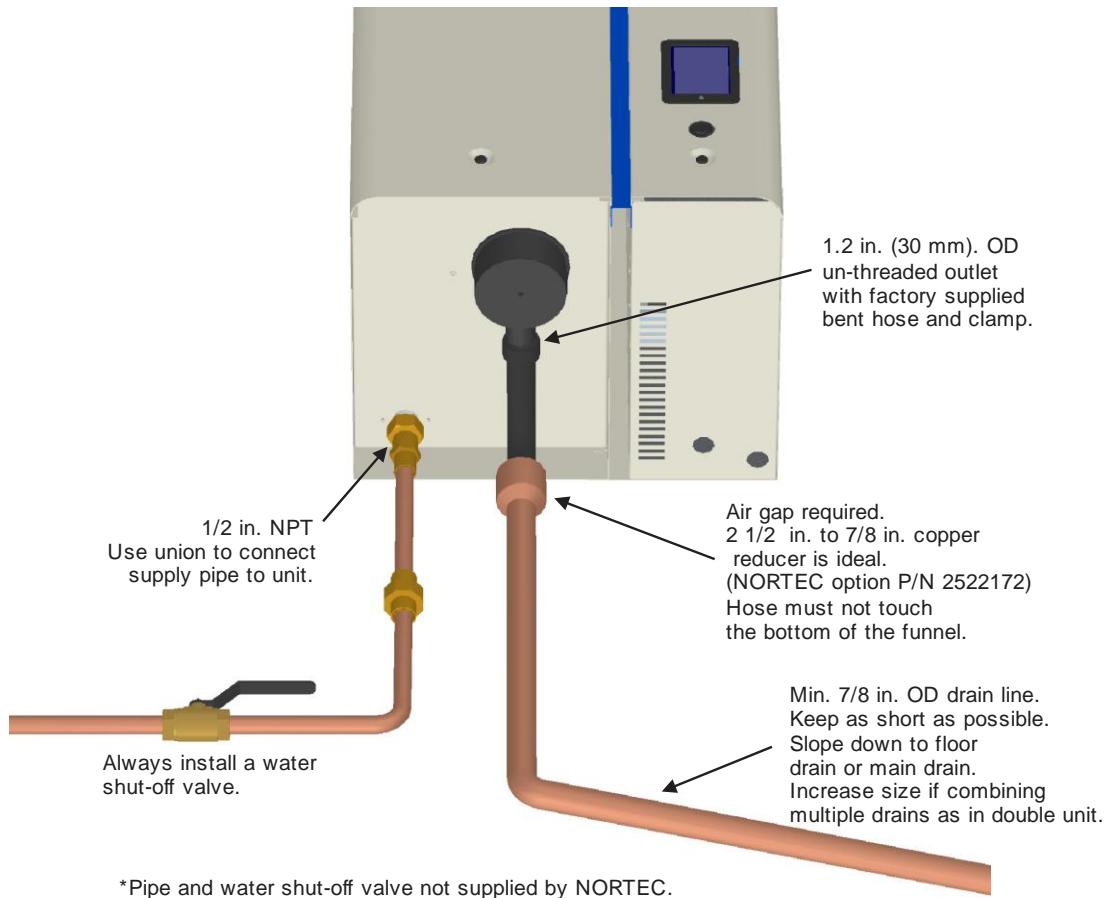


Figure 7: Water Supply and Drain Connection

Note:

- Drain Water is very hot, do not drain to public sink
- Supply cold potable water (not Reverse Osmosis or Demineralized). Conductivity: 150–750 microsiemens and pressure: 30-80 PSIG.
- Use material suitable for 212°F (100°C) for drain and condensate lines.



- All water supply and drain line connections should be installed in accordance with local plumbing codes.
- Supply water should at 30 to 80 PSIG and be between 150-750 microsiemens (Hardness 0-12 GPG). For 750-1200 microsiemens, please consult factory.
- Install water shut off valve and union before humidifier to facilitate servicing.
- The drain line should not end in a sink used frequently by personnel, or where plumbing codes prohibit. Route to a floor drain or equivalent for safety reasons.
- Ensure drain line is adequately sized to provide free and easy draining and that an air gap is installed as shown. A restricted drain can cause cylinder water to over concentrate, resulting in poor operation or result in water backing up at the air gap.

Steam Distributor

- Steam generated by the NH-EL may be distributed directly into a space with a built on or remote blower pack, or into an air handling system using either Nortec steam distributors or Nortec's SAMe steam distribution manifold.
- Whichever method is used, the steam distributor should be installed as close as possible to the humidifier. Short steam distribution lines minimize condensate losses and the possibility of generating back pressure in the steam distribution line.
- Figure 8: Distributor Location in Duct provides common guidelines for locating a steam distributor in a duct.

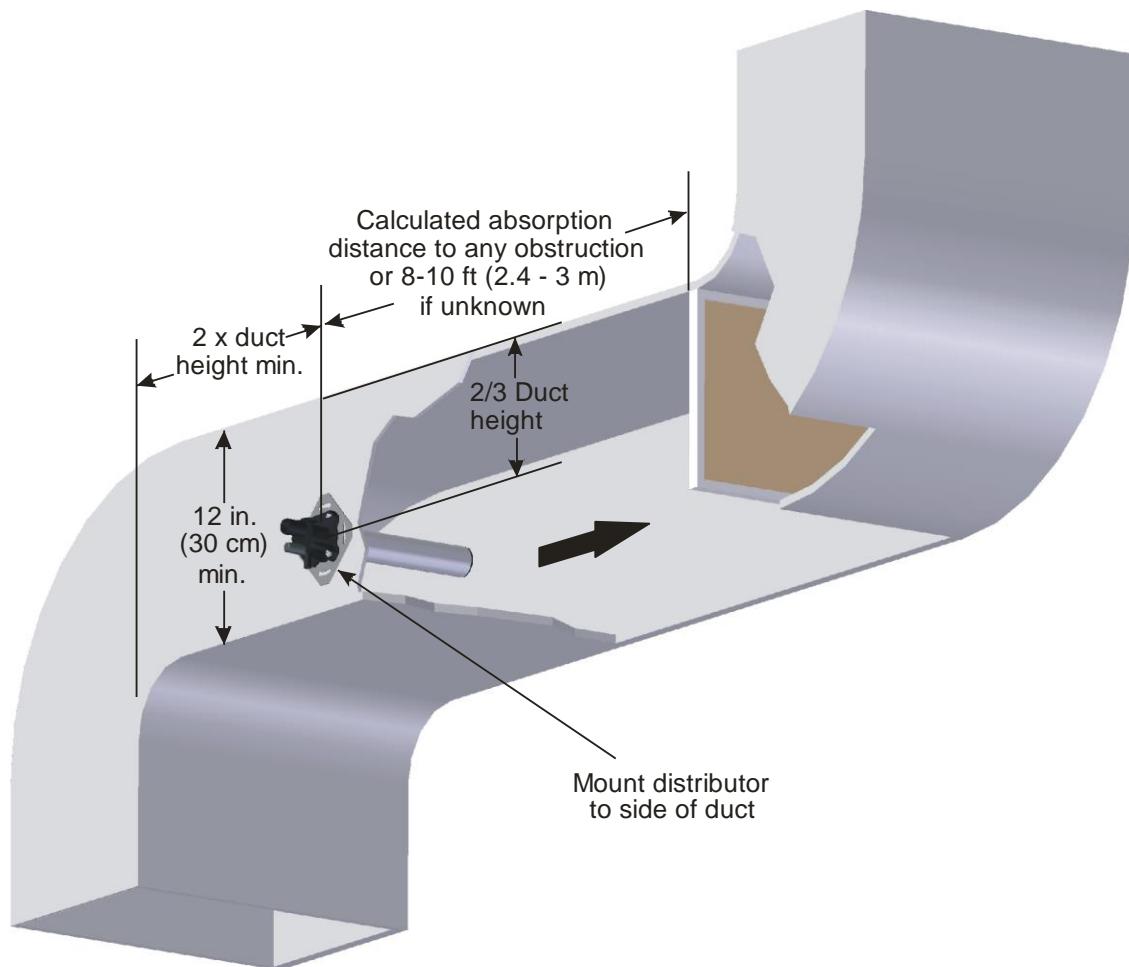


Figure 8: Distributor Location in Duct

Note:

- Install the NH-EL as close as possible to whatever steam distributor is used.
- Refer to distributor, SAMe, or remote blower pack installation manuals for detailed installation instructions.



Steam Lines and Condensate Return Instructions

The following instructions must be followed for installation of steam lines for ASD, BSD, CSD, SAM-e, and remote blower packs. Failure to use material recommended in

Table 7, exceeding maximum recommended length in Table 7, or failure to follow any other steam line installation instructions will result in improper operation and could void the warranty.

Danger:

The NH-EL is an atmospheric humidifier that will only operate properly when its steam distribution system is installed so that it provides no significant backpressure.

Installing the NH-EL in such a way that backpressure can develop during operation could result in serious injury or damage to property.



Table 7: Recommended Steam Line Material*, Maximum Length, Losses

NH-EL Model	Maximum Steam Line Length ft (m)	MED-L Copper Tube	Stainless Steel Tube	Possible Steam Losses (based on 1" insulated copper pipe) lb/hr/ft (kg/hr/m)
5	7 (2)			
10	12 (3.5)			
20	17 (5)			
30	22 (6.5)			
50	43 (13)			
75/150**	47 (14)			
100/200**	50 (15)			
Oversized Steam Line (Use for longer steam runs)***				
5	14 (4)			
10	24 (7)			
20	34 (10)			
30	44 (13)			
50	86 (26)			
75/150**	94 (28)			
100/200**	100 (30)			

Nortec Steam Hose

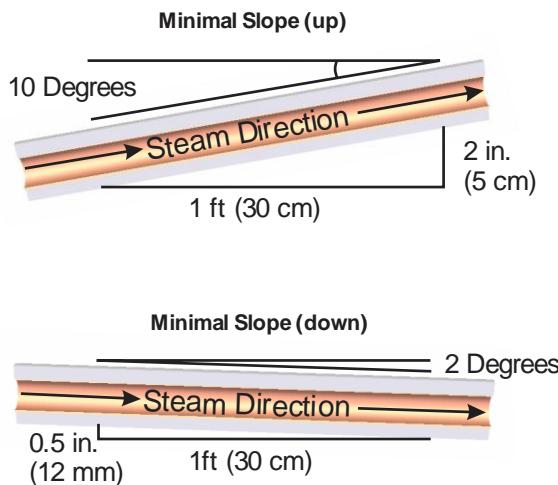
5-30	10 (3)	Pt No 1328810 (7/8")	0.1 (0.15)
50-200**	10 (3)	Pt No. 1328820 (1 3/4")	0.15 (0.22)

Note: * The use of steam line other than copper, stainless steel tube or Nortec supplied steam line will void the warranty and may adversely affect the operation of the humidifier.

** Use one steam line per cylinder for NH-EL 150-200 humidifiers. Do not combine lines except at distributor using a Nortec adapter designed for that purpose and only if humidifiers operate in parallel.

*** These diameters require a reducer at humidifier and steam distributor connection.

Use Appropriate Slope



Insulate Pipe



Figure 9: Steam Line Slope and Insulation

Trap condensate

- Trap at all low points and recommended intervals using full size 'T' for traps.
- Condensate should not be routed to a sink used frequently by personnel. Route to a floor drain or equivalent. Condensate normally cools in traps but is still hot. A SAME or larger steam line generates more condensate and water may not cool in the trap. A drain water cooler option may be installed if required by code.
- Route condensate to floor drain or equivalent in multi-unit to single SAM-e installation.

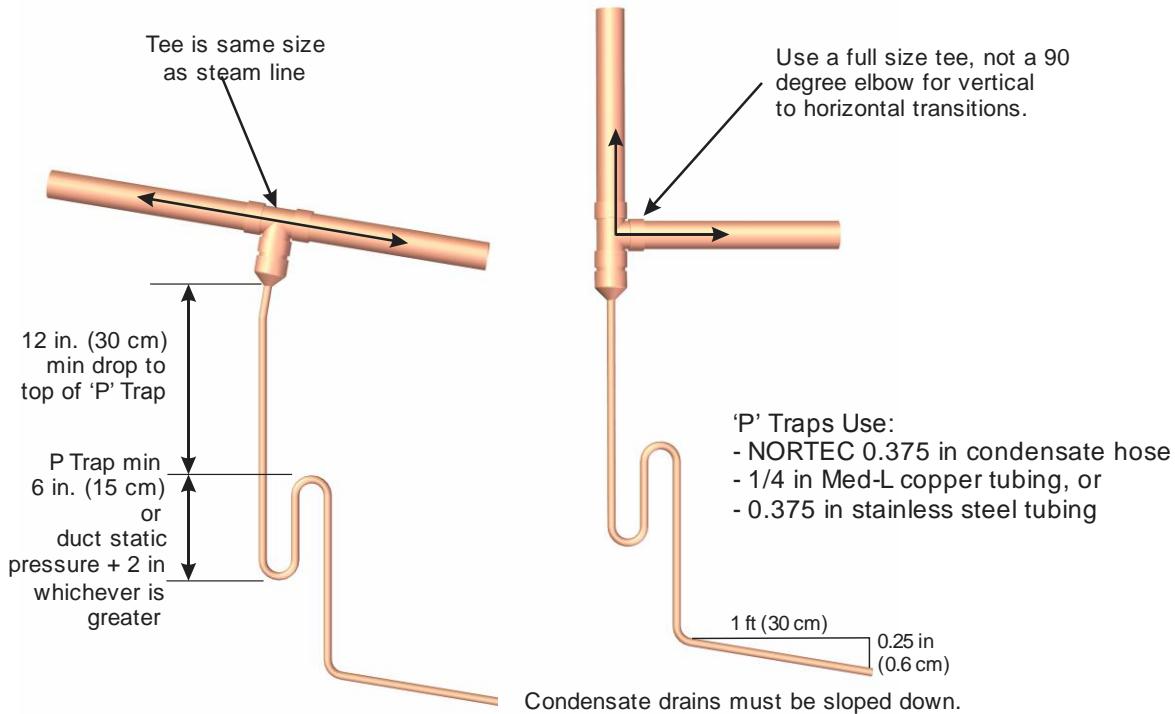


Figure 10: Condensate Traps

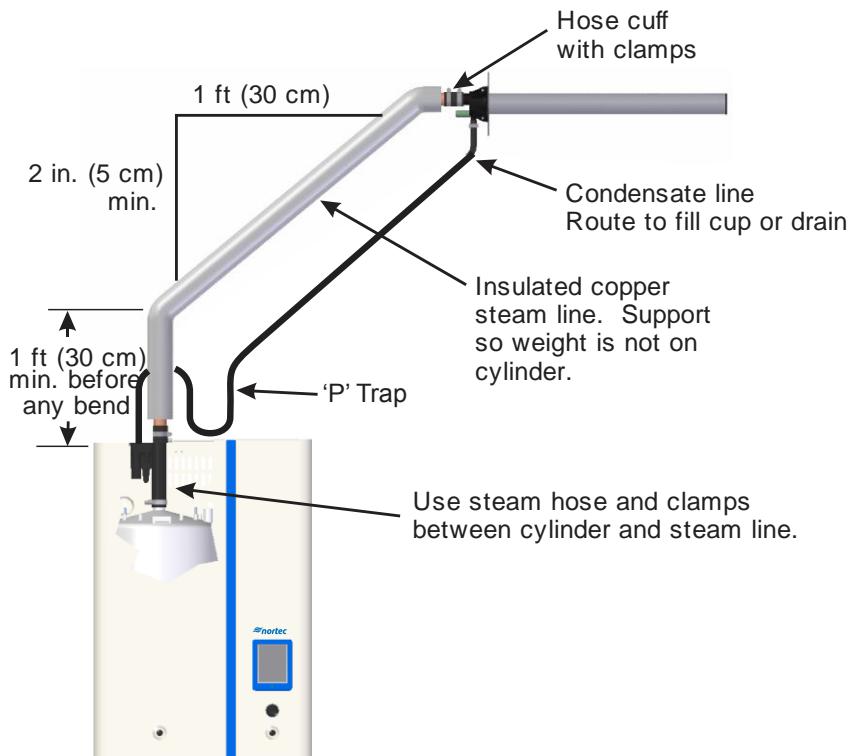


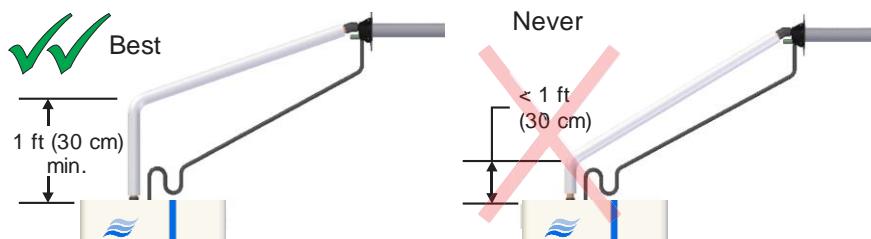
Figure 11: Typical Steam Line Installation

Steam Line Rules

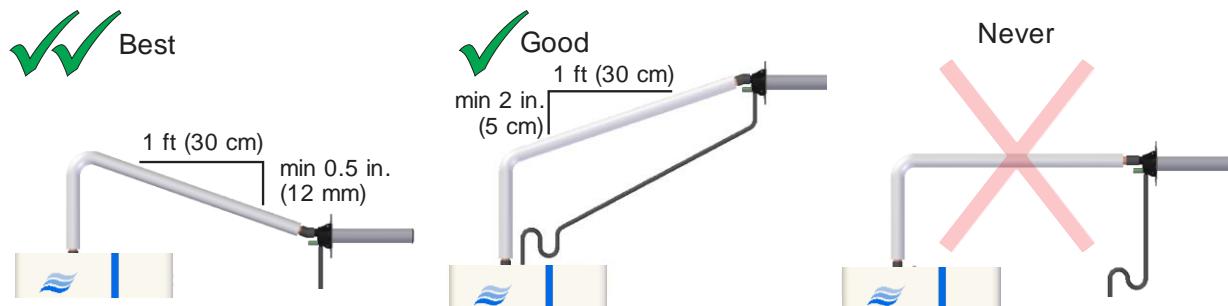
The following 10 points provide rules for installing steam lines connecting the NH-EL humidifier to ASD, BSD, CSD, SAMe and remote blower packs. In addition to these rules never use unapproved material for steam lines.



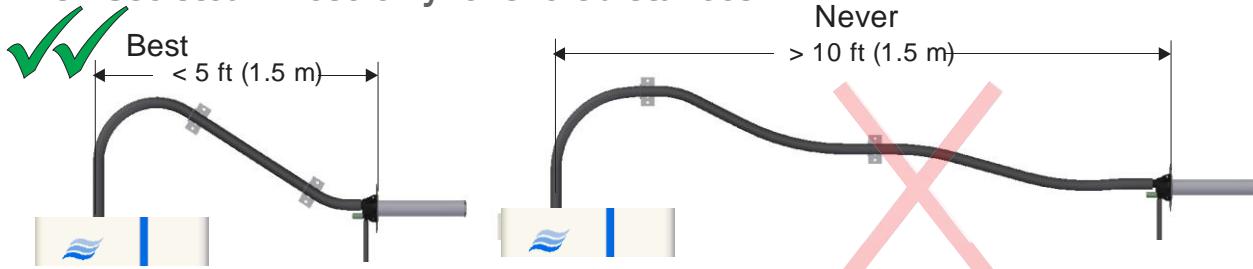
1. Allow minimum of 12 in. (30 cm) before first bend in steam line.



2. Slope the steam lines.

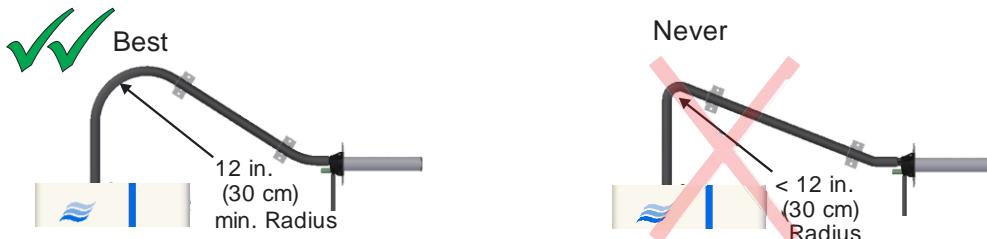


3. Use steam hose only for short distances.

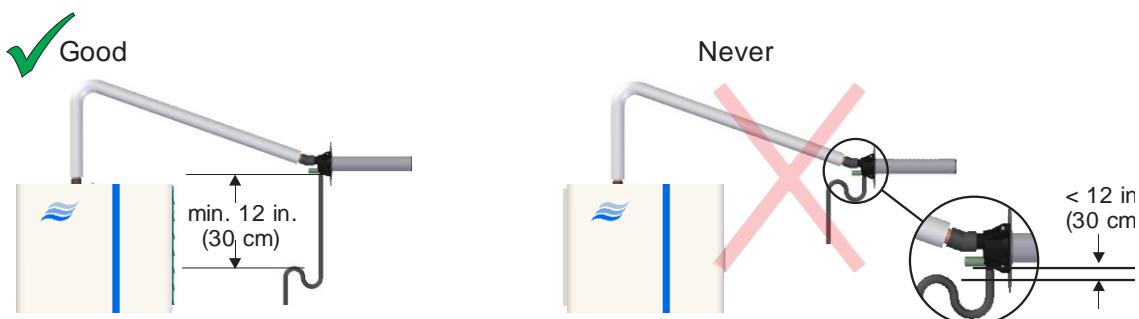


Note: 1) Always support hose.

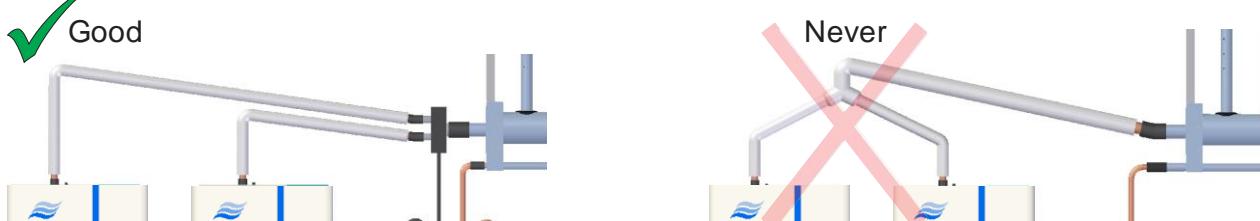
4. For steam hose maintain minimum 12 in. (30 cm) bend radius.



5. Install traps on condensate lines at least 12 in. (30 cm) below connection.



6. Only combine steam lines at steam distributor with Nortec adapter.



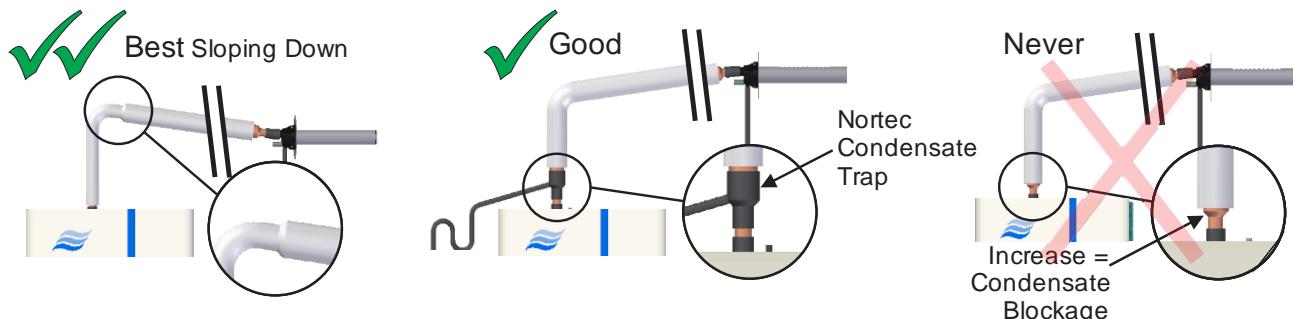
Notes: 1. Units must operate in parallel.

2. Also for double units (cylinders must operate in parallel).

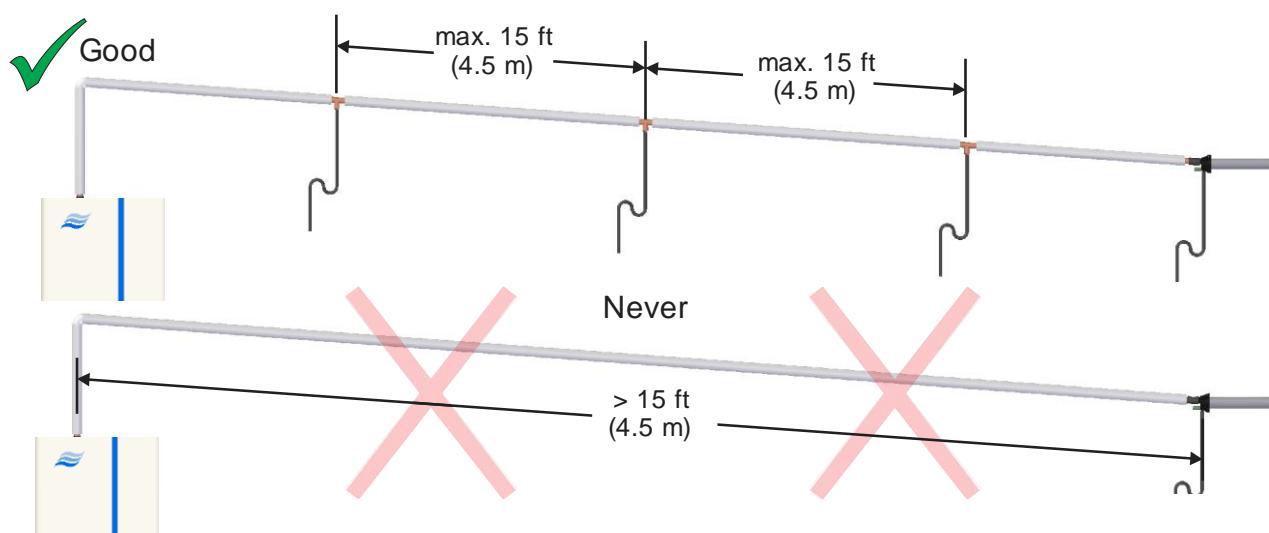
7. Install condensate traps at low points and horizontal to vertical transitions.



8. Increase diameter either on down slope or install condensate trap.



9. Install condensate traps if steam line > 15 ft (4.5 m).



10. In addition never:



After Installation Always:

- Purge steam lines to remove any contaminants and installation materials
- Ensure all condensate lines / traps flow.



Electrical



Caution: Wiring to be performed by a licensed electrician.



Three Phase NH-EL

Three Phase Supply

Ground
L1
L2
L3
Neutral

Dedicated Circuit Breaker or Fused Disconnect

Ground
L1
L2
L3

Single Phase NH-EL

Single Phase Supply

Ground
L1
L2

Ground
L1
L2

Three Phase Supply
(Note: Load will be unbalanced)

Ground
L1
L2
L3
Neutral

Ground
L1
L2

Three Phase Supply
(Note: Load will be unbalanced)

Ground
L1
L2
L3
Neutral

Ground
L1
Neutral

Note:

- 1 Optional internal fuses are not a substitute for external fuses.
- 2 Dedicated external fused disconnect must be installed. Fusing must not exceed max circuit protection as indicated on the specification label.
- 3 Ensure that adequate power is available to carry full humidifier amp draw as indicated on the specification label.
- 4 All wiring to be in accordance with national and local electrical codes.

Figure 12: Primary Power Connection

External Controls

Control Wiring

The following information is relevant to all controls, factory supplied or otherwise. For wiring use a minimum of 18 AWG and keep as short as possible. The NH-EL humidifier can be operated with two modulating inputs. Signal types must be the same (both demand or both transducer). The NH-EL can also be operated as On/Off. See NH-EL Humidifier Configuration on page 54 for configuration.

Caution: Failure to wire the humidifier in accordance with the wiring instructions could cause permanent damage. Such errors will void the warranty.



Control Location

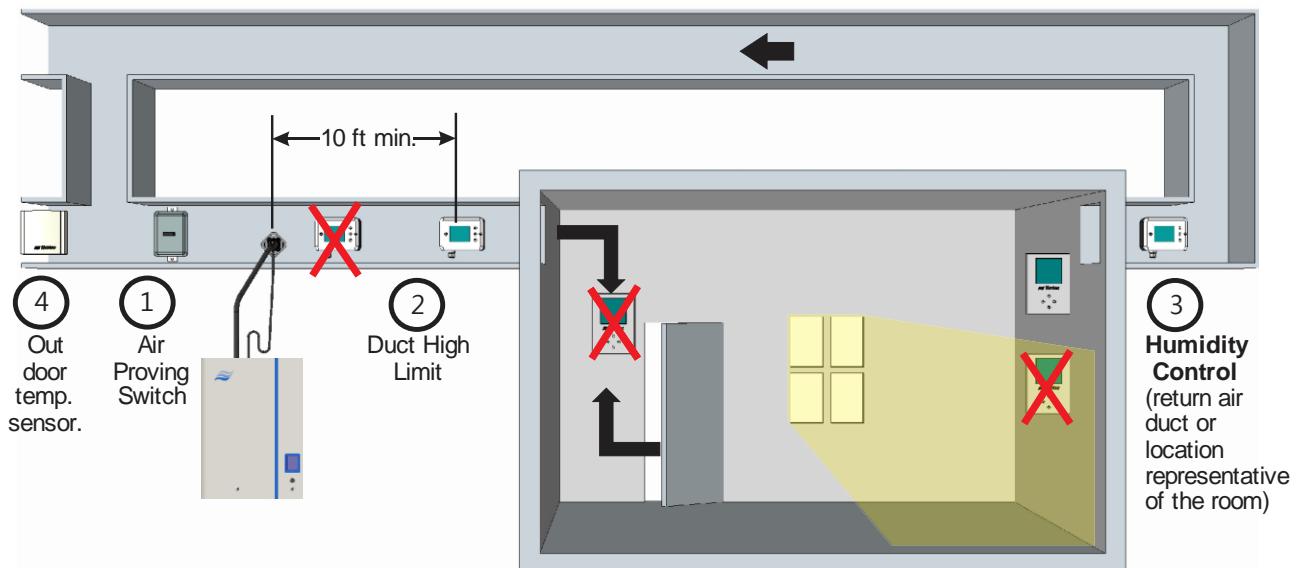


Figure 13: Control Location (Duct Humidification)

Duct Humidification

1 Air Proving Switch

- Locate so that it can sense air flow or lack of it.

2 Duct High Limit

- NH-EL can be modulating, On/Off, or a humidity sensor.
- Locate at least 10 feet from steam distributor or far enough that under normal conditions steam is fully absorbed.

3 Humidity Control

- NH-EL can be Modulating, On/Off, or a Humidity Sensor.
- Can be located either in return air duct (preferred) or in room being humidified.
- Mount in area representative of room humidity (draft, doorways, sunlight, or overhang such as a shelf can affect reading). Avoid placing near discharge diffuser of humidified air.

4 Outdoor Temperature Sensor

- Mount in area representing outdoor air temperature (makeup air duct, outside).



Note: Regardless of selecting on/off or modulating control method, Nortec humidifiers must have a closed circuit across its security loop control terminal to operate. Nortec highly recommends the use of a high limit humidistat and an air proving switch in series for this function.

Space Humidification

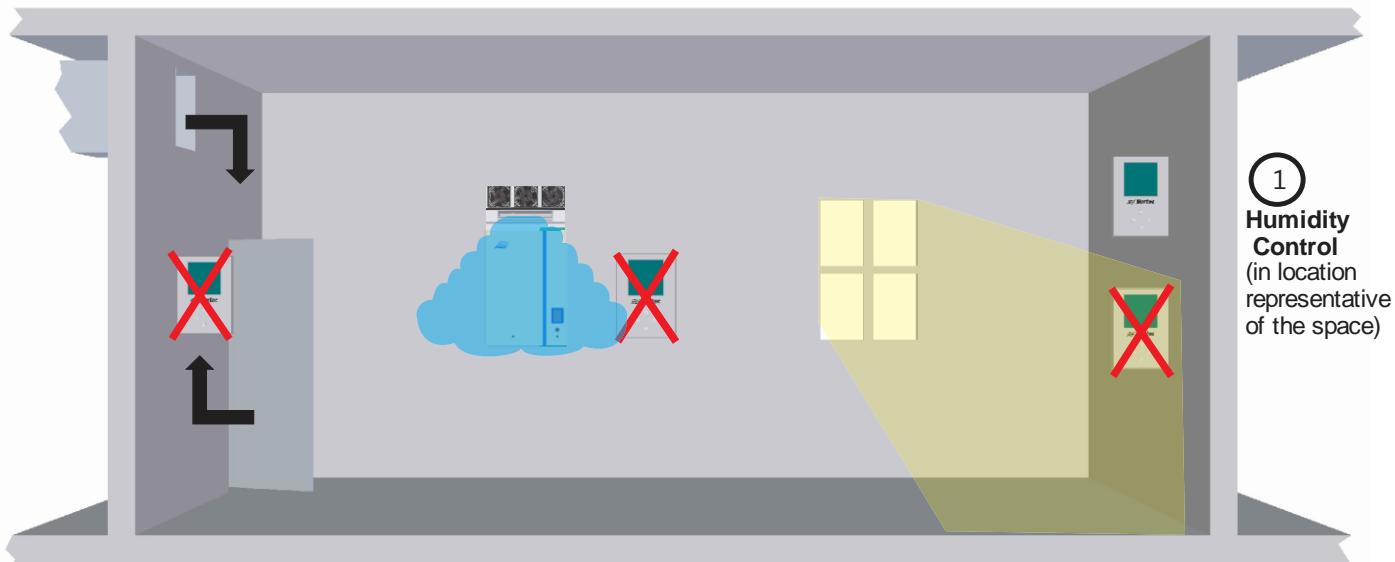


Figure 14: Control Location (Space Humidification)

1 Humidity Control

- NH-EL can be modulating, On/Off, or a humidity transducer.
- Locate in room being humidified but not in discharge zone of blower pack(s).
- Mount on indoor wall in area representative of room humidity (draft, doorways, sunlight, or overhang such as a shelf can affect reading).

2 High Limit Humidistat (not shown)

- Install a high limit On/Off humidistat in area representative of room humidity.

3 Outdoor Temperature Sensor (not shown)

- Mount outside in area representing air temperature.

On/Off Control Wiring

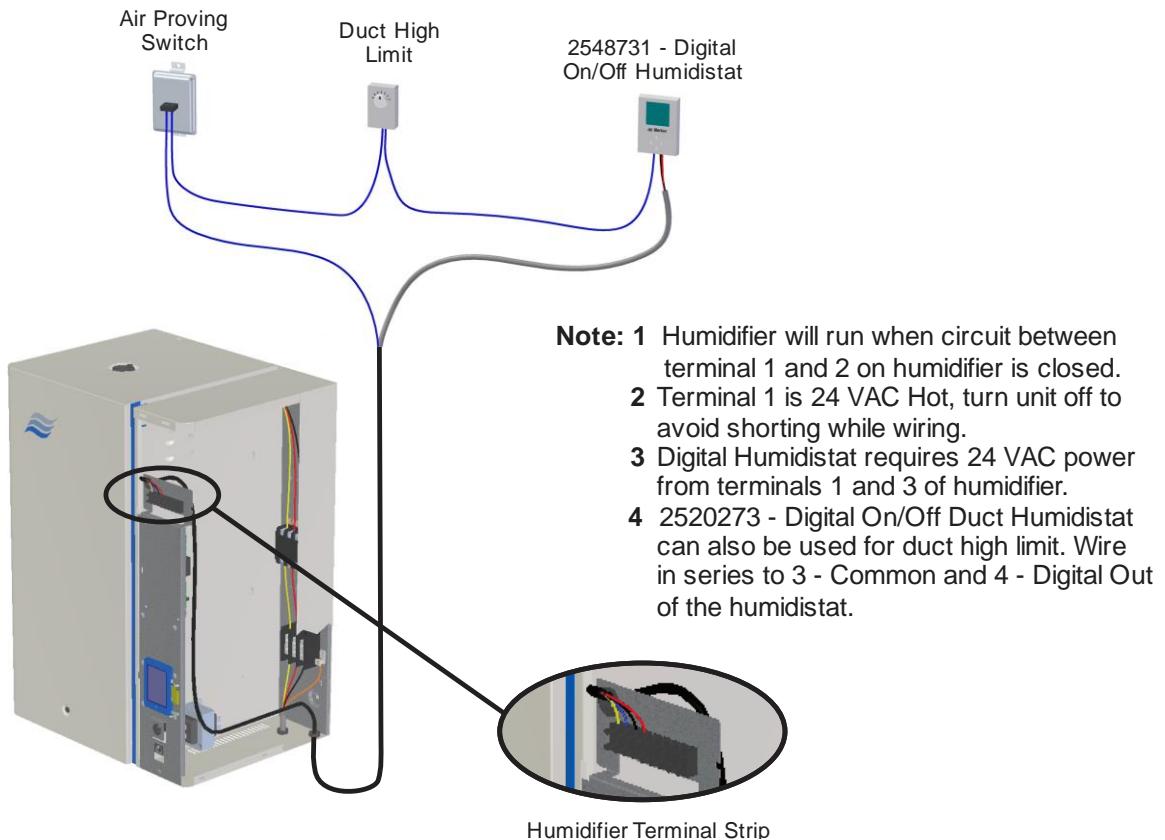


Figure 15: On/Off Controls

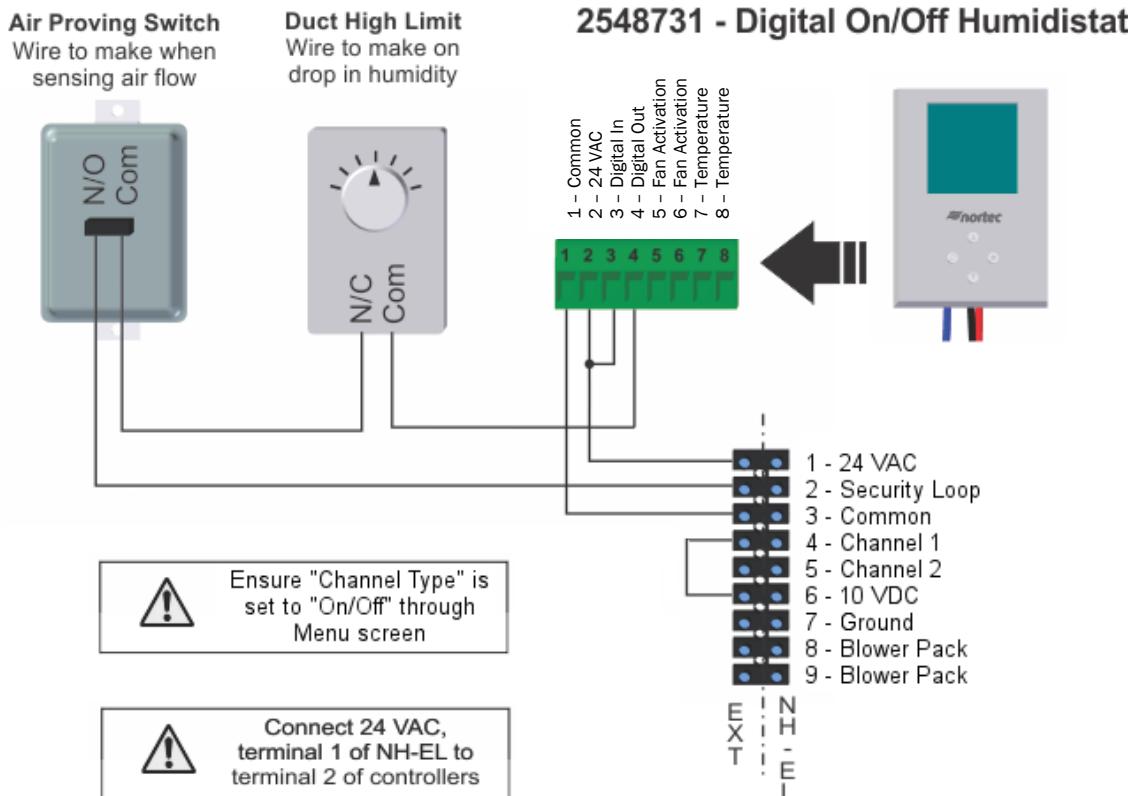


Figure 16: Digital On/Off Humidistat

2520273 - Digital On/Off Duct Humidistat Package

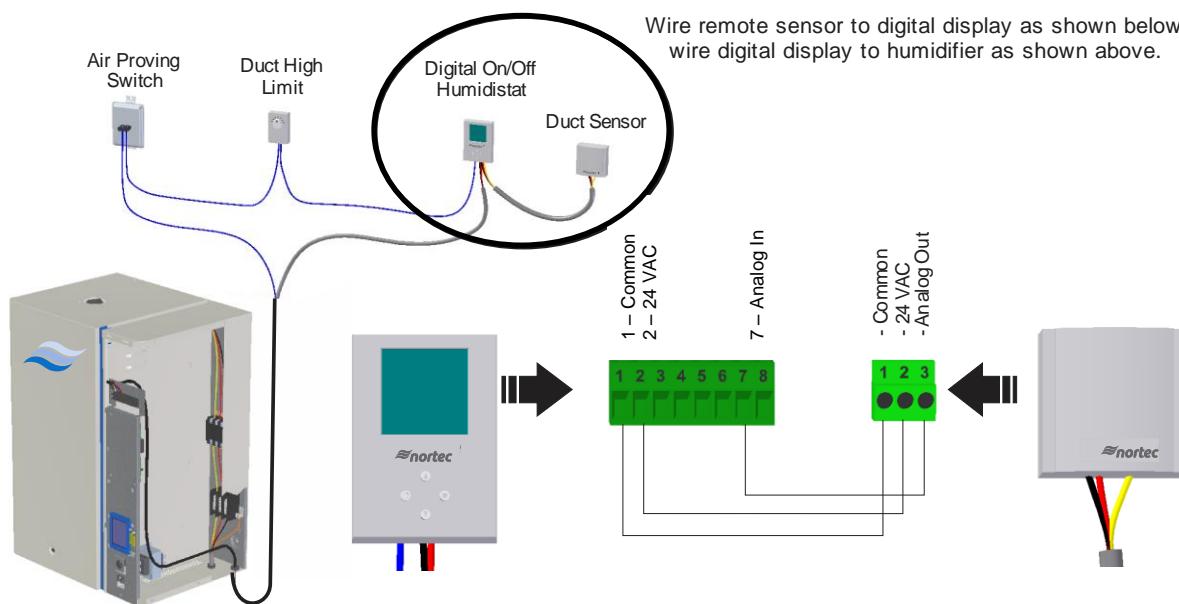


Figure 17: Duct Sensor Wiring

Keep Warm Wiring

For the keep warm feature to work the security loop between terminal 1 and 2 on the low voltage terminal strip must be closed. To accomplish this:

- 1 Install an On/Off high limit humidistat between terminal 1 and 2.
- 2 Install any other On/Off controls in series with the control signal connected to terminal 4 (Channel 1 control signal).
- 3 If desired a modulating high limit humidistat can also be installed and connected to terminal 5 (Channel 2 control signal).

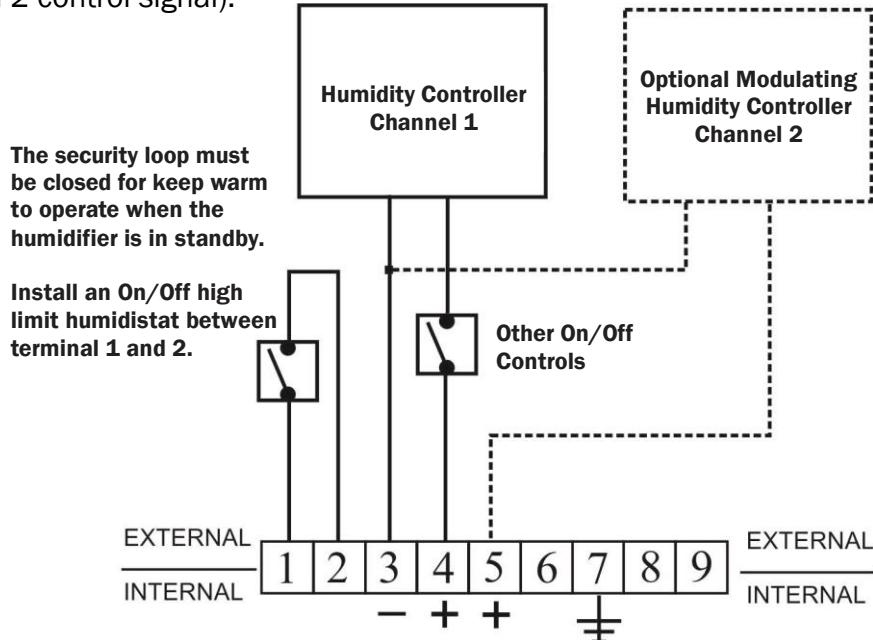


Figure 18: Keep Warm Wiring

Modulating Control Wiring

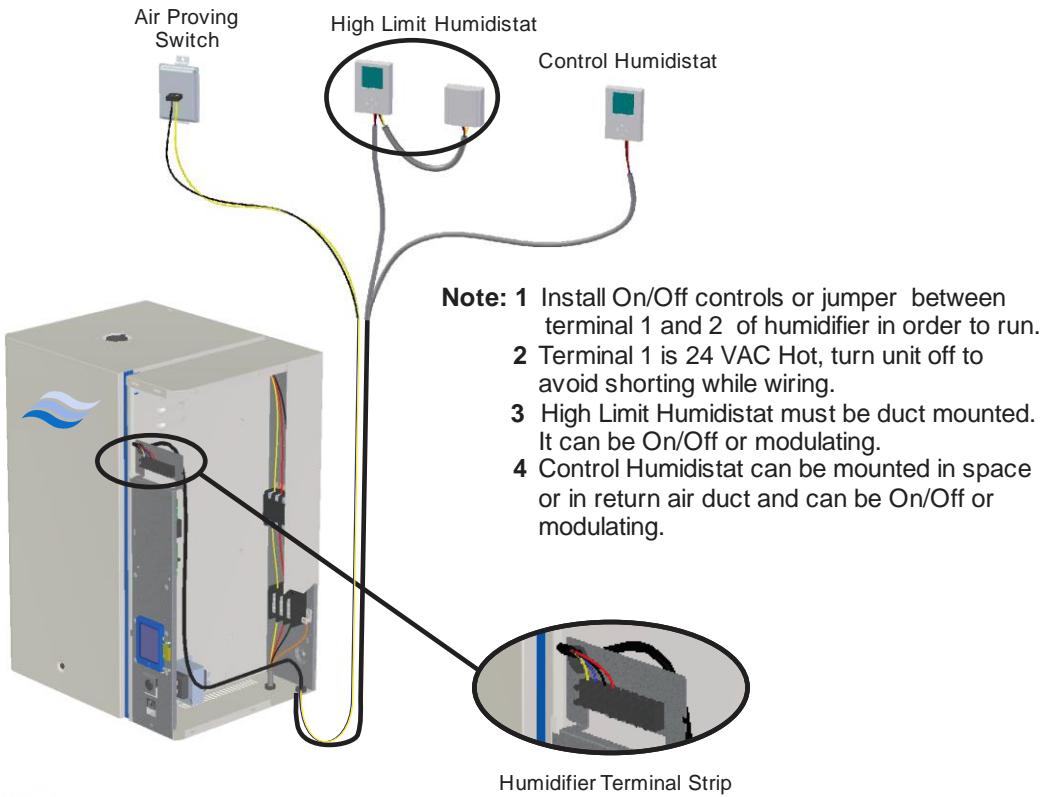


Figure 19: Modulating Controls

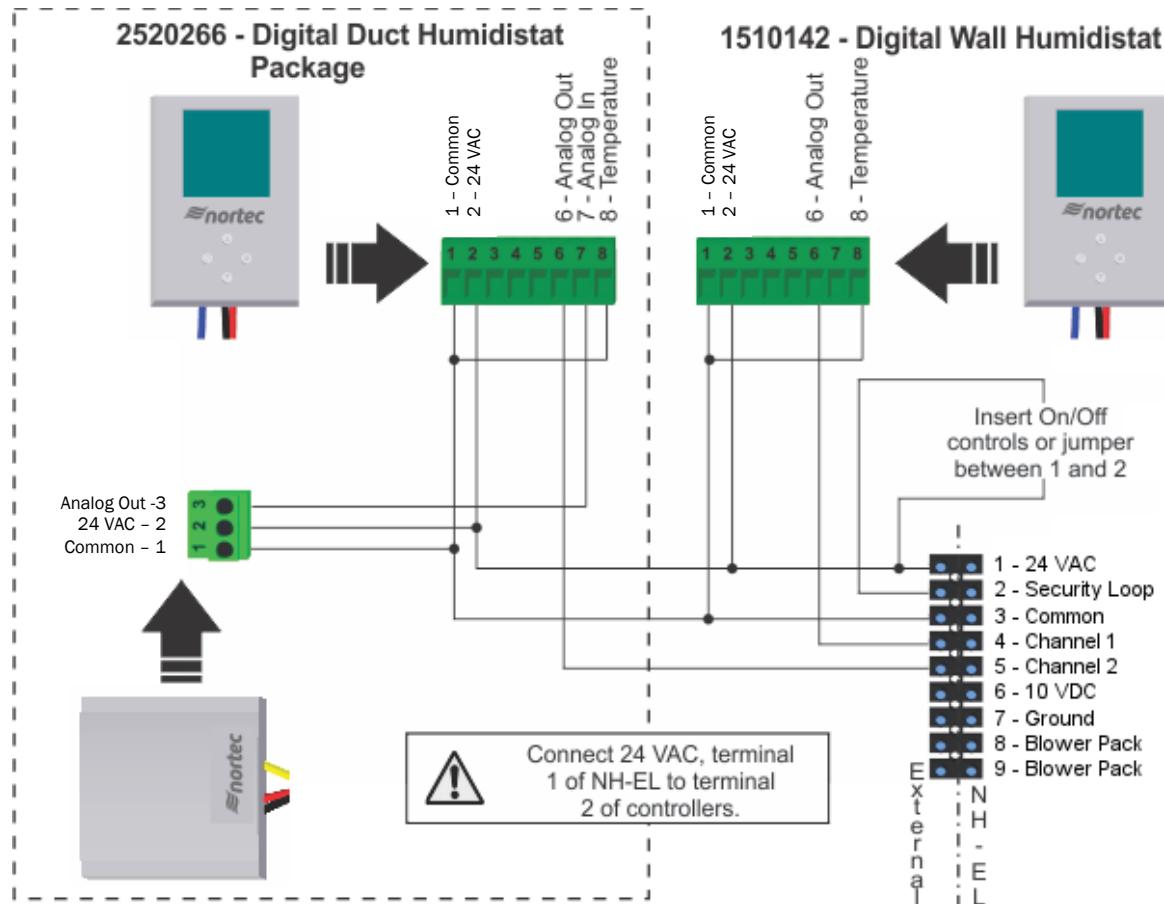


Figure 20: Digital Modulating Humidistats

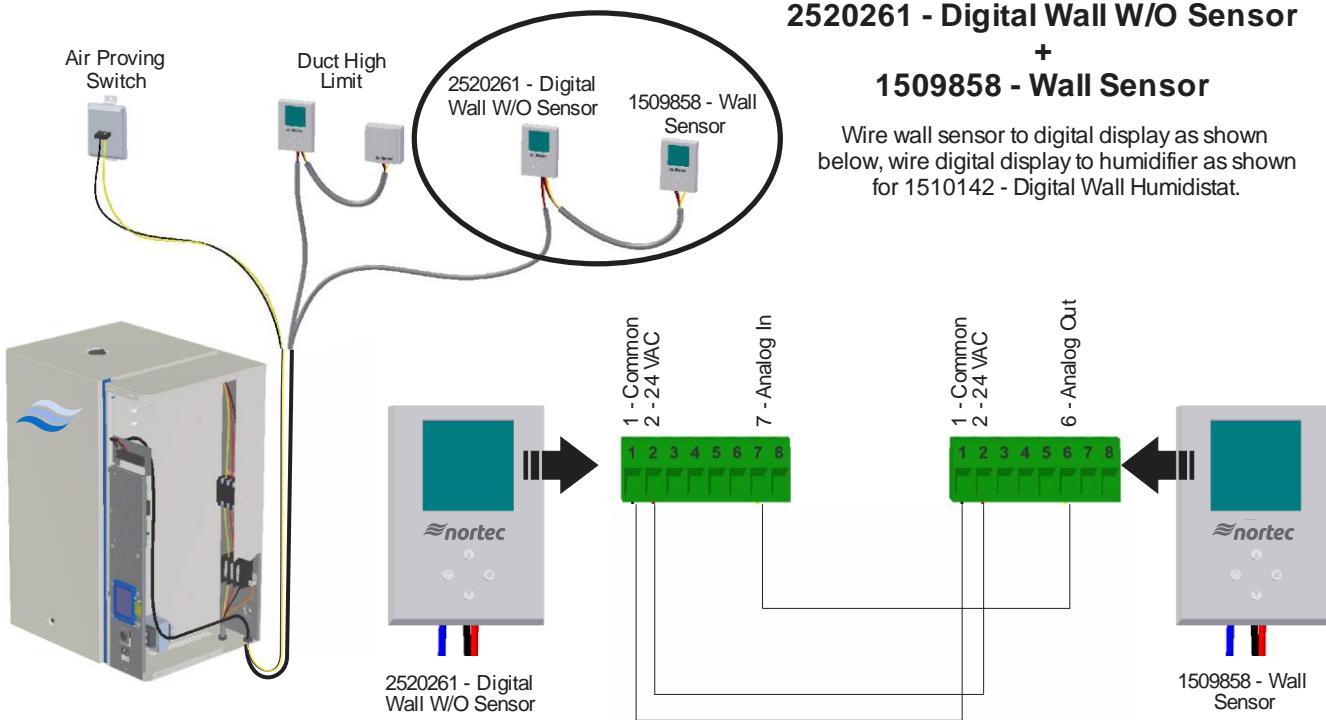


Figure 21: Digital Wall Humidistat – Remote Wall Sensor

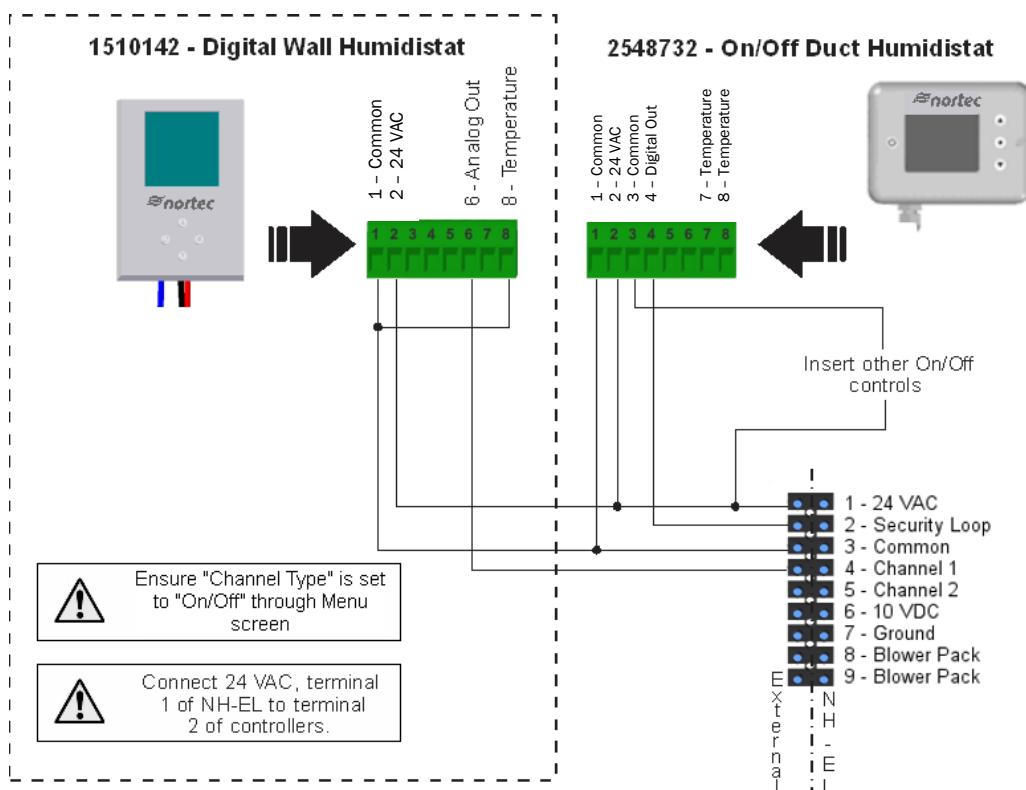


Figure 22: Digital Wall Humidistat - On/Off High Limit Duct Humidistat

Transducer Control Wiring

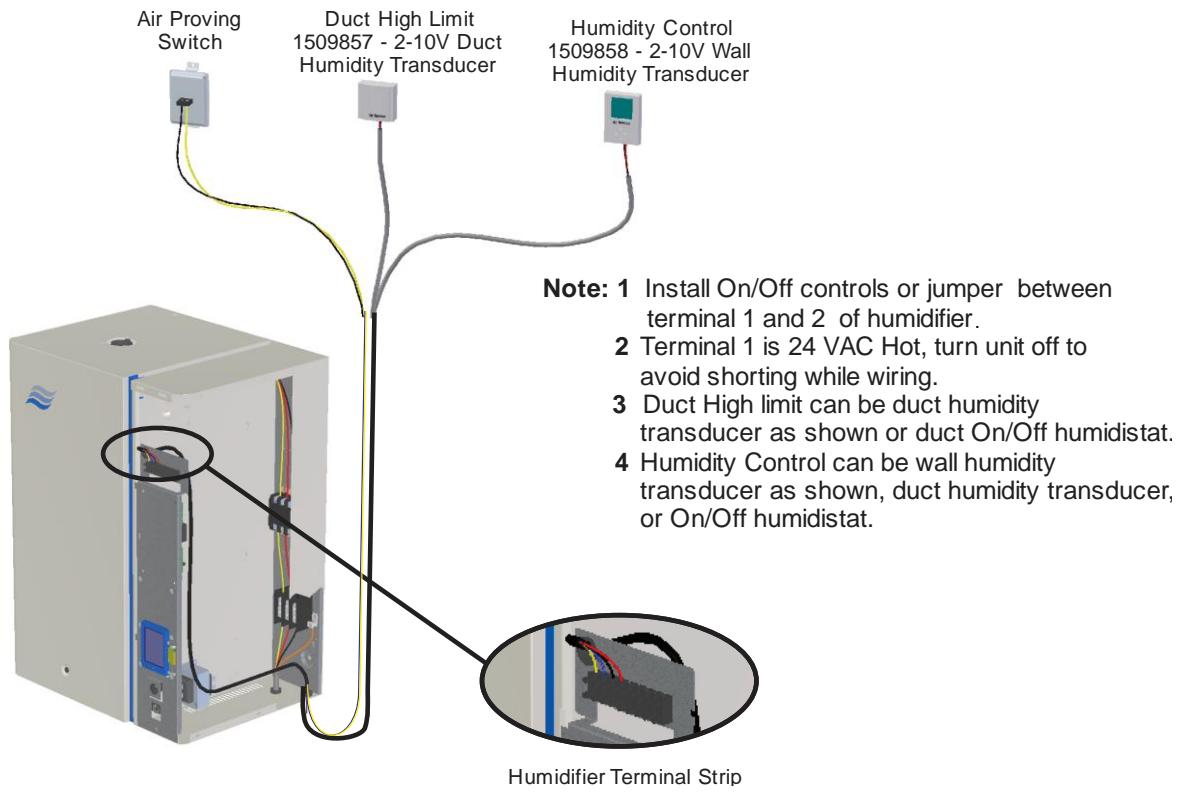


Figure 23: Transducers

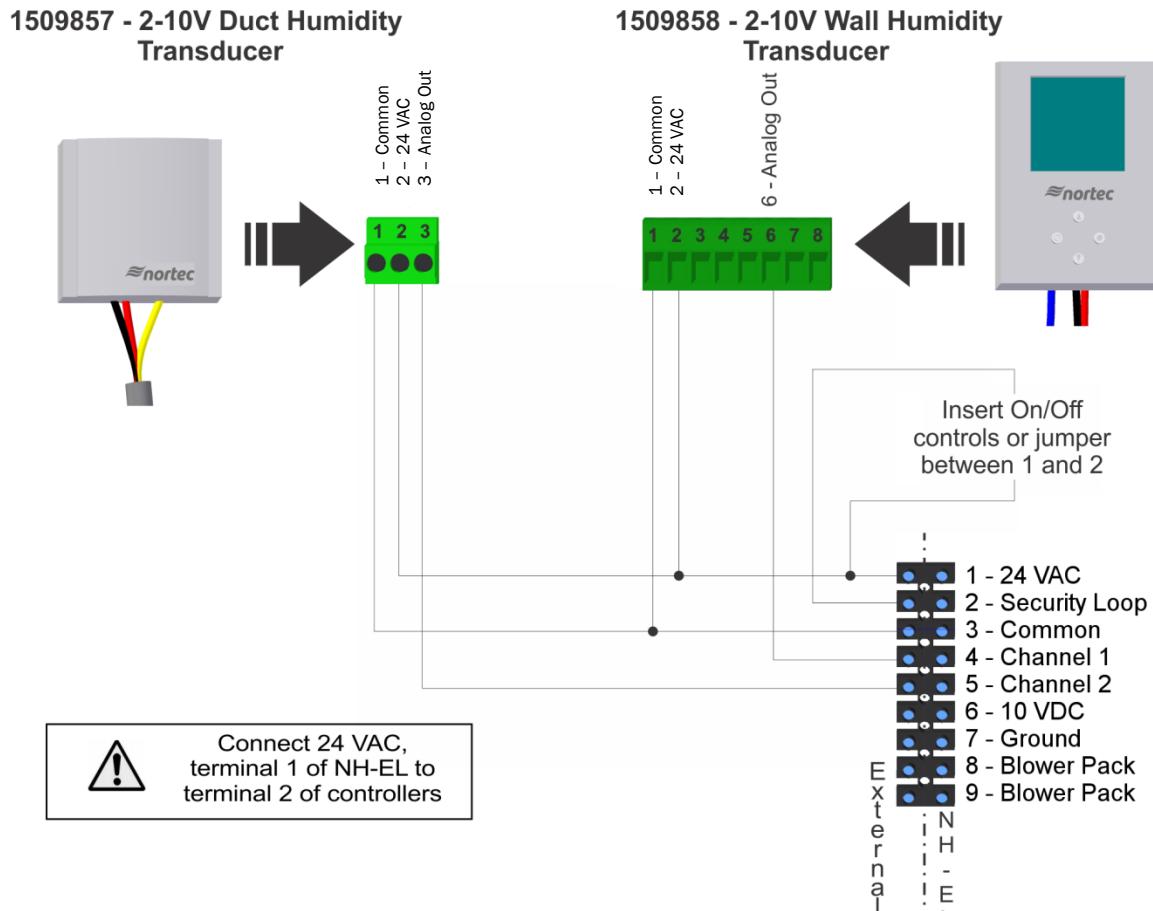


Figure 24: Digital Transducers

Double Unit Control Wiring

NH-EL double units (150-200) have two low voltage terminal blocks. The units can be configured to operate the cylinders in series or parallel from one set of control signals, or independently from two sets of control signals. See Double Mode (NH-EL 150-200 only) on page 56 for more information.



Always select Parallel operating mode when connecting both cylinders to one SAM-e. Use separate steam distributors for each cylinder if configured for sequence operation.

Parallel or Series - One set of control signals (Double Mode = Series or Parallel) wire the controls to terminal block A.

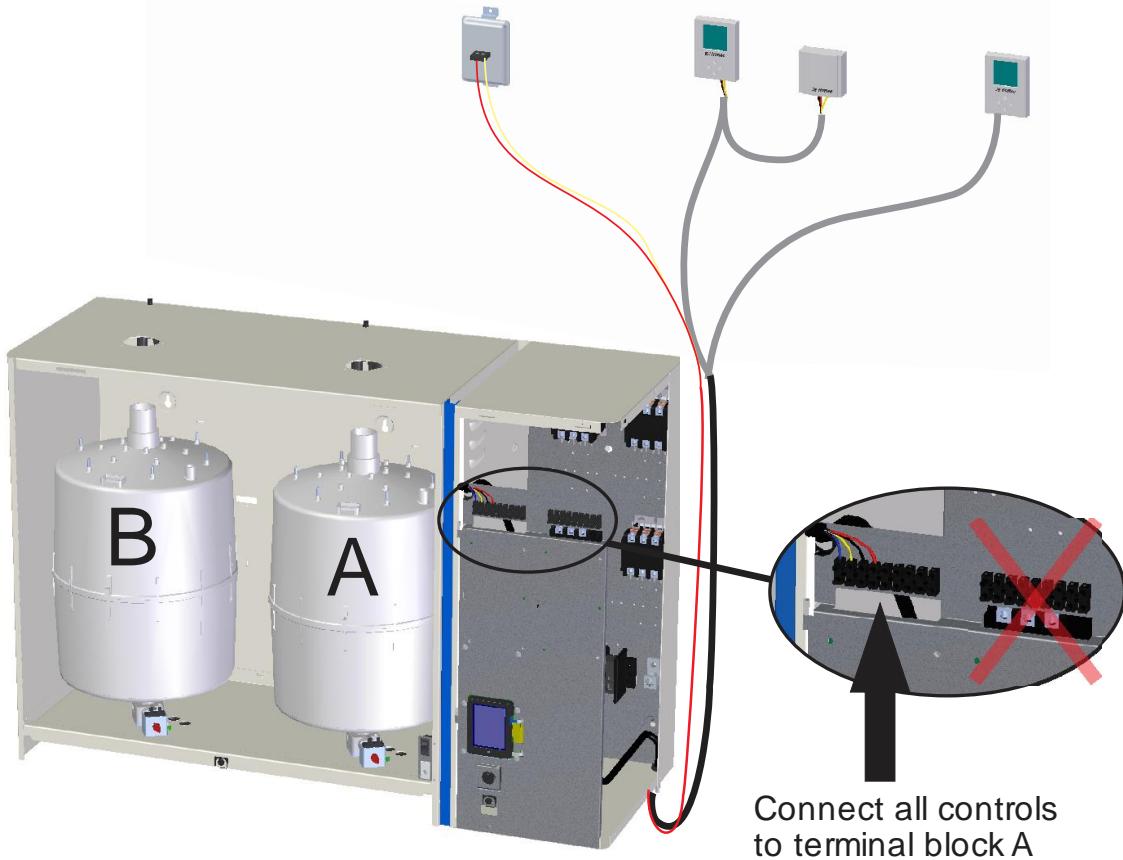


Figure 25: Parallel or Series Mode Control Wiring (Double Unit)

Double Unit Control Wiring (Continued)

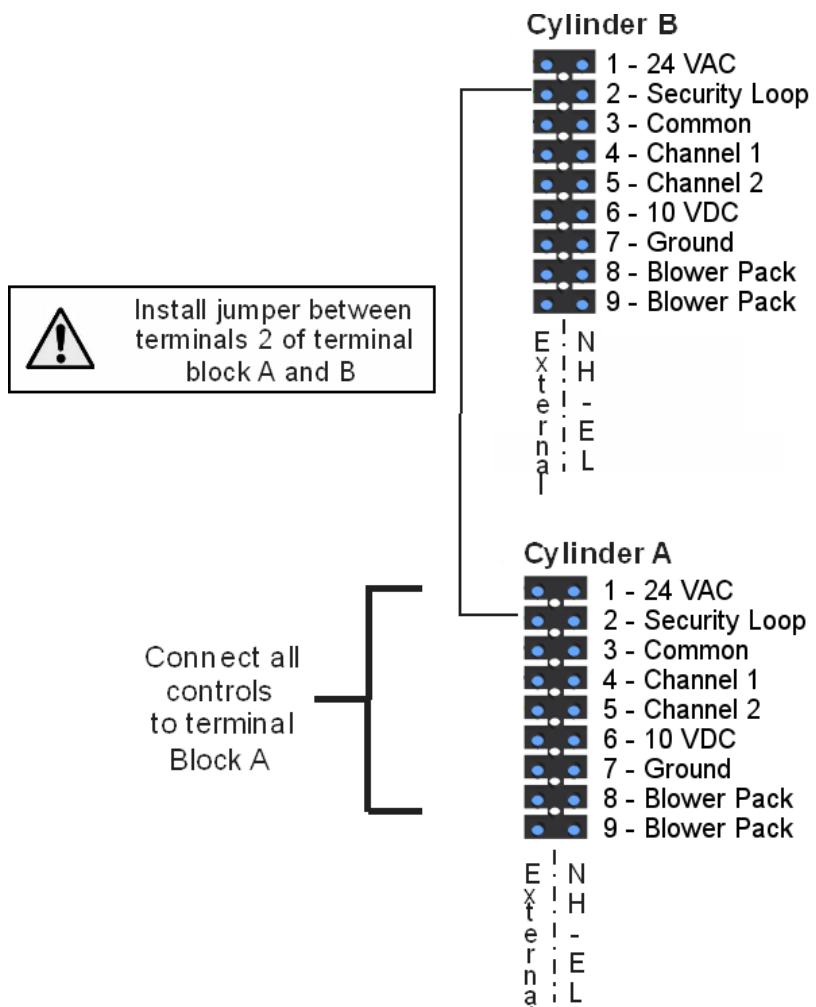


Figure 26: Double Unit Parallel or Sequence Wiring

Double Unit Control Wiring (Continued)

Independent- Two sets of control signals (Double Mode = Independent) wire the controls for Zone A (cylinder A) to terminal block A and wire the controls for Zone B (cylinder B) to terminal block B. All control signals must be the same type (Demand/Transducer).

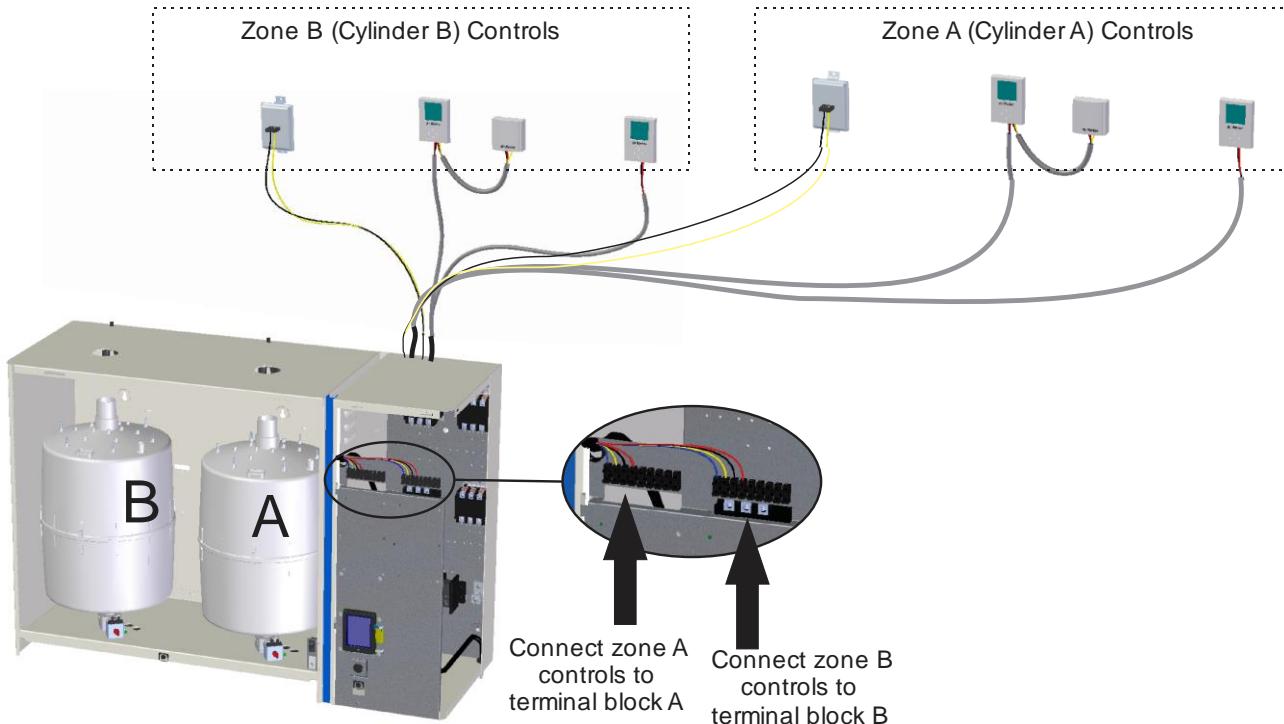


Figure 27: Independent Mode Control Wiring (Double Unit)

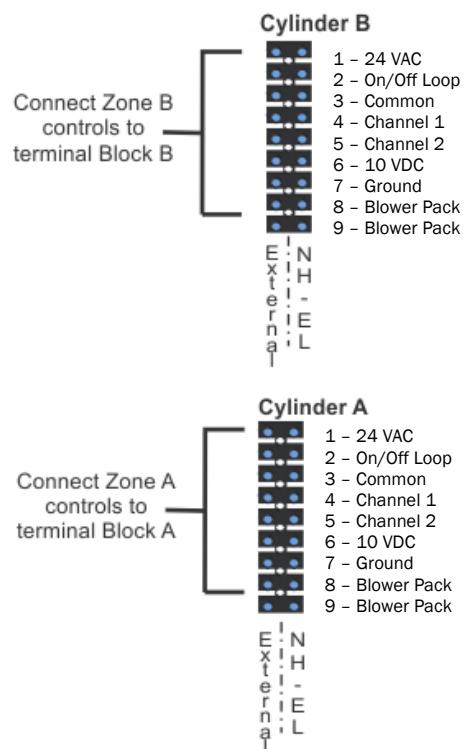


Figure 28: Double Unit Independent Mode Wiring

Outdoor Temperature Setback Sensor

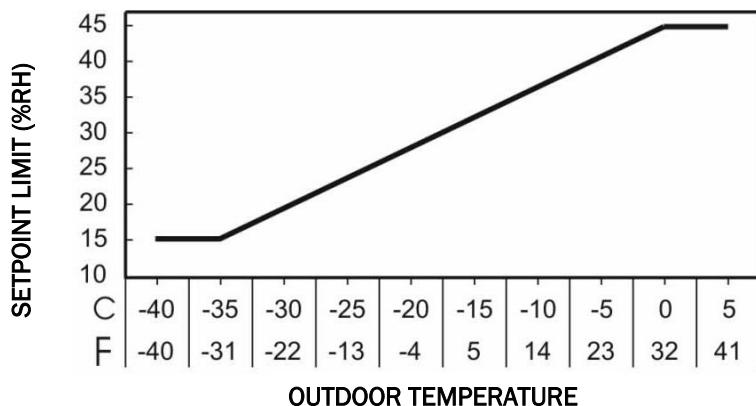


Figure 29: Outdoor Temperature Reset

- Each digital controller is equipped with an integrated reset function that can reduce the setpoint during cold weather operation. This will prevent condensation on windows and building structures. The above graph illustrates how the setpoint reset feature operates.
- This feature is enabled by removing the jumper from terminals 8 and 1 on the humidistat and wiring the outdoor temperature sensor to these terminals.
- When the outdoor temperature setback feature is in effect, the humidistat will normally display the calculated setpoint limit based on the outdoor air temperature. A snowflake will also be displayed to indicate cold weather operation. When any key on the controller is pressed, the LCD screen will display the customer specified setpoint for a short duration.

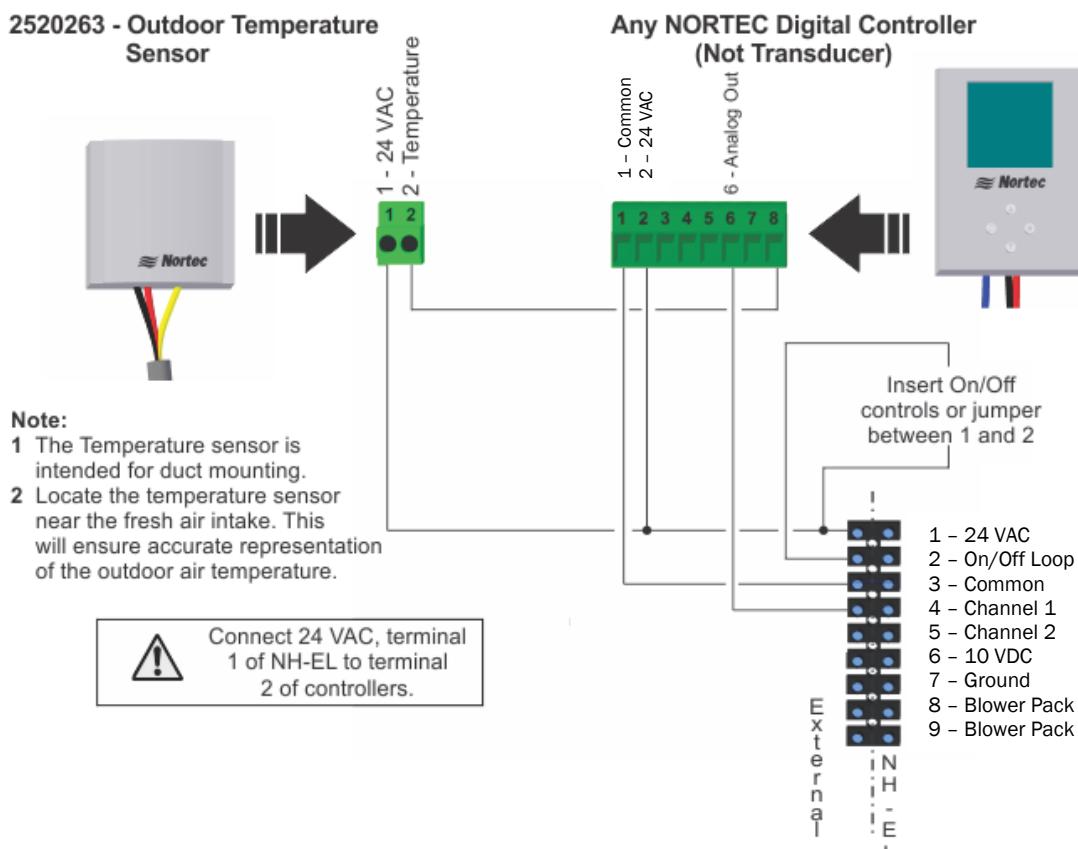


Figure 30: Outdoor Temperature Sensor

Remote Fault Option Wiring

The NH-EL remote fault option includes 4 relays that can provide remote status indication. The relays are mounted to a remote fault board which is located as shown in Figure 31: Remote Fault Wiring. The PCB with the relays includes markings which indicate the function of each terminal on the board. The relays indicate the following status:

- 1 Unit On** – The normally open relay is closed when the humidifier has power and the On/Off switch is set to on.
- 2 Steam** – The normally open relay is closed when the control board detects that the cylinder is drawing current and steam is being produced.
- 3 Service** – The relay can be wired to open (NC) or close (NO) when a warning is displayed on the humidifier display and the yellow service LED is illuminated.
- 4 Error** – The relay can be wired to open (NC) or close (NO) when a fault is detected by the humidifier controls.

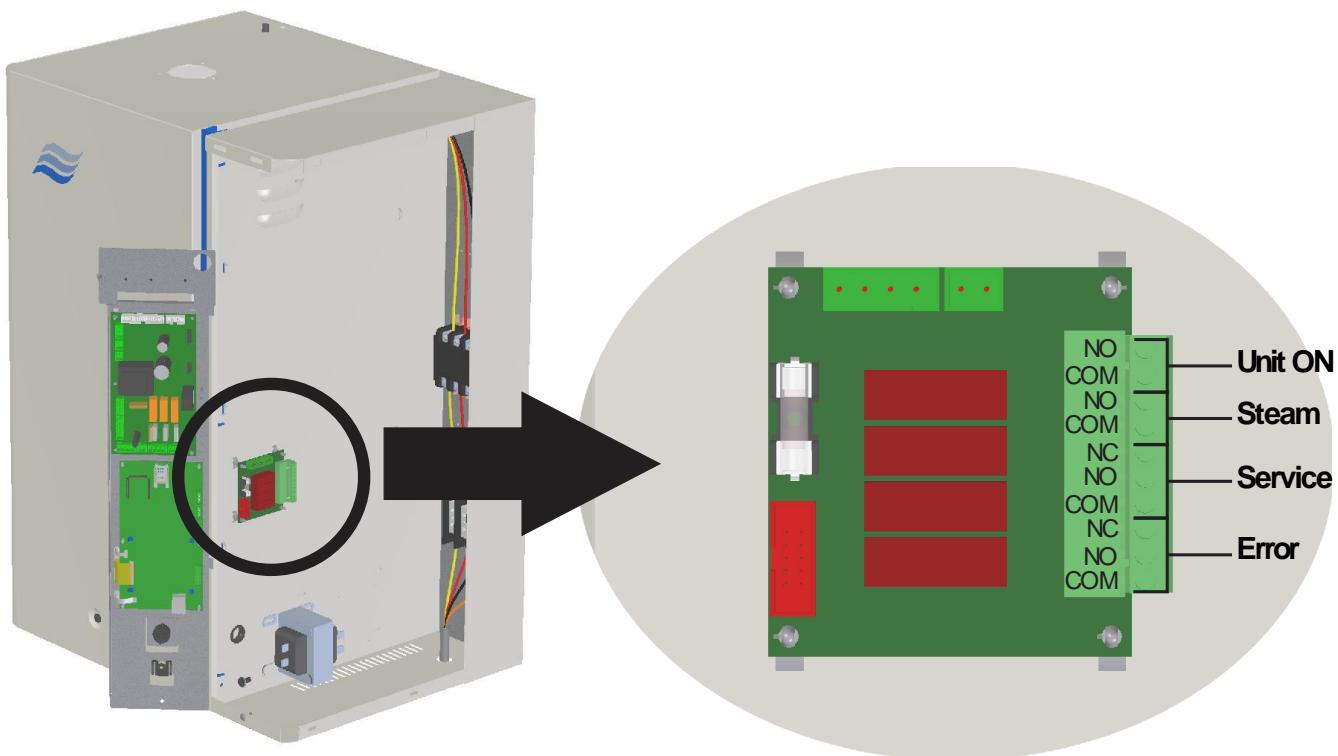


Figure 31: Remote Fault Wiring

Multi Mode Wiring

- Connect up to 16 units (equivalent of 1600 lb/hr) using 18-24 AWG multi-strand, twisted pair, shielded cable.
- Connect humidistats/transducers and security loop to master unit only.
- Jump the security loops on slave units.
- When connecting double units connect only to driver board A.
- See NH-EL Humidifier Configuration on page 54 and Multi on page 57 for software configuration.

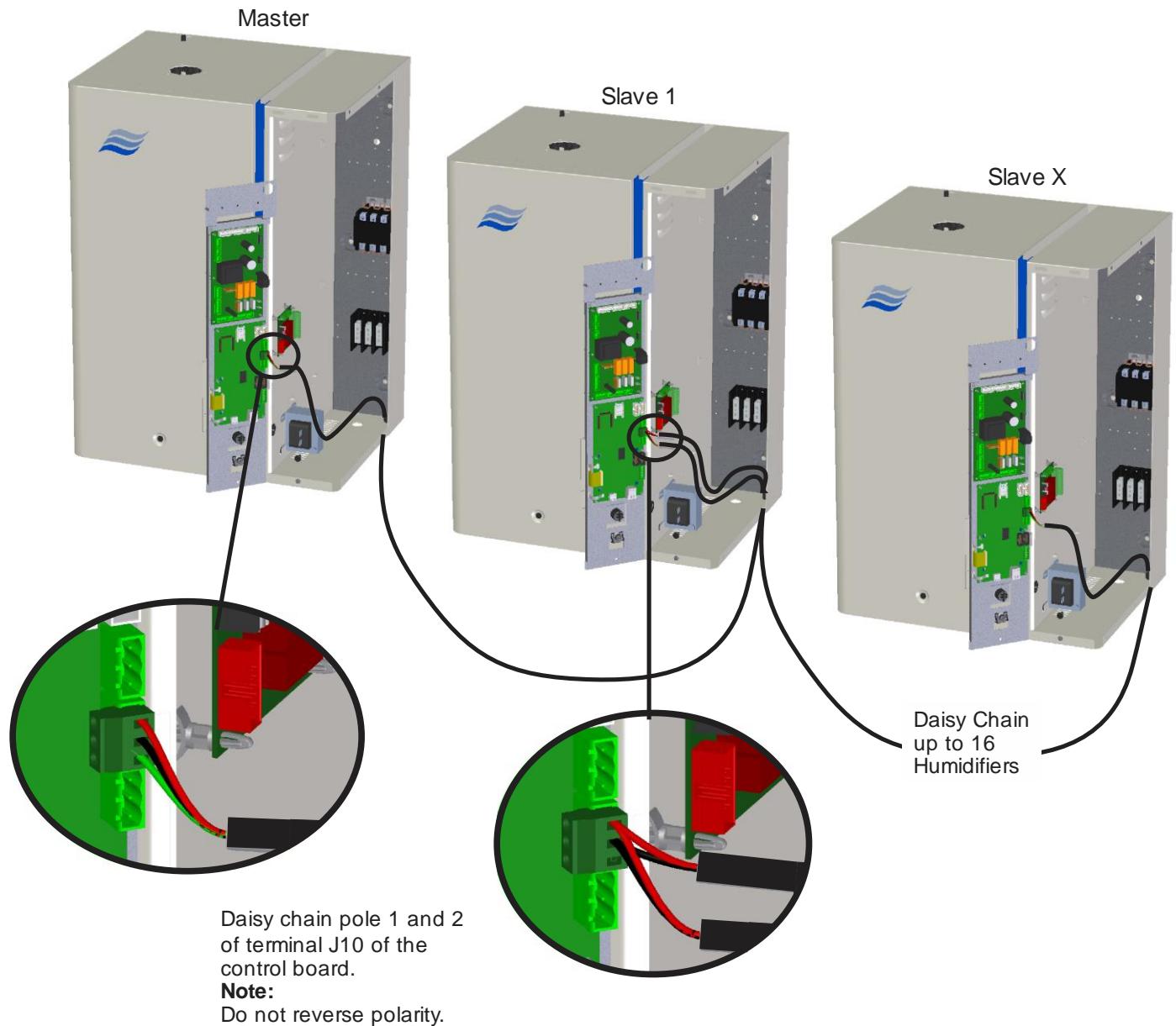


Figure 32: Multi Mode Wiring

Modbus Digital Control

The NH-EL humidifier comes standard with a Modbus communication interface. The Modbus interface can be configured to control the humidifiers output or can be used to monitor its operation. See Nortec document 2560599 – Using Modbus with Nortec Humidifiers for a listing of Modbus parameters that are available with the NH-EL.

Wiring

Table 8 provides information on Modbus wiring requirements. The NH-EL uses a three pole terminal, the Integrated Controller PCB, to provide Modbus communications. Connections can be made directly to this terminal.

Table 8: Modbus Wiring Requirements

BMS Protocol	Signal Type	Recommended Cable	Max. Recommended Distance from Nortec Module to BMS
Modbus	EIA-485, 2-wire	18-24 AWG Shielded, Twisted Pair, 120 Ω*	Should not exceed 2200 ft

* Connect humidifiers in daisy chain to the Modbus RTU. Ground shield at one end only (BMS or humidifier)

Modbus Communication Requirements

Table 9: Modbus Communication Parameters lists the requirements for Modbus communication with the NH-EL and the range of adjustable parameters. Adjustable parameters are set using the LCD touchscreen of the NH-EL in the Factory Menu Level which is not accessible to users. If the parameters must be changed from default, refer to the Nortec document 2560599 – Using Modbus with Nortec Humidifiers.

Table 9: Modbus Communication Parameters

Item	Default	Adjustment Range
Signal Type*	EIA-485	-
Transmission Mode*	RTU	-
Baud Rate	9600	9600, 19200, 38400, 115200
Data Bits*	8	-
Stop Bits*	1	-
Parity	Even	Odd, Even, None
Address	1	1-247
Timeout	300 s	0-300 s

* Parameters not adjustable

Options and Accessories

Note:

For installation of options and accessories follow the instructions that are provided with them.



Blower Packs

The NH-EL Space humidifier models come pre-assembled with a Blower Pack mounted on the top. Both smaller steam capacity NH-EL models (5-30 lbs/hr) and medium steam capacity NH-EL models (50-100 lbs/hr) can be ordered for direct In-Space steam distribution.



Figure 33: Small and Medium NH-EL Space Humidifiers (not to scale)

For mounting clearances of the NH-EL Space humidifier, please refer to Figure 5 on page 11. Installation of an NH-EL with a built on blower pack is otherwise identical to installation of an NH-EL without a blower pack. The steam line, condensate return and wiring connections to the blower pack have been done at the factory.

For in-space distribution with large steam size capacities humidifier (Dual cylinder NH-EL 150, 200), the RM-BP (remote mounted blower pack) can be added to the humidifier.

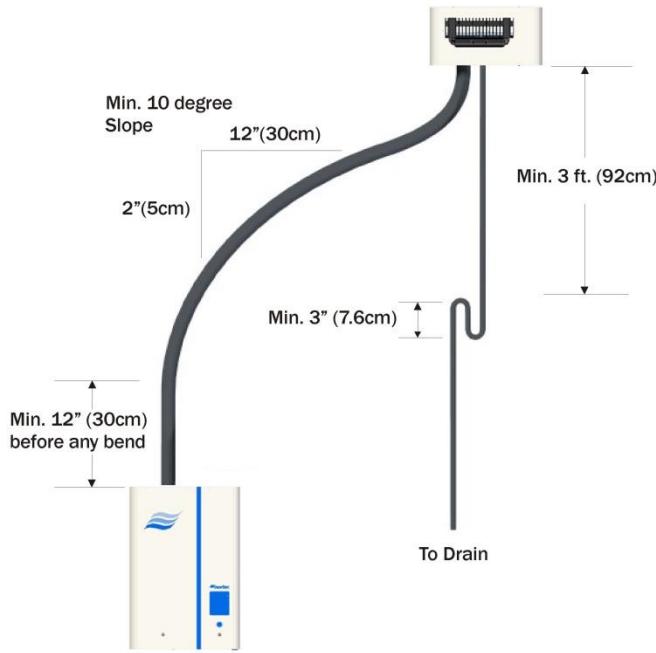


Figure 34: Remote Mounted Blower Pack

For installation instructions on the RM-BP, please refer to the Blower Pack installation and operation manual (document 2572641).

Fill Cup Extension

For installations where duct static pressure exceeds 6 inches a fill cup extension kit is required. This provides a bracket and hoses for mounting the fill cup above the humidifier. The fill cup extension kit may be required if water runs to drain while the humidifier is filling. See chapter on troubleshooting for more information on diagnosing fill problems.

Extreme Drain Water Cooling

For installations where drain water must be cooler than 120°F (49°C) a kit is available which consists of a double fill valve. The second fill valve adds additional water to the drain cup while the humidifier is draining to cool the water more than the single fill valve.

Note that initiating a drain using the black manual drain switch on the front of the unit will not induce drain water cooling as it is controlled using software. See **Drain Cool** on page 55 for details.

Condensate Cooling (External)

Pneumatic and electric drain water coolers are available from Nortec for installation outside the humidifier or on condensate drains from steam traps, distributors, and SAMe headers. If condensate cannot be routed back to the humidifier tank via the humidifier's fill cup then an external condensate cooler may be required to meet regulations restricting the temperature of hot water that can be fed to drain. The external drain water cooler is only available for field installation.

Foam Protection

NORTEC's NH-EL includes software detection of foaming which in most cases should be sufficient to address waters which can cause foaming. For more severe cases, an optional foam prevention kit is available. The kit consists of an external float chamber, steam outlet, hose and fittings required for installation. The kit can be factory or field installed.

Internal Fusing

An optional internal fusing kit is available for all models of NH-EL. The kit provides extra internal protection to the humidifier and must always be used in conjunction with an external fused disconnect. The Internal fusing option is only available as a factory installed option.

Remote Fault Indication

An optional remote fault kit is available that can provide remote indication of humidifier status. The kit can be factory or field installed. See **Remote Fault Option Wiring** on page 33 for more information about the remote fault indication kit.

Start Up

39 Installation Check

40 NH-EL User Interface

40 Auxiliary Drain Switch

40 Door Interlock Switch

41 Start Up Procedure

42 Information Screens

43 Nortec Digital Controls

43 Demand Control

43 On/Off Control

44 Transducer Control

44 Multi Unit Operation

45 Modbus Control

45 BACnet MS/TP and IP

45 Other Building Automation Systems

45 Nortec ONLINE

46 NH-EL Pre-Start Up Checklist

47 NH-EL Start Up Checklist

Installation Check

Before turning on power to the NH-EL, inspect the installation to ensure that it was carried out correctly. Refer to Figure 35: Installation Check, to the NH-EL Pre-Start Up Checklist on page 46, and to the chapter on Installation that starts on page 9.

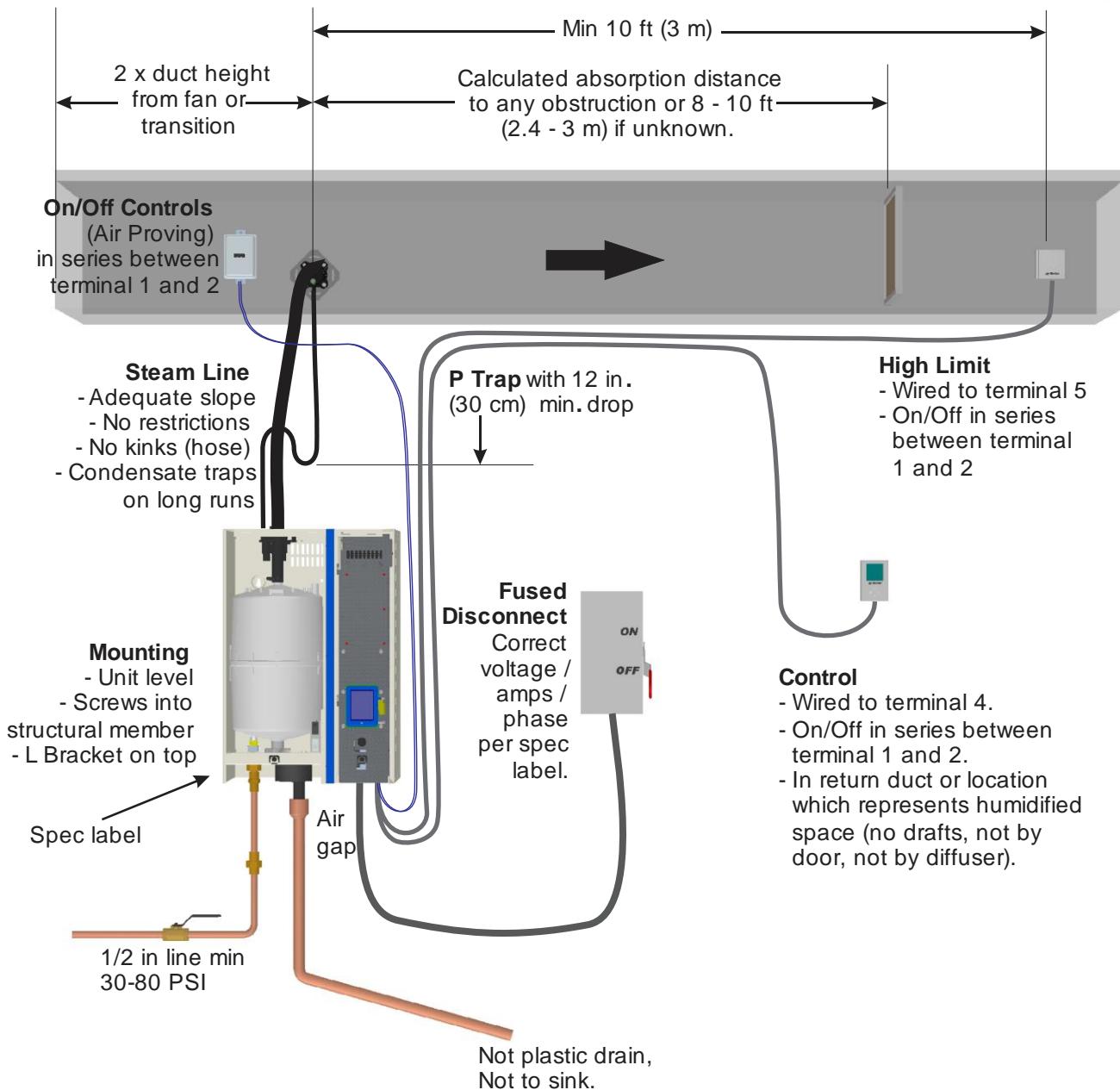


Figure 35: Installation Check

NH-EL User Interface

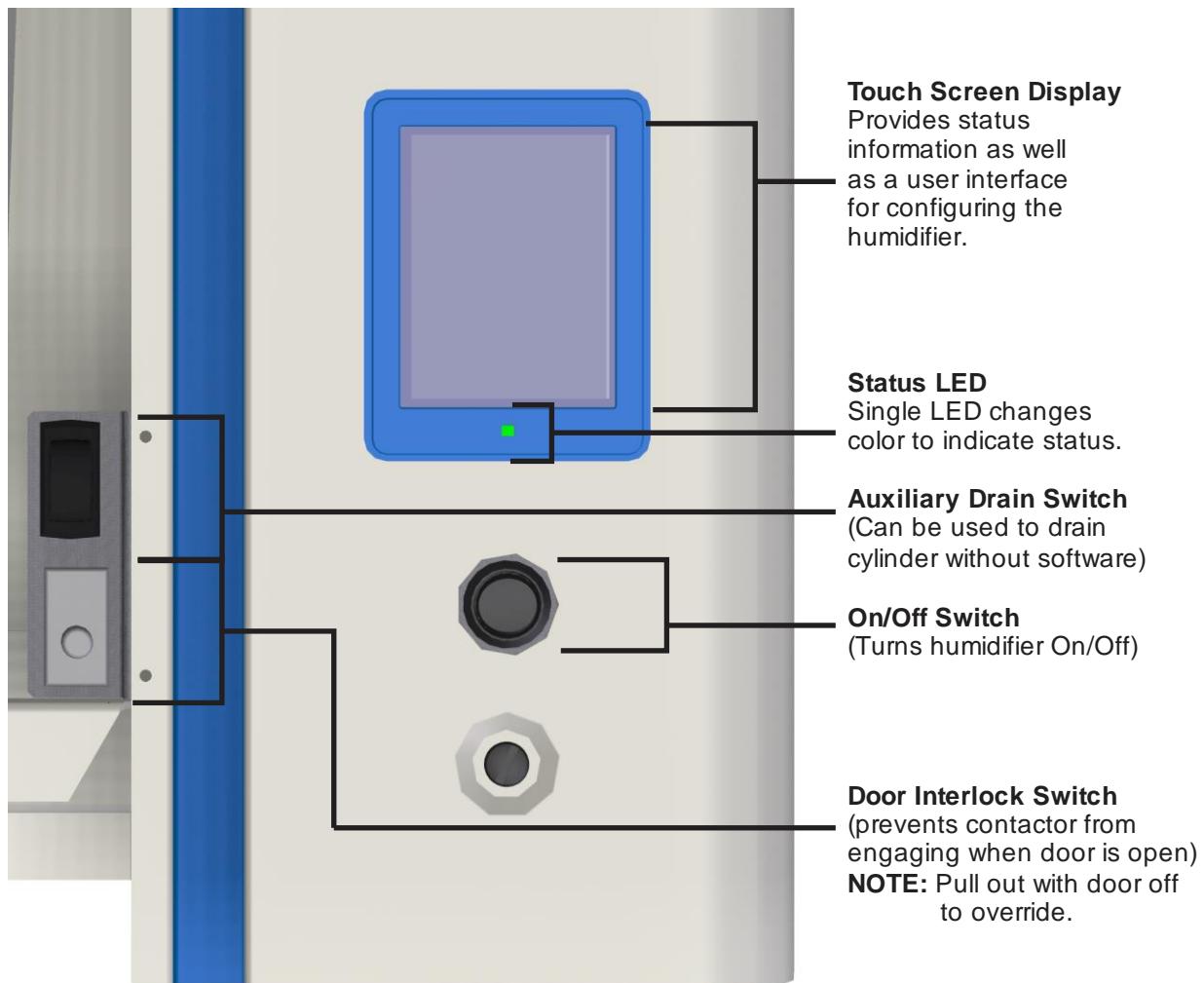


Figure 36: NH-EL User Interface

Auxiliary Drain Switch

In addition to software controlled draining of the cylinder, the NH-EL has a manual drain switch which can be used to drain the cylinder even if software is not functioning. To drain the cylinder put the switch into the drain position. For normal operation the switch should be in the off position. If the unit has multiple cylinders, the switch will have both "Cylinder A" and "Cylinder B" settings. This allows single-cylinder draining.

Door Interlock Switch

The door interlock switch cuts power to the contactor when the door is removed. It is an additional safety device intended to prevent the possibility of service technicians coming into contact with live electrical wiring while working on the humidifier. Pull the switch out with door off to override.

Caution: Power to the humidifier should always be turned off using the dedicated external disconnect before removing the door or side panel, or before doing any service work on the humidifier.



Start Up Procedure



Warning: Damaged units or improperly installed units must not be operated. Damaged or improperly installed units may present a danger to persons and property.

- 1 Examine the humidifier and installation for damage and/or improper installation.
- 2 Ensure that the doors are in place and secured with retaining screws.
- 3 Open the supply water shut off valve.
- 4 Turn on the mains power using the installed disconnect.
- 5 Press the On/Off switch on the front of the humidifier to turn the humidifier on.



The display will show a splash screen then a few seconds later the main status screen will be displayed indicating the humidifier is in normal operation mode. If no faults or warning conditions are detected the LED will be either solid, or flashing green.

If a warning or fault condition is detected it will be displayed on the status screen and the status LED will be yellow for a warning or red for a fault. See troubleshooting section for information on diagnosing and correcting faults.

Note: The information displayed depends on the configuration of the NH-EL and the actual operating conditions. It may vary from the display shown.

- 6 If On/Off or a control humidistats have been installed, check and adjust the control setpoint on the control and high limit humidistat (see Nortec Digital Controls on page 43). If transducer controls have been installed then adjust the humidity setpoint using the touch screen display (see NH-EL Humidifier Configuration on page 54)
- 7 When either the external humidistat or internal controller generate a demand for humidity higher than 27% and the security loop is closed the LED will turn solid green, the main contactor will engage, the fill valve will activate (after a delay) and the cylinder will slowly fill with water.

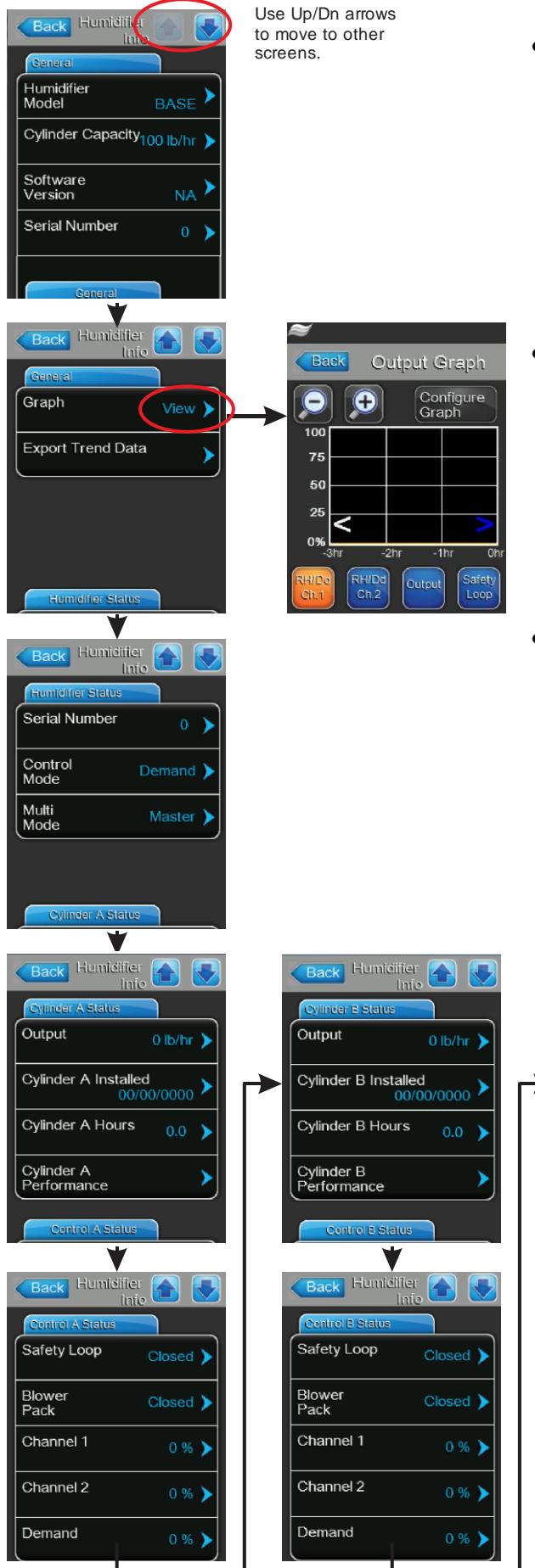
Note: While the cylinder is filling with water there should be no water flowing down the drain. If water is flowing down the drain it can indicate excessive backpressure or a leaking drain valve. See General Troubleshooting on page 72.

- 8 It can take 15 – 20 minutes or longer for a large humidifier to fill, for the water to be heated up by the submerged electrodes, and for steam to be produced.



Note: If operated on low conductivity water it may take several hours for the NH-EL to reach full output capacity. This is normal. During this time the status will cycle between "Filling" and "Warning – Max Level". The humidifier will not perform any drains and will concentrate the cylinder water until required capacity is reached, at which point it will indicate "Humidifying".

Information Screens



- In addition to the main status screen, the NH-EL includes several information screens which provide additional information about the humidifier. The additional screens can be reached by pressing the “(i) About” button at the bottom of the status screen display. To page down and up through the screens, use the up / down arrows located at the top of the screen.
- The Information screens also provide access to an output graph that displays a trend graph, indicating the performance of the humidifier. To view the graph press “View”. The - / + buttons on the screen change the time scale at the bottom of the graph. Buttons at the bottom of the screen activate/deactivate display of indicated data.
- The Humidifier Status screen shows the control mode configuration. Control Mode must be set to match humidistats/ transducers connected to the humidifier.

Figure 37: Information Screens

Caution:

- Improper control configuration can result in over humidifying which can result in damage to property.
- See Advanced Control Configuration if the controls displayed in the humidifier Status screen do not match those connected to the humidifier.



Nortec Digital Controls

Nortec provides optional On/Off, Modulating Control, or Transducer digital controls. Figure 38 and Figure 39 show the function and meaning of the Digital Control's display and buttons. All controls are available either wall mounted or with a remote sensor for duct mounting.

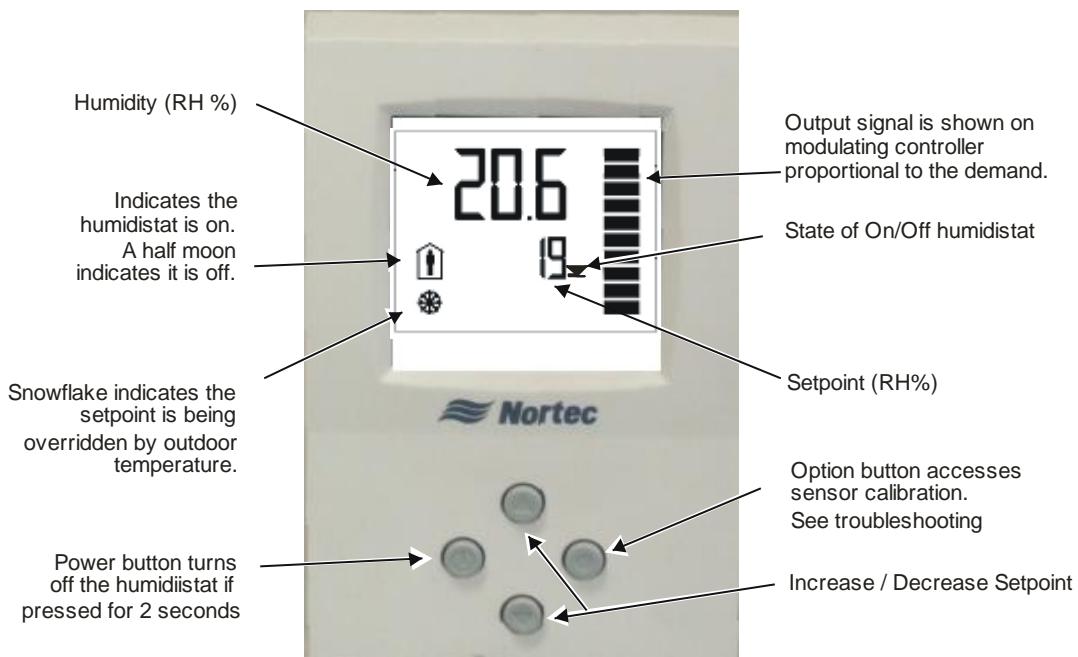


Figure 38: Modulating and On/Off Digital Control Operation

Demand Control

The modulating controls use a PI control algorithm to transmit a 0-10V control signal to the humidifier. Adjust the setpoint to the desired setting by using the up/down arrow buttons on the controller.

On/Off Control

The On/Off controls use a PI control algorithm to open and close a relay that opens and closes the humidifier's security loop. Adjust the setpoint to the desired setting by using the up/down arrow buttons on the controller.

Transducer Control

The transducer controls transmit a 2-10V control signal proportional to the sensed relative humidity to the humidifier. Humidity setpoint is not set at the transducer. The setpoint is set on the NH-EL's display.



Note: It is possible to field calibrate NORTEC Digital controls if the displayed humidity is found to be different than a known trusted source. See Digital Humidistat on page 74 of chapter on Troubleshooting.

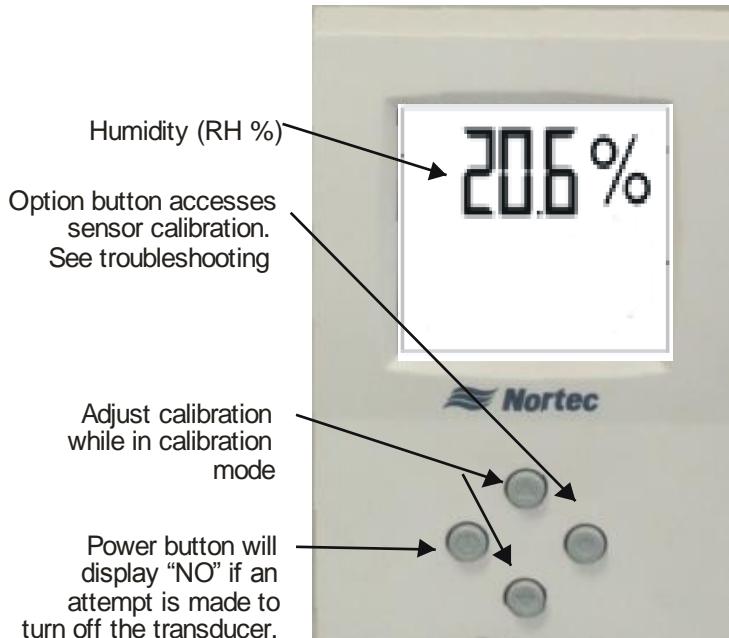


Figure 39: Transducer Control Operation

Multi Unit Operation

Start up of each humidifier configured and installed for multi mode operation is the same as starting up standalone humidifiers with the exception that for the humidifier to fill and produce steam the demand to the master unit must be greater than the **Zero Out** setting of the unit being started. (Example for a slave unit configured to operate between 20 and 30% the demand to the master must be greater than 22.7%).

Each unit connected in a multi mode system will display its demand as a percentage of the range for which it is configured. Example, a slave unit configured to operate between 20 and 30% demand will display a demand of 50% when demand to the master is 25%.



Note: See Multi on page 57 for software configuration, and Multi Mode Wiring on page 34 for wiring of humidifiers in a multi mode system.

Modbus Control

If the humidifier is to be controlled using the standard Modbus interface then the **Source** parameter in the Control Setting Menu must be set to Modbus (see page 56). When Source = Modbus the humidifier will operate on the basis of digital inputs from the Modbus network and ignore any analog inputs. See **Modbus Digital Control** on page 35 for other requirements for Modbus control and/or monitoring.

BACnet MS/TP and IP

If the humidifier is to be controlled using the standard BACnet IP interface, then the **Source** parameter in the Control Setting Menu must be set to BACnet (See page 60). See supplemental Building Management manual for more information.

Other Building Automation Systems

Additional protocols such as LonWorks and Johnson N2 can be used with the NH-EL by purchasing the respective Building Automation System option. See supplemental Building Management manual for more information.

Nortec ONLINE

Nortec OnLine enables a humidifier to communicate and be monitored through the Internet. Nortec OnLine is built into the NH-EL. See **Nortec Online** on page 60 for configuring the NH-EL to operate on Nortec Online. See supplemental Building Management manual for more information.

NH-EL Pre-Start Up Checklist

Unit Serial #: _____ Tag: _____
Unit type: _____ Voltage: _____ V / _____ ph Steam output: _____ lb/hr
Cylinder type: _____ Customer/Job: _____ Address: _____

Water Quality:

- Well water City water Softened water

Humidifier Mounting: (Clearances around the unit)

- Level Front/Side Clearance

Steam Line(s):

- Slope up (min 2 in/ft). Slope down (min 0.500 in/ft)
- Diameter / Size _____ Material _____
- Low point condensate traps No Hose Kinks / Restrictions
- Type of Insulation _____

Condensate Line(s):

- P Trap min 6 in or duct press + 2 in P Trap min 12 in drop

Water Line:

- Conductivity 150-750 microsiemens Water pressure: 30-80 psig

Drain Line:

- Air gap within 3 ft of the unit Diameter / Size _____

Cylinder:

- Seated in drain valve and secured yes no

Wiring:

- Wiring connections and connectors secured yes no

Controls:

- Control Location _____ Control to Terminal 4
• High Limit Location _____ High Limit to terminal 5

Power:

- Voltage, amp, fuse per Spec Label: yes no
- Disconnect switch located close to humidifier yes no
- Panel Number _____

Inspected by: _____ Date of inspection: _____ / _____ / _____

Company: _____

NH-EL Start Up Checklist

Unit Serial #: _____

Tag: _____

Unit type: _____

Voltage: ____ V/____ ph Steam output: ____ lb/hr

Cylinder Type: _____

Customer/Job: _____ Address: _____

Preliminary:

- Pre-start-up checklist completed? yes no
If no, perform Pre-Start-up Checklist before starting humidifier.

Start-Up Procedure:

The prerequisites for the humidifier filling and contactor pulling in to make steam are as follows:

- Plumbing door in Place and secured with screw yes no
- Water supply valve opened yes no
- Mains disconnect switched on yes no
- Turn on the On/Off switch yes no
- On/Off Security loop (Terminal 1 and 2) closed yes no

Controls:

- Installed Controls Match Configuration yes no
- Control Setpoint: _____
High Limit Setpoint: _____
- Demand (Modulating Humidistat)
or
• Sensed RH < Setpoint (Transducer) yes no

The Humidifier will undergo a self-test when the power is turned on activating the LED's and other internal components.

If the above listed prerequisites are fulfilled the humidifier will start filling the cylinder and begin normal operation.

Note: Most water does not contain enough conductivity for full boil on initial start-up. Units will need to concentrate the water over a time period (hours to days). It is normal for the humidifier status to cycle between "Filling" and "Warning – Max Level" indicating water level is at the top of the cylinder during this time period.

Remarks:

Started by: _____ Date of Start Up: _____ / _____ / _____

Company: _____

Operation

49 LED Status Lights

51 How the Humidifier Works

51 Steam Generation

51 Drains

51 Steam Distribution

52 Selecting an RH Setpoint

54 NH-EL Humidifier Configuration

54 Navigating the NH-EL Software

54 Main Menu (NH-EL Password)

55 Configuration Submenu

55 Features Submenu

56 Controls Submenu

57 Multi Mode

58 General Submenu

59 Comms. Submenu

61 Service Submenu

61 Admin Submenu

Note : For Description of Components in Introduction:

3 Humidifier Components

4 Description of Components

LED Status Lights

The keypad and display panel includes a single tri-color LED which provides information about the humidifier status.

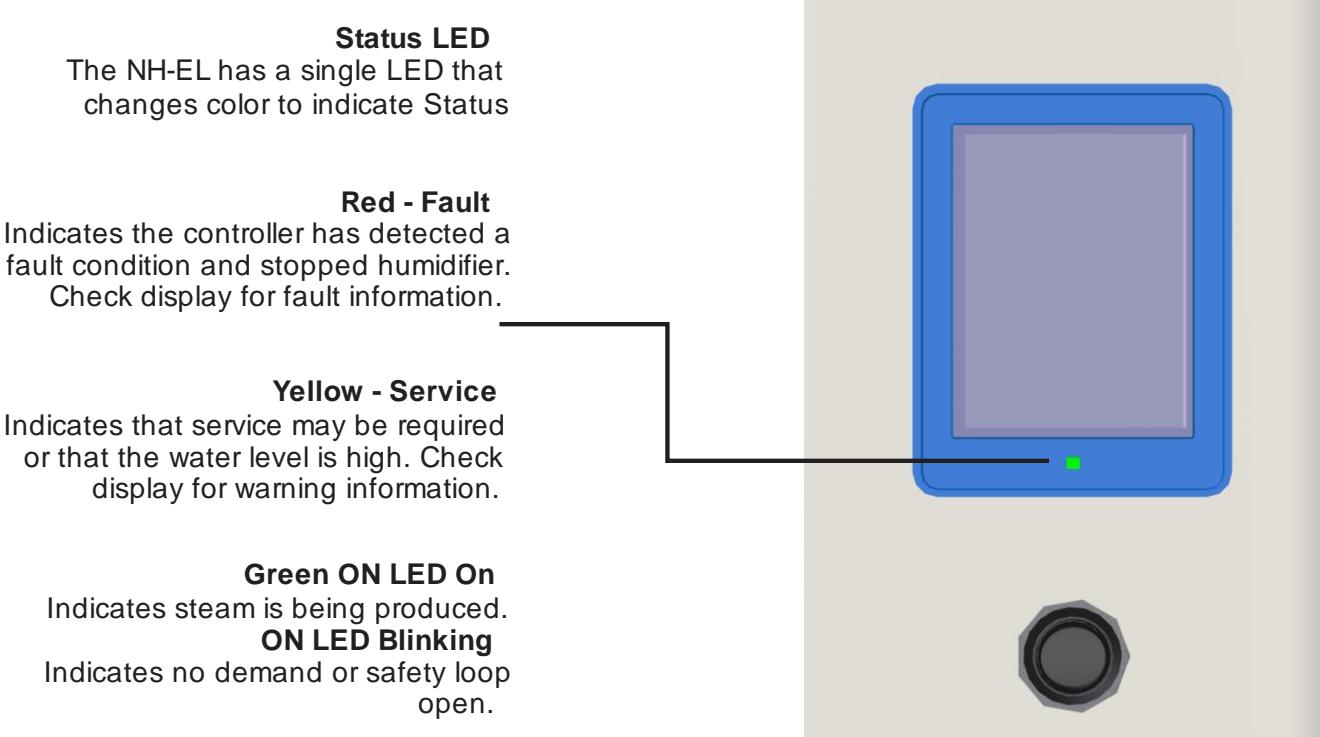


Figure 40: LED Status Lights

Common Warnings

The following two warnings are common during normal operation and do not normally indicate that service is required. For a new cylinder the Level Sensor On warning indicates that full capacity cannot be reached because cylinder water is not concentrated. For an old cylinder the Level Sensor On warning may be an indication that the cylinder will soon have to be replaced.



Warning – Max Level

The above warning is normal during the start and end of a cylinder life. It indicates that the high water sensor has interrupted filling of the cylinder. It is displayed for information only and unless it persists for an extended period of time it does not require any action.



Security Loop

The above warning is normal during operation. It indicates that one of the security loop devices connected between control terminal 1 and 2 is open. It is displayed for information only and does not require any action.

Humidifier Schematic

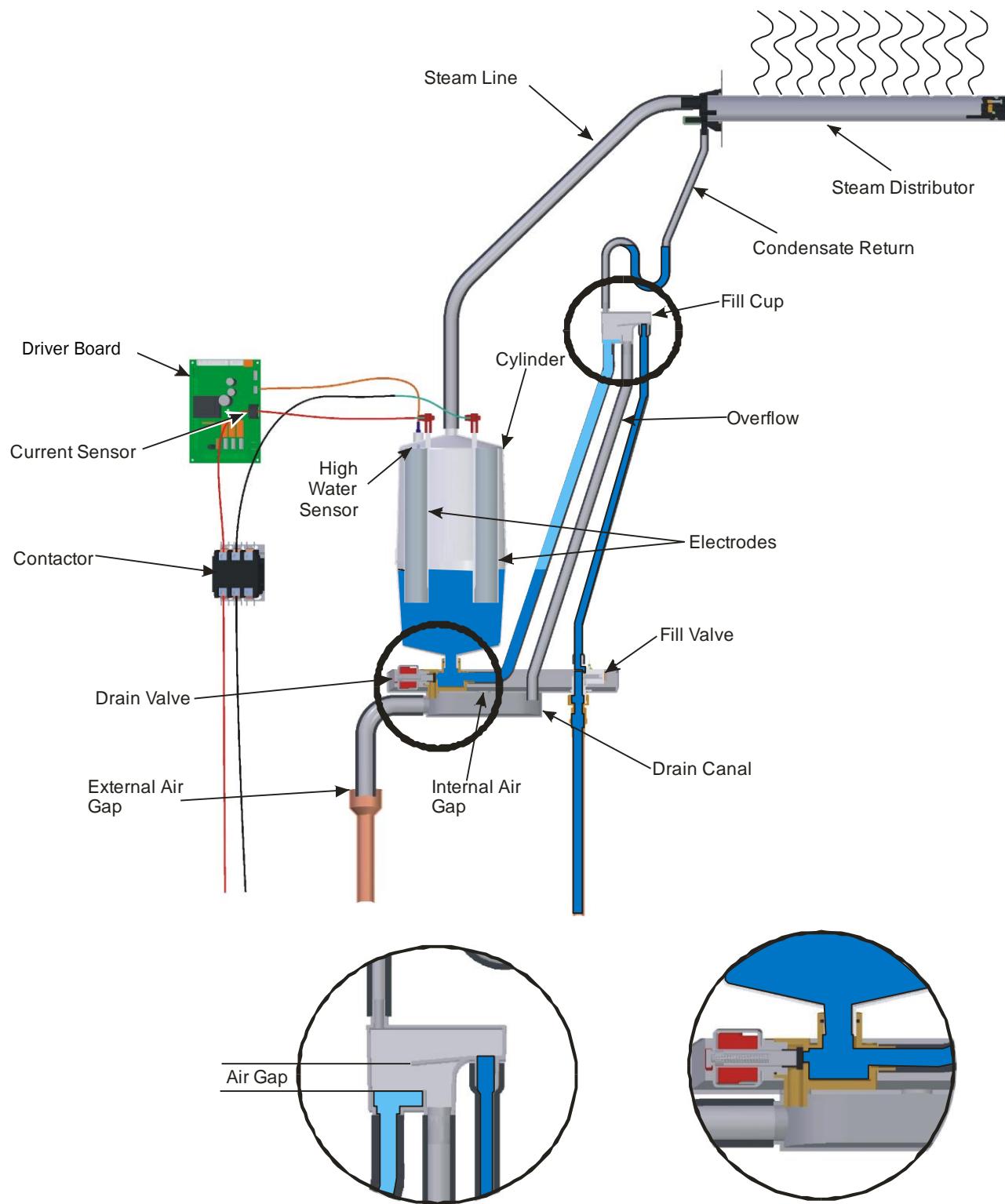


Figure 41: Humidifier Schematic

How the Humidifier Works

The NH-EL is an atmospheric steam generator that uses heat generated by electrical current flowing between submerged electrodes to generate heat and steam. The NH-EL is designed for air humidification via steam distributor, blower pack, or steam manifold (SAM-e).

Steam Generation

- Once the unit receives a demand signal, the door interlock switch is closed, and the security loop between terminal 1 and 2 is closed, the humidifier closes the contactor and measures the current.
- If the demand is lower than the actual output, the inlet valve is kept closed and output is reduced by letting the water level in the cylinder decrease by evaporation.
- If demand is higher than the actual output, after a brief delay, the fill valve is activated and water flows into the fill cup. Water from the fill cup flows into the bottom of the cylinder through a hose connected to the drain valve housing.



Note: The cylinder is gravity fed from the fill cup. If backpressure from the steam line is too high it will cause water to back up in the fill cup and flow down the overflow line to the drain.

- As soon as the water in the cylinder comes in contact with the energized electrodes current flows through the water. The resistance of the water to the electrical current heats the water and turns it to steam. The more the electrodes are covered by water the higher the current and output. The unit continues to fill until the current matches demand or the high water sensor detects a high water level.
- The NH-EL repeats the fill and boil down cycle repeatedly to match output to demand.
- Over time minerals in the water will adhere to the cylinder electrodes. The humidifier will automatically fill to a higher water level to maintain full capacity during the life of the cylinder. Eventually, because of scale formation, it will no longer be possible for the humidifier to reach its full capacity. The NH-EL software monitors this condition and will display a warning when the cylinder needs to be replaced.

Drains

- As steam is produced, minerals are left behind, increasing the conductivity of the water. The NH-EL's patented auto adaptive cycle will monitor the water conductivity and perform drains to maintain the water at optimal conductivity for peak performance.
- The auto adaptive cycle provides the longest cylinder life in combination with keeping the tightest control and most efficient use of water during the entire cylinder life.

Steam Distribution

Steam generated by the humidifier may be introduced into the air in several different ways. The most common method for adding the steam into the air is to mount a steam distributor tube in a supply air duct as shown in Figure 41: Humidifier Schematic. For larger ducts, or larger loads, it is also common to use a steam manifold with a single steam line connection and multiple tubes for distributing the steam (see Figure 42: SAM-e Manifold). For introducing steam directly into a room, humidifier mounted or remote mounted blower packs are used (see Figure 43: Remote Blower Pack).

Condensate Return

The condensate must be collected and removed from the distribution system so that it does not build up and leak into the duct (or room if blower pack is used). Condensate can be returned to the NH-EL fill cup to reduce water waste, or can be fed to drain.

Selecting an RH Setpoint

The optimum humidity setpoint depends on the reasons that a space is being humidified. The “ASHRAE Handbook – HVAC Applications” recommends specific design relative humidities for specific applications. Also see NORTEC publication “When You Need Humidity” (Form 124A) for more information on humidity settings.

Health and Comfort - The benefit of humidity is most pronounced for health and comfort in the 40-60% range. A humidity setting of 40-50 % is recommended for this purpose to prevent over humidifying.

Note: The job site design may have specified a setpoint chosen specifically for the site. Refer to site documentation and where possible use setpoints specifically determined for the site.



Temperature Setback - In cold climates it is often necessary to reduce the humidity level in a space to prevent build up of condensation on the inside of exterior walls, windows, and trim. It is highly recommended that the temperature setback function of the NORTEC digital controls be used under these conditions to prevent damage from condensation. The digital control with an outdoor temperature sensor installed will automatically setback the humidity setpoint to correspond with outdoor temperature.

Duct High Limit – The duct high limit is intended to prevent saturation and wetting in duct work at high load conditions. NORTEC recommends a setting of 85% for the duct high limit. It may be necessary to reduce this setting if the duct work is very cold or in contact with exterior cold surfaces.

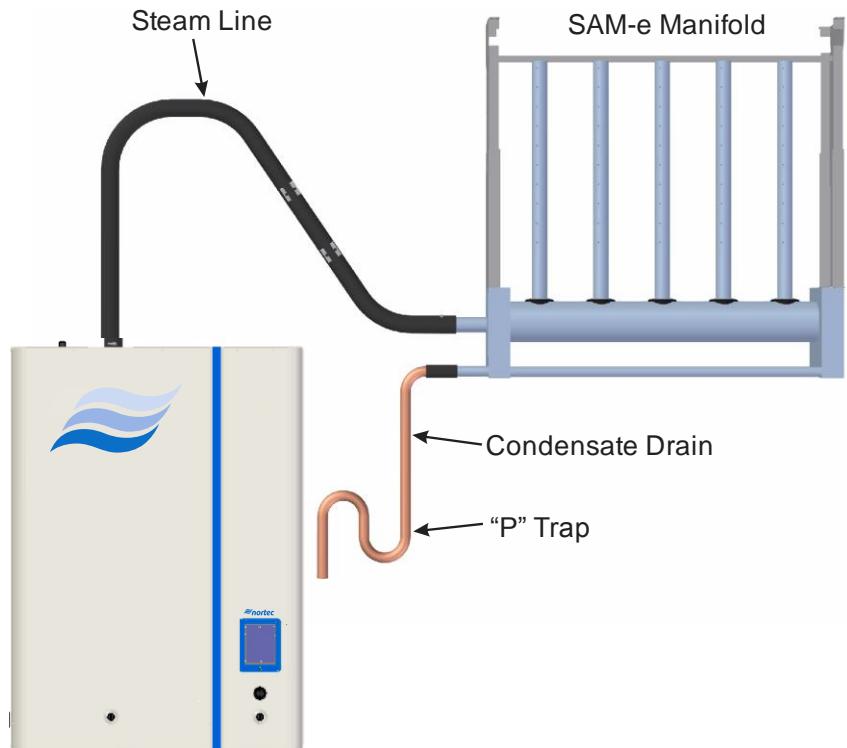


Figure 42: SAM-e Manifold

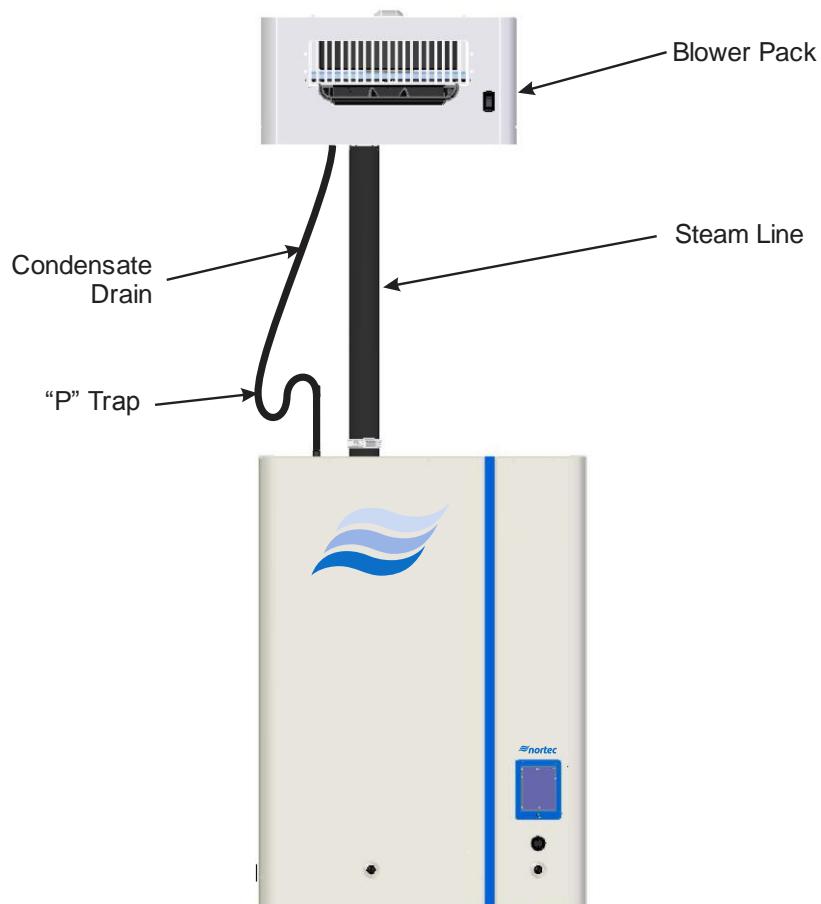


Figure 43: Remote Blower Pack

NH-EL Humidifier Configuration

Navigating the NH-EL Software

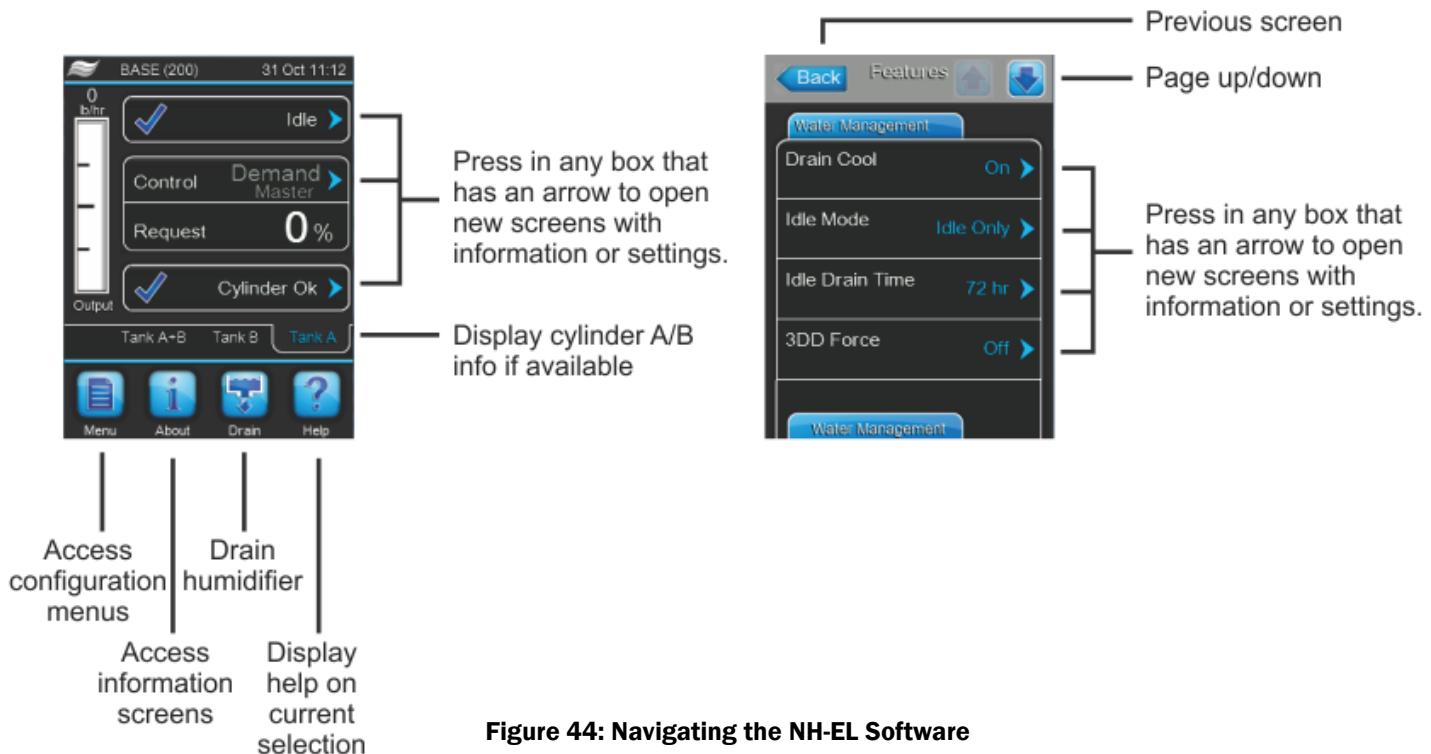
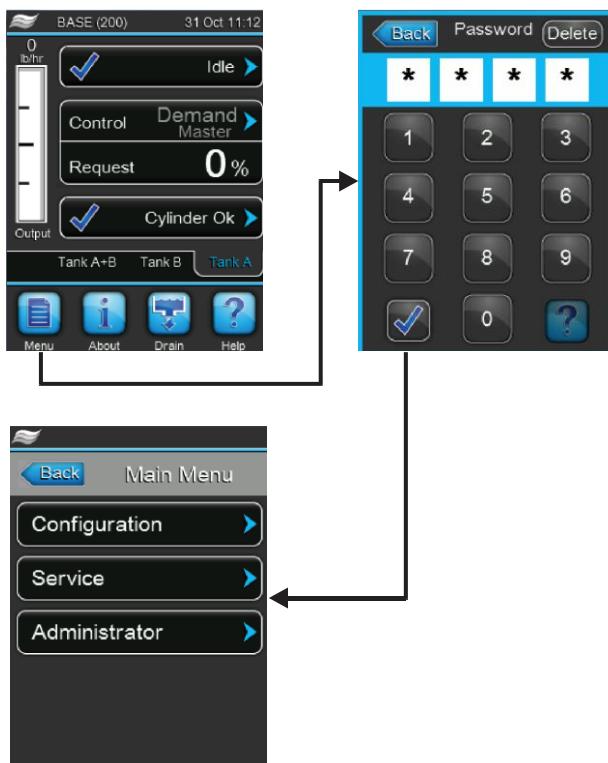


Figure 44: Navigating the NH-EL Software

Main Menu (NH-EL Password)

The menu levels of the NH-EL are password protected to prevent configuration changes by unauthorized persons. In order to access the menu level press the Menu icon and when prompted enter the password 0335.



Enter Password

Press the Menu button from the main status screen. Enter the user level code **0335**. Press the check mark to accept the entered password.

Main Menu

From here you can access the Configuration, Service, Setpoint, and Administrator submenus. Select any sub-menu by touching it on the screen.

Note: Do not make changes unless you are familiar with the software.

Configuration Submenu

The configuration submenu provides access to most user configurable settings. It is further broken down into Features, Control Settings, General, and Comms. submenus. Select any submenu by touching it on the screen.

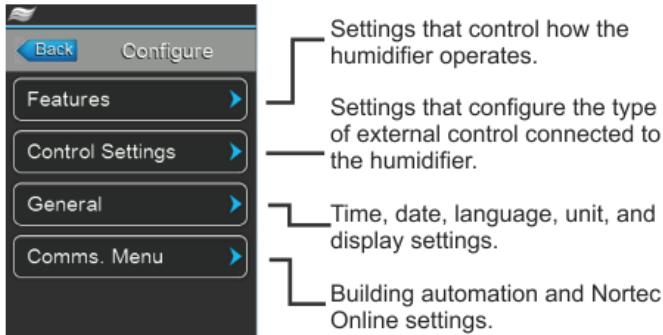


Figure 45: Configuration Submenu

Features Submenu



Drain Cool

When On the fill valve is activated at any time that the drain valve is activated to cool the drain water. (Default = On).

Idle Mode

Configures operation when no demand is present. **Idle Only** = no action.

Idle Drain = drain cylinder after Idle Drain Time. **Keep Warm** = keep cylinder warm by periodically engaging contactor. (Default = Idle Drain).

Idle Drain Time

When Idle Mode = Idle Drain configures time the humidifier waits with no demand before the cylinder is drained. (Default = 72 hours).

3DD Force

When On the humidifier will drain the contents of the cylinder every 3 days regardless of demand or idle condition. It can improve performance for water conditions with sediment or other contaminants. (Default = Off).

Dfactor

Increases or decreases the drain time used to control cylinder water conductivity. It should not normally need to be adjusted. A NORTEC representative will provide instructions if it should need to be adjusted. (Default = 1.0).

Drain Mode

Configures when a corrective drain will be performed in case the software detects excess current. **Fixed ED** = drain at 115% of full capacity. **Float ED** = drain at 115% of current demand. (Default = Fixed ED).

Foam Mode

These settings can be used to detect foaming in the cylinder and take corrective action. **Basic** is a software only setting. **Advanced** requires installation of a hardware kit. (Default = Off, Default with Kit = Advanced).

Cal. Drain Mode

Sets how the humidifier drains to control cylinder water conductivity. **Basic** = normal drain, **Prefill** = fill then drain, **Multi** = fill then drain to trigger point until drain duration elapsed. (Default = Basic).

(Features Submenu Continued)



Double Mode (NH-EL 150-200 only)

Parallel = cylinders operate in parallel from one set of control signals.

Sequenced = cylinders operate in series from one set of control signals.

Independent = two sets of controls signals and each cylinder follows one of the sets.

Manual Cap

Reduces the maximum capacity of the humidifier to a percentage of its full capacity. Use up/down buttons to increase/decrease and press checkmark to save the setting.

Ground FI

When "On" the contactor will be disengaged whenever the drain valve is activated to prevent current leakage to the drain. (Default = Off).

Fill Stop

When activated during a fill cycle the fill valve will be turned off when current equals 95% of demand to prevent overshooting the demand. (Default = Off).

Ovcurr

Adjust only if instructed by NORTEC Representative. (Default = 0.00)

Low Conductivity

Prevents false "Spent Cylinder" codes. Set to On if water conductivity is below 250 microsiemens. (Default = Off)

Short Cycle

When "On" reduces the capacity if short cycling is detected. This will reduce the possibility of short cycling. (Default = Off).

CAUTION: Improper control configuration can result in over humidifying which can result in damage to property.



Controls Submenu

Control Settings allow you to set the type of external controls the humidifier is connected to. In most cases, the NH-EL humidifier is factory configured to operate with the external controls that were specified for the site.



Source

Configures the humidifier to either accept analog control signals from a humidistat or digital signals from a Building Management System.

Control Mode

Configures the type of control used with the humidifier. **RH (P)** is proportional only internal control based on a transducer signal. **RH (PI)** is proportional control with an integral.

Control Channels

Configures the humidifier to either operate with a single channel (control only) or dual channel (control and high limit).

Channel 1/2 Type

Configures the Volt or amp range of the control signal connected to Channel 1/2. Can be used to configure the humidifier to be On/Off. However, Nortec recommends using the Security Loop for On/Off applications.

(Controls Submenu Continued)



Note: Set P, Prop Band, and Int Time will only be displayed in the menu if Control Mode is set to RH (P) or RH (PI).



Setpoint Channel 1/2

Sets the humidity setpoint value. The humidifier will attempt to maintain this humidity level in the space where the control transducer is installed. The controller evaluates demand for both channels (if activated) and uses whichever is lower.

Band Channel 1/2

Band should not have to be changed under normal conditions. The Band setting adjusts the proportional band within which the humidifier will modulate between 0 and 100% output. At set point +Prop Band the output will be 0. At set point – Prop Band the output will be 100%. (Default 15%).

I Time Channel 1

I Time should not have to be changed under normal conditions. In order to correct for error inherent in proportional control, the controller will increase /decrease output by Setpoint-Actual humidity. The I Time adjusts the frequency at which the correction is performed. (Default 5 min).

Damp Channel 2

Damp Channel 2 should not have to be changed under normal conditions. In order to prevent rapid cycling between Channel 1 and 2, Damp provides a delay time before Channel 2 is used as the demand source. (Default 5s).

Multi Mode

To Operate in Multi Mode the following is required.

- One humidifier must be designated the master and all others as slave units.
- The master unit must be the unit to which external controls, including security loop, are connected.
- Each humidifier in the system, including the master, must have the range of demand signal in which it will operate configured. Based on the setting of the Full Out and Zero Out the humidifiers can be configured to operate in parallel or in series.

Parallel Operation – When Full Out = 100% and Zero Out = 0% for the master and every slave humidifier connected, all humidifier's will output the same amount to meet the zone humidification demand. The advantage is even wear on all units.

Series Operation – When Full Out and Zero Out are set to different ranges for each humidifier they will each only operate when the demand is equal to, or greater than, the Zero Out setting. The advantage is the turndown ratio of a single unit. The Full Out - Zero Out range of each unit is based on its capacity divided by the sum of all the connected units capacity. To provide even output, the Zero Out of each unit in series should be equal to the Full Out of the proceeding unit.

Example: 2 x 200 lb/hr units and 1 x 50 lb/hr unit are to operate in series.

- Master Unit (50 lb/hr) - Zero Out = 0, Full Out = $50 / (50+200+200) = 11\%$

- Slave 1 (200 lb/hr) - Zero Out = 11%, Full Out = $11 + (200 / (50 + 200 + 200)) = 55\%$
- Slave 2 (200 lb/hr) - Zero Out = 55%, Full Out = $55 + (200 / (50 + 200 + 200)) = 99\%$

Note: To obtain the best turn down ratio possible the smallest unit should be configured to come on first.

When more than one humidifier is required to satisfy the demand of a single zone the units are all operated from a single control signal. By using the Multi Mode function of the NH-EL the control signal only needs to be connected to one master humidifier. All other humidifiers serving the zone must then be connected using the linkup terminal (J10) on the NH-EL control board (See Multi Mode Wiring on page 34). Additionally, all slave units must have a jumper on the security loop.



Multi Mode

Use **Multi Mode** to configure the humidifier to operate as one humidifier of a group controlled by a single control signal / transducer signal. (Default = Standalone)

Full Out

System demand at which the humidifier should output its full capacity (Default = 100%).

Zero Out

System demand at which the humidifier should shut off (Default = 0%)

NOTE: The Full Out and Zero Out selections are only displayed if **Multi Mode** is set to either **Master** or **Slave**. It is not displayed in **Standalone** mode units



General Submenu

The **General** menu allows you to set the date, time, language, units and general display settings.



Date

Sets the date. Enter MM/DD/YYYY. Use arrows to move to digit you wish to change or press “Delete” to clear entry completely. Press checkmark to save changes.

Time

Sets the time of day. Use arrows to move to digit you wish to change. Press “a”(2) for am, “p”(7) for pm. Press checkmark to save changes.

Language

Select the desired language and press the checkmark to save changes.

Unit

Select the desired units and press the checkmark to save changes.

Contrast

Increase/Decrease screen contrast. Press checkmark to save changes. (Default = 8)

Brightness

Increase/Decrease screen brightness. Press the checkmark to save changes. (Default = 52)

Date / Clock Format

Select the desired format and press the checkmark to save changes.

Comms. Submenu

The Comms. Submenu allows the user to configure the humidifier for operation on a TCP/IP network, Modbus network, or BACnet IP network.



Allow Remote Disable

Sets whether the humidifier can be disabled remotely by a Building Management System. Select Yes or No and press checkmark to save settings. (Default = No).

IP Type

DHCP = Automatically acquire network address settings, Fixed = manually configure network address and settings. (Default = DHCP).

IP Address

The IP address of the humidifier. Should only be configured if IP Type = Fixed.

Subnet Mask/Default Gateway/Primary DNS/ Secondary DNS

Network configuration parameters for the humidifier. Should only be configured if IP Type = Fixed.

MAC Address / Host Name

The MAC address and Host Name of the humidifier. For information purposes only and cannot be changed by the user.



Modbus

On = The humidifier will connect to a Modbus network. Additional Modbus parameters are only displayed if Modbus = On. (Default = Off).

Modbus Address

The Modbus address that has been assigned to the humidifier on the network. (Default = 10).

Parity

Sets the parity that the humidifier will use for communicating on the Modbus network. Select the desired parity and press checkmark to save. Reboot to implement save. (Default = Even).

Baud Rate

Odd/Even Sets the baud rate the humidifier will use for communicating on the Modbus network. Select the desired baud rate and press checkmark to save. Reboot to implement save. (Default = 9600).

BMS Timeout

Sets a maximum time the humidifier will wait with no communication from the Modbus network before a Modbus timeout warning is generated. Exceeding the timeout also stops humidifier operation if the humidifier Source is set to Modbus in the Controls Menu. (Default = 300s).



BACnet

MSTP = Use a BACnet MSTP connection. IP = Use a BACnet IP connection.
Off = No BACnet connection. (Default = Off).

Device Name/Description/Location

Used to set a name, description, and location of the humidifier. To enter letters repeatedly press numeric key until desired letter is displayed (eg press “2” twice to enter “a”. Press checkmark to save setting.

Node ID

Sets the node ID the humidifier will use on the BACnet network. Select the desired value using up/down arrows and press checkmark to save. (Default = 79).

BACnet IP Port

Sets the IP Port the humidifier will use on the BACnet network. Select the desired value using up/down arrows and press checkmark to save. (Default = 47808).

BMS Timeout

Sets a maximum time the humidifier will wait with no communication from the BACnet network before a BACnet timeout warning is generated. Exceeding the timeout also stops humidifier operation if the humidifier Source is set to BACnet in the Controls Menu. (Default = 300s).



Nortec Online:

Enabled: When enabled the humidifier will connect to Nortec Online. Additional Online parameters are only presented when Nortec Online is enabled. Default setting Disabled.

Online Status:

Displays the status of Nortec Online either Connected, Disconnected or Waiting for registration

PIN:

A unique PIN number assigned and written to the humidifier by the Nortec Online server

Serial Number:

Displays the serial number of the humidifier.

JID:

A unique Jabber ID used by the humidifier to communicate with the Online server, including registration, real time data transfer and historical data downloading.

Service Submenu



Cylinder A/B Reset

The humidifier uses information about cylinder replacement to optimize the performance of the humidifier. Only after replacing a cylinder select **Reset Cylinder**, and then press the **Yes** button.

Drain Cylinder

Allows the user to drain the cylinder(s). Select the cylinder(s) that should be drained and press the checkmark. To interrupt draining press cancel.

Fault / Service History

Displays the fault / service events that have been recorded by the humidifier.

Reset Fault/Service History

Deletes the list of Faults/Service events stored in the Fault / Service history. Resetting the fault / service history is not normally required, but can be done after repairs to remove faults that are no longer needed.

Export History

Allows export of the service history to a USB memory stick plugged into the humidifier controller USB port. The file can be sent to Nortec for analysis.

Input Diagnostics

Displays a list of the humidifier's inputs and the current status/value.

Output Diagnostics

Displays a list of the humidifier's components and remote indication relays. The components and relays can be activated for diagnostic purposes.

Admin Submenu



Setpoint Password

Yes = The humidifier will prompt a user for a password in order to change the setpoint from the main status screen. No = allows any user to change the setpoint from the main status screen without a password. (Default = Yes)

Main Menu Password

Sets whether a password is required to access the main menu. No = pressing Menu on the main status screen opens the Main menu without requesting a password.

Software Update

Initializes a software update from a USB memory stick plugged into the humidifier controller USB port.

Maintenance and Servicing

63 Required Maintenance

- 63 Cylinder Spent Warning / Fault
- 64 Replacement Cylinder
- 65 Removing the Cylinder
- 66 Drain Valve Cleaning
- 67 Installing the New Cylinder

68 Extended Shutdown

- 68 Starting After Extended Shutdown

69 NH-EL Maintenance Checklist

Required Maintenance

The NH-EL humidifier has been designed to require very little maintenance. Regular maintenance consists of checking the humidifier to ensure it is in good condition, replacing the cylinder when the software advises that the cylinder is spent (and changing the o-ring), as well as cleaning out the drain valve whenever the cylinder is replaced.

Cylinder Spent Warning / Fault

The steam cylinder is disposable and must be replaced at end of cylinder life. Cylinder life is dependent on water supply conditions and humidifier usage.



Danger:

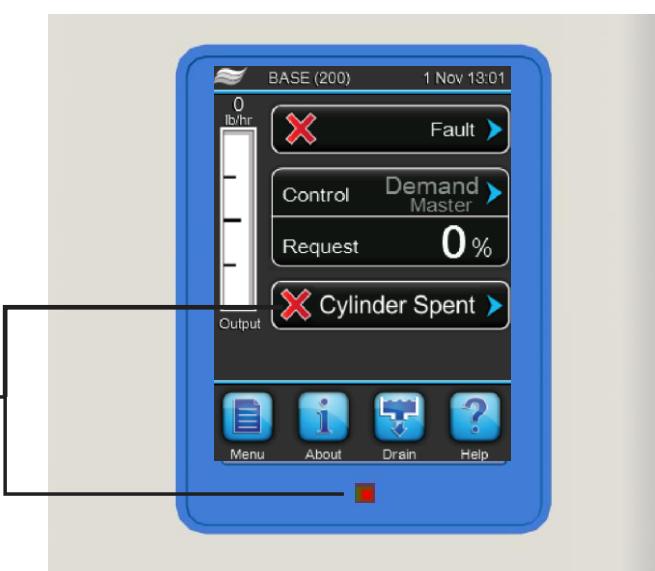
Resetting and/or servicing a spent cylinder to extend operation will void warranty and could cause serious injury or damage to property.



Status LED Yellow
+
Cylinder Spent
=
Cylinder is Spent and
must be replaced.

Warning

When the software determines that the cylinder is spent, it first displays a warning and turns on the yellow service LED. The humidifier will continue to operate for another 72 hours after the warning is displayed.



Fault LED On
+
Cylinder Spent
=
Cylinder is Spent and
must be replaced.
Humidifier has
shut down.

Fault

After 72 hours the humidifier will display a fault and shut down.

If a replacement cylinder is not yet available, the humidifier can be temporarily put back into service by turning the humidifier off and on. The humidifier will run for another 72 hours at reduced capacity.

Figure 46: Cylinder Spent Warning / Fault

Replacement Cylinder

The label on the existing cylinder identifies the cylinder type in its top left corner. When ordering a cylinder always quote the three or five digit model number on the label, the humidifier's serial number and the humidifiers voltage. Serial number and voltage are located on the specification label on the right side of the humidifier.

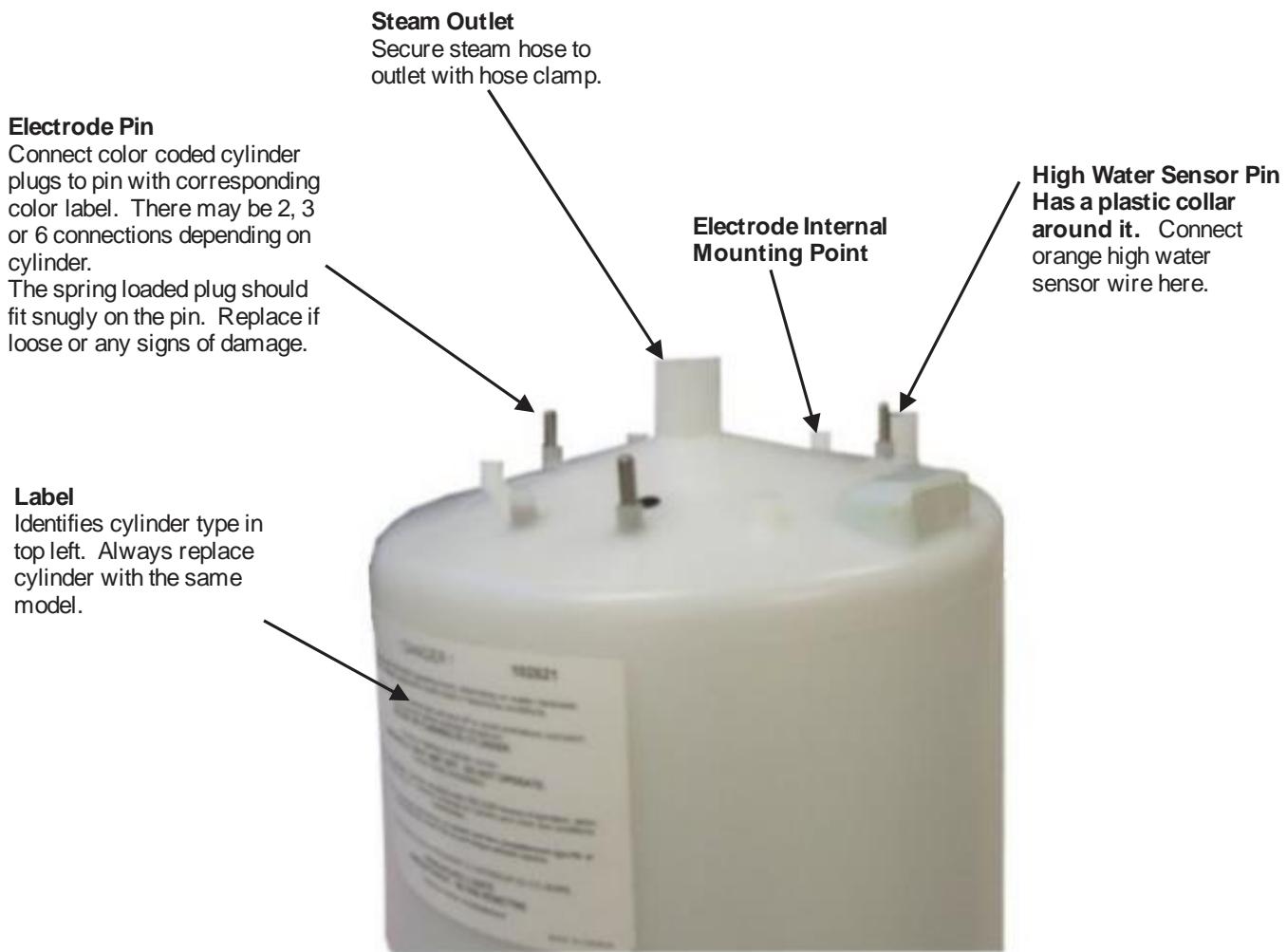


Figure 47: NH-EL Cylinder

Note: Nortec recommends keeping several replacement cylinders in stock throughout the humidification season. This will prevent possible downtime when the humidifier reports cylinder end of life.



Removing the Cylinder

Warning

- Disconnect main power at the external disconnect before any servicing.
- The plumbing and electrical compartments contain high voltage components and wiring. Access should be limited to authorized personnel.
- Cylinder may be hot, take care when handling.

- 1 Drain the existing cylinder. Press Drain Icon on the display. If asked for a password enter 0335 and press the checkmark. Either press “Yes” to confirm the cylinder should be drained or, for a double unit, select which cylinder(s) should be drained and then press “Yes”. The display will show that the unit is being drained. Let the humidifier drain until no more water is flowing out to drain. The NH-EL will count down the drain time with a 20 minute timer.
- 2 Close supply water shut off valve.
- 3 Turn the humidifier On/Off switch off.
- 4 Turn off power to the humidifier with the external disconnect.
- 5 Loosen the plumbing door screw and remove the door.
- 6 Remove the cylinder plugs from the cylinder pins by pulling vertically.
- 7 Using a flat screwdriver, loosen the hose clamp where the hose is connected to the cylinder.
- 8 Using a small flat screwdriver, press the tab on the cable tie holding the cylinder in place and pull the cable tie open.
- 9 Tip the top of the cylinder forward to pivot it out of the steam hose. When free of steam hose lift the cylinder out.

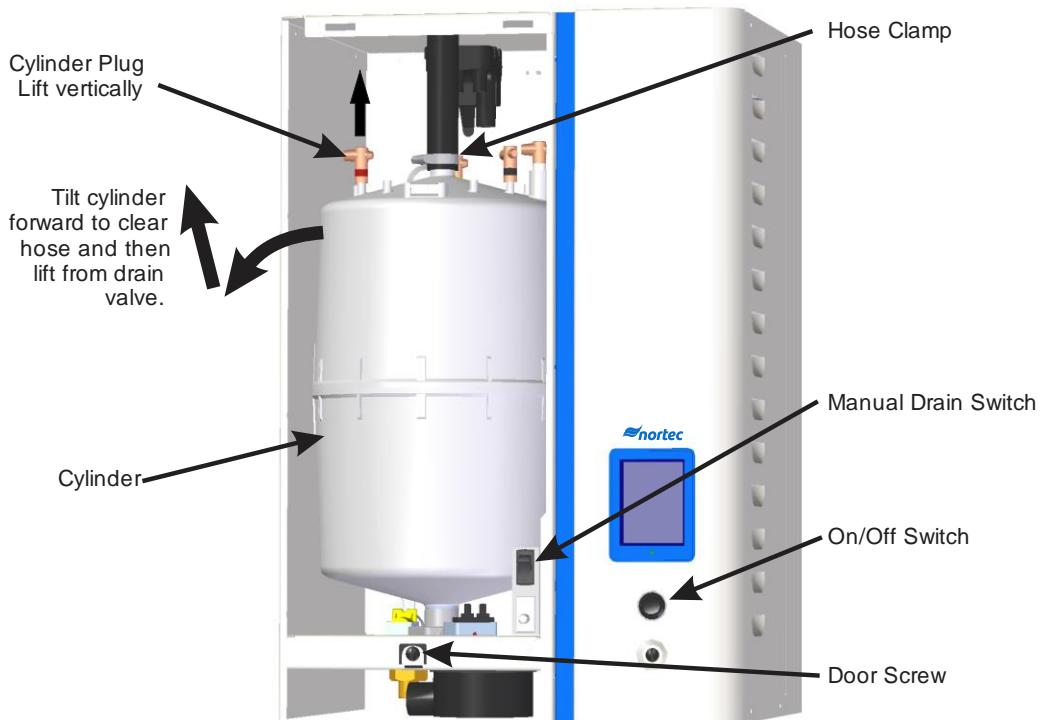


Figure 48: Cylinder Removal

Drain Valve Cleaning

Always clean the drain valve before installing a new cylinder. Scale from the spent cylinder may have fallen into the drain valve and could prevent its proper operation. To properly clean the drain valve it must be removed and disassembled.

Note: Be sure to reattach the green ground wire to reduce the risk of electrical shock.



- 1 Disconnect spade terminals from the drain valve.
- 2 Remove the screw holding the green ground wire and the two screws holding the valve to the drain pan.
- 3 Squeeze the tabs of the spring clamp holding the hose to the drain valve and slide it up the hose. Pull hose from drain valve. Lift the drain valve from the drain pan.
- 4 Unsnap red coil cap on solenoid and remove the solenoid from the valve.
- 5 Loosen brass nut holding actuator to plastic housing with a wrench and disassemble actuator.
- 6 Clean actuator components and valve housing (inlet port, outlet port, and cylinder port). Put new o-ring that was supplied with new cylinder into valve.
- 7 Reassemble actuator making sure tapered end of spring is oriented as shown in Figure 50: Drain Valve Actuator Assembly. Tighten brass nut 1/4 turn past hand tight.
- 8 Clean out end of hose and reattach to valve. Slide hose clamp back in place and place valve into drain pan.
- 9 Secure valve with 2 screws and attach green ground wire to solenoid.

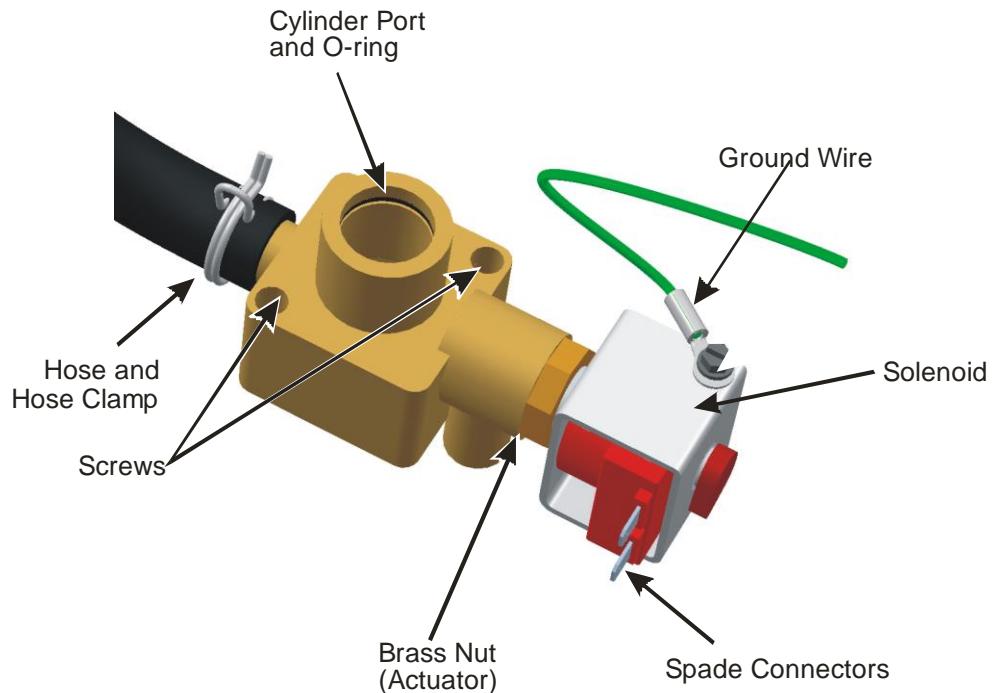


Figure 49: Drain Valve

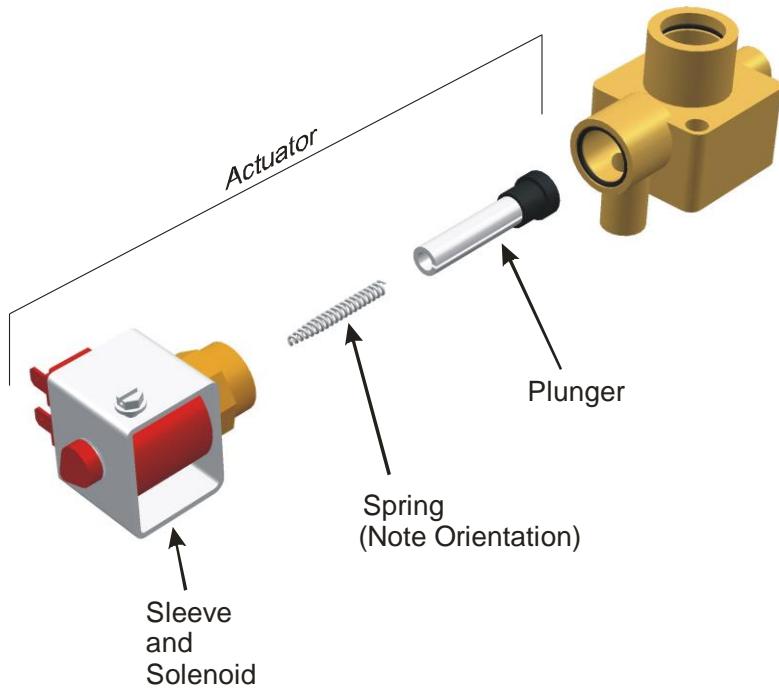


Figure 50: Drain Valve Actuator Assembly

Installing the New Cylinder



CAUTION: Make sure the new cylinder is the same model as the one that was removed. Model number is on top left corner of cylinder label.

- 1 Insert cylinder into drain valve. Tilt cylinder forward and fit end of steam hose to steam outlet. Tip cylinder back into place.
- 2 Secure cylinder with the reusable cable tie. Hand tighten hose clamp being careful not to over tighten and crush the plastic cylinder steam outlet. The Maximum torque is 12 in-lbs for 7/8" Nortec steam hose and 16 in-lbs for 1 3/4" Nortec steam hose.
- 3 Attach color coded cylinder plugs to the corresponding color coded cylinder pin. Push down completely. Connect high water sensor plug. Spring loaded plugs should fit snuggly onto the cylinder pin. Replace if they are loose or damaged.
- 4 Replace the humidifier door and secure with door screw.
- 5 Turn on power to humidifier with the external disconnect.
- 6 Open supply water shut off valve.
- 7 Turn the humidifier On/Off switch to On.
- 8 After the software has completed its start up self check reset the cylinder by pressing in the cylinder box of the status screen and confirming the cylinder was replaced in the following screen.



NOTE: If the “Cylinder Reset” is not performed the humidifier will operate for 72 hours and then fault on cylinder spent!

Extended Shutdown

Should it be required to disconnect power to the humidifier for a period of extended shut-down, always drain the cylinder first.

- 1** Utilize the Drain Cylinder function on page 61
- 2** Wait until the humidifier is completely drained (20 minutes).
- 3** Turn the On/Off switch to the Off position.
- 4** Shut off power to the humidifier with the external disconnect.
- 5** Close the supply water shut-off valve.

Note: As long as the NH-EL is powered, it will automatically drain the cylinder when there has not been a call for humidity for an extended period of time. This feature will reduce or prevent the possibility of corrosion of the electrodes and the accumulation of algae and bacteria growing in the cylinder. The cylinder will remain empty until there is a call for humidity at which time the fill valve will open and refill the cylinder. The unit will go through its normal process for optimum operation.



Starting After Extended Shutdown

- 1** Check to see the humidifier has not been damaged and the installation has not been altered. Refer to the Chapter on Start Up.
- 2** Turn on the power to the humidifier with the external disconnect.
- 3** Turn the On/Off switch to the On position.
- 4** Drain the humidifier completely by pressing and releasing the manual drain button. Wait until there is no water flowing to drain. It usually takes less than 10 minutes.
- 5** Follow the start up procedure in the chapter on Start Up.

NH-EL Maintenance Checklist

Model #: _____

Serial #: _____

Tag: _____

Cylinder #: _____

Cylinder / System Check

- Warning Cylinder Spent Fault Cylinder Spent
(If software displays Warning Cylinder Spent then cylinder must be replaced)
- Yellow LED On with Max Level Warning.
(If Yellow LED is On with Max Level Warning and cylinder is not new, cylinder may have to be replaced soon.)
- Other warnings or Faults shown in display? No Yes _____
(See Troubleshooting Chapter for actions to address warnings and faults if present)

Replace Cylinder

- Cylinder drained.
- Disconnect open, On/Off switch to Off, water shut off valve closed, door removed.
- Cylinder removed
- Drain valve removed / cleaned / new O-Ring
- Drain valve installed / ground wire attached.
- New Cylinder Installed and hose clamps tight (12 in-lbs for 7/8" steam hose and 16 in-lbs for 1 3/4" steam hose). New cylinder model # _____
(Should be same as removed cylinder)
- Cylinder plug colors match cylinder dots.
- Cylinder plugs snug and in good condition.
- High Water Sensor plug snug and in good condition.
- Electrical wiring not loose and in good condition.
- Steam hoses and steam lines in good condition / No kinks in hose.
- No Signs of water leaking around humidifier, steam line, condensate returns.
- Door replaced, water shut off valve opened, On/Off switch to On, Disconnect Closed.
- "Reset Cylinder" in Software, (press cylinder status, Password 0335).

Inspected by: _____ Date of inspection: _____/_____/_____

Company: _____

Troubleshooting

71 Organization of Troubleshooting Chapter

71 Troubleshooting Requirements

72 General Troubleshooting

72 Humidifier

73 Steam Distributors

74 SAM-e

74 Blower Pack

74 Digital Humidistat

75 NH-EL Warnings and Faults

75 Warnings

75 Faults

75 Clearing a Fault

81 NH-EL Wiring Diagram (Cylinder A)

82 NH-EL Wiring Diagram (Cylinder B)

Organization of Troubleshooting Chapter

The troubleshooting chapter is broken down into 2 sections.

General Troubleshooting Deals with troubleshooting incorrect humidifier operation, steam line and plumbing issues without any control software warnings or faults.

Humidifier Warnings and Faults Deals with warning and error messages that are generated by the humidifier's control software.

Troubleshooting Requirements

- Ensure the installation meets the installation requirements outlined in the Installation Chapter of this manual.
- Familiarize yourself with the operation of the humidifier by reading the Operation Chapter of this manual.
- Wiring diagram specific for your humidifier is installed on the inside of the humidifier door. A generic copy of the NH-EL wiring diagram is also included at the end of this chapter for reference purposes.
- When contacting your local representative or NORTEC for troubleshooting assistance, please ensure the serial number has been obtained for reference purposes.



CAUTION: Be aware, when troubleshooting, that the humidifier is powered by high voltage. Familiarity with both good practices and wiring of the humidifier is recommended. Any troubleshooting that requires opening the cabinet should be done by qualified personnel.



NOTE: Most humidifier faults are not caused by faulty equipment but rather by improper installation. A complete fault diagnosis always involves a thorough examination of the entire system. Often, the steam hose connection has not been properly executed, or the fault lies with the humidity control system.

General Troubleshooting

The following section provides general guidelines for troubleshooting the NH-EL humidifier and auxiliary components. For detailed troubleshooting information refer to the manuals that were provided with the auxiliary equipment and to Table 11: Troubleshooting Warnings and Faults later in this chapter.

Humidifier

Table 10: General Troubleshooting

Symptom	Cause	Corrective Action(s)
Nothing happens when On/Off switch is turned On.	1 Fuse blown	1 Check inline fuse in yellow housing between transformer and driver board. Check and replace fuses (F2 and F3) on driver board.
	2 Incorrect or no Voltage	2a Check voltage against spec label and correct. 2b Check disconnect and ensure humidifier is getting power.
	3 Step Down Transformer not outputting 24VAC	3a Replace the transformer. 3b Verify primary wiring.
	4 Door interlock switch open	4a Replace the door 4b Pull door interlock switch out to override. Caution! The electrical and plumbing compartment contains high voltage components and wiring.
Humidifier will not humidify or not reaching RH setpoint	1 Security loop open	1a Check if “Security loop”: “Security loop” is displayed on the humidifier’s display. 1b Check if there is 24 VAC at terminal 2. 1c Check wiring and operation of On/Off devices connected to terminal 1 and 2. Ensure they are closing when they should be.
	2 High limit limiting output	2 Check if the high limit is installed too close to the humidifier, and if it is operating correctly.
	3 No signal on Channel 1	3 Check voltage between terminal 3 and 4. For demand configuration 27% of full scale signal must be present for humidifier to start. For transducer configuration the signal must be lower than setpoint for the humidifier to start.
	4 No signal on Channel 2 (For units configured for dual channel operation).	4 Check voltage between terminal 5 and 3. For demand configuration 27% of full scale signal must be present for humidifier to operate. For transducer configuration the signal must be lower than setpoint for the humidifier to start.

Symptom	Cause	Corrective Action(s)
	5 Capacity has been manually limited	5 Check Manual Capacity on status screens. Adjust "Manual Capacity (A/B)" under "0335" / "Configuration" / "Features" / if necessary.
	6 Low conductivity water	6 Check if "Max Level": "Max Level" is displayed on the humidifier's display. If operated on low conductivity water it may take several hours for the NH-EL to reach full output capacity. This is normal. During this time the humidifier will not perform any drains and the conductivity of the water in the cylinder will increase.
Humidifier has faulted or has a warning	1 Software has detected an abnormal condition	1 Refer to Table 11: Troubleshooting Warnings and Faults.

Steam Distributors

Symptom	Cause	Corrective Action(s)
Distributor spitting out water	1 Distributor not level	1 Use support at end of distributor to ensure it is level.
	2 "P" Trap too close to distributor	2 "P" Trap must be a minimum of 12 in (30 cm) below the distributor to ensure flow. Relocate if required.
	3 Condensate line not sloped sufficiently	3 Sufficient slope to ensure flow is required. Reinstall if required.
	4 Trap blocked	4 Check that water flows through trap. Clear out if blocked.
	5 Condensate line double trapped	5 Condensate lines must not have two traps in sequence. This can cause an air lock and prevent water draining.
	6 Steam line not insulated	6 If steam line is long, condensate build up could overload distributor condensate port. Insulate line to improve efficiency and install additional condensate traps as required.
Condensation in duct	1 Installation clearances not observed	1 Refer to distributor installation manual for required clearances. Relocate distributor if required.
	2 Design conditions changed	2 Check supply air temperature and humidity to determine if conditions have changed.
	3 High limit not functioning	3 Check setting and operation of high limit. Replace if defective.
	4 Air proving not installed or not working	4 Check that the humidifier will only operate when there is air moving in the duct.
	5 Improper location of high limit	5 Check that high limit is installed where it can detect high duct humidity.

SAM-e

Symptom	Cause	Corrective Action(s)
SAM-e spitting out water	1 "P" Trap too close to SAM-e	1 "P" trap must be at least 12 in (30 cm) below header. Relocate if required.
	2 Condensate line not sloped sufficiently	2 Ensure line is sloped sufficiently to carry condensate produced.
	3 Steam line not insulated	3 If steam line is long condensate build up could overload the SAM-e condensate port. Insulate the steam line to improve efficiency and install condensate traps as required.
SAM-e Grommet leaks	1 Distributor tubes not seated properly	1 Push distributor tubes down until support washer is resting on rubber grommet.
	2 Grommet Damaged	2 Replace any damaged grommets

Blower Pack

Symptom	Cause	Corrective Action(s)
Blower not operating Note: Blower pack does not come on unless steam is being produced by the humidifier.	1 No power to blower pack	1a Check power connection. 1b Check blower pack fuses
	2 On/Off Thermostat not closing	2 Check wiring to thermostat replace if it does not close when it is exposed to steam.

Digital Humidistat

Symptom	Cause	Corrective Action(s)
Humidistat Reading incorrectly	1 Sensor out of calibration	1 See humidistat manual.
	2 Improper sensor location	2 Check that the humidistat is positioned in a location representative of room humidity.
	3 Exposed to draft or heat source	3 Check that heat/cold fluctuations, drafts, sunlight, doors, or vents are affecting the reading.
	4 No vapour barrier	4 Ensure drafts cannot affect reading by ensuing vapour barrier is in place and working.

NH-EL Warnings and Faults

The self-diagnostic system built into the NH-EL is continually monitoring the operation of the humidifier. When the display shows a warning or fault condition you can find out more information about the fault by pressing on the warning/fault box. This will display a screen listing any warnings/faults that are in effect. Pressing on any item in the list will provide a description as well as causes and possible corrective actions.

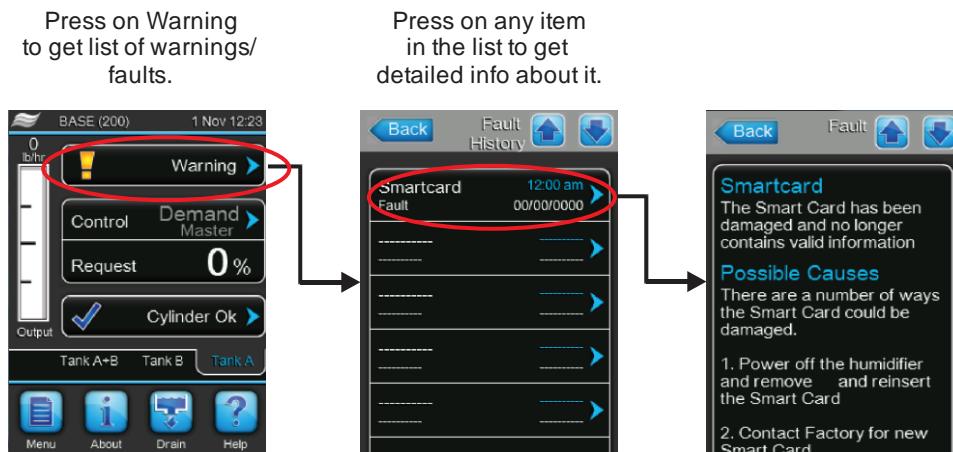


Figure 51: Displaying Warning / Fault Information

Warnings

- When problem symptoms are detected, the NH-EL will attempt to take self-corrective actions to try to correct the problem. A warning is displayed on the screen for information purposes and the humidifier continues to operate.
- If the condition which generated the warning is eliminated the warning is cleared from the display.
- While a warning is displayed the status LED is Yellow.

Faults

- If the humidifier is not able to self-correct a problem symptom it will, if necessary, respond by shutting down.
- When this occurs, the humidifier illuminates the red "Fault" LED, shuts off power to the cylinder, and drains the cylinder.

Clearing a Fault

- Check the fault message that the humidifier is displaying and take any necessary actions to correct the cause(s) as outlined in Table 11: Troubleshooting Warnings and Faults.
- Power cycle the humidifier with the On/Off switch waiting 3 seconds between turning it off and on.

Table 11: Troubleshooting Warnings and Faults

Display Message	LED	System Detected	Cause	Corrective Action(s)
BMS BACnet Nortec Online Staged Modulation Warning/Fault	Red	No Modbus/ BACnet / Nortec Online / Multi Mode signal	1 Loose connection	1 Check connections and polarity of wires.
			2 Incorrect Modbus/BACnet/IP address or configuration.	2 Check that address of humidifier matches that of network.
			3 Humidifier configured but not connected to network	3 Configure controls correctly in “Control Setting” level of software (see Operation Chapter).
			4 Improper wire used	4 Use 120 Ohm impedance shielded twisted pair cable for Modbus, Cat 5 for BACnet IP/ IP.
			5 Noise preventing humidifier from detecting signal.	5 Eliminate source of noise causing interference.
Control Signal Warning / Fault		No signal from RH control sensor	1 Sensor not powered	1 Use multimeter to check that sensor is powered.
			2 Sensor not wired correctly	2 Check wiring is secure and wired correctly per instructions in installation chapter.
			3 Defective sensor	3 Check if sensor output is corresponding to RH. If not replace the sensor.
	Red	No signal from RH Limit sensor	4 RH less than 5%	4 RH less than 5% are interpreted as a broken sensor. Contact NORTEC Representative for recommendation.
	Red		5 Humidifier control configuration incorrect	5 Check that the humidifier control configuration matches the installed sensor output.
Current Off Fault	Red	Current detected with no demand	1 Contactor seized closed	1 Open Disconnect, check if contactor is closed
			2 Driver Board out of Calibration	2 If display indicates output with contactor open, then replace the driver board.

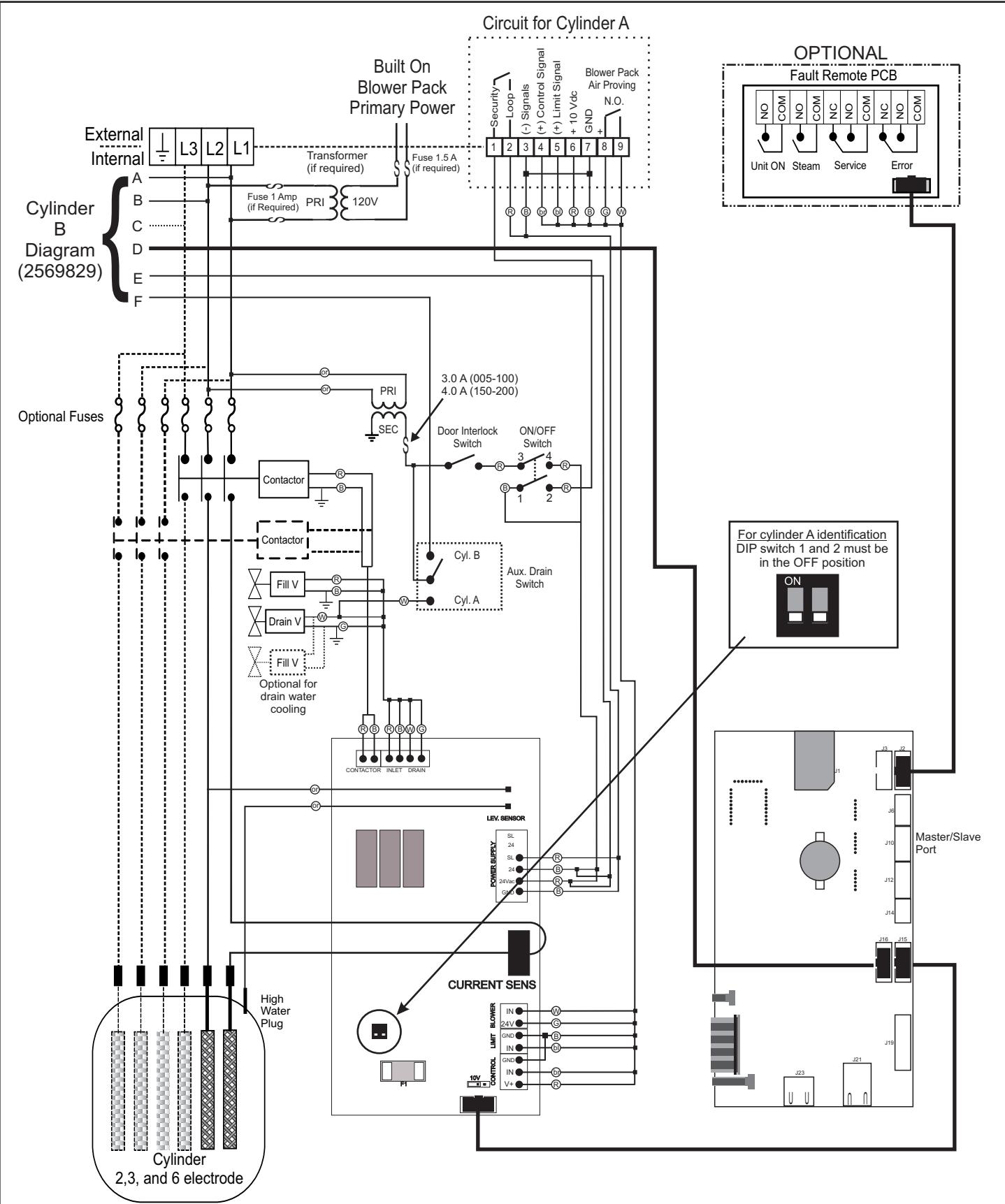
Display Message	LED	System Detected	Cause	Corrective Action(s)
Cylinder Spent	Yel Red	Electrodes covered with scale.	1 Cylinder electrodes are covered with scale and humidifier cannot meet demand	1 Replace cylinder with same model number (see maintenance chapter)
Excess Current Warning/Fault	Yel	Current has exceeded 130% of max Full Load Amps	5 Water supply too conductive	5a Contact Nortec representative for recommendation on alternate cylinder 5b Change the water supply
			6 Wrong cylinder installed	6 Install correct cylinder model
	Red		7 Cylinder Spent but not detected by software	7 Replace the cylinder (see maintenance chapter)
Fill Timeout Warning / Fault		Fill valve activated for long time, but high water level not reached. Water level in cylinder should rise faster than 1" per minute.	1 Drain valve leaking or stuck open	1 Clean drain valve or replace (see maintenance chapter)
			2 Water shut off valve closed	2 Open shut off valve
			3 Fill Valve strainer blocked	3 Clean out strainer on fill valve inlet.
			4 High system back pressure	4a Check for kinked hose 4b Check for proper condensate removal (see installation chapter) 4c Install fill cup extension
			5 Air flow into cylinder through steam line	5 Disconnect steam line, let cylinder fill part way, then reconnect steam line.
	Red		1 Back pressure restricting water from entering cylinder	1a Check for restrictions and proper condensate removal in steam line. 1b If water is going down drain during fill cycle then install fill cup extension kit.
Foaming Cylinder Warning / Fault	Red	Foam inside the cylinder.	2 Organic material in water	2 Install filter to remove organic material
			3 Drain blocked water over concentrated	3 Clean the drain line

Display Message	LED	System Detected	Cause	Corrective Action(s)
Foaming Cylinder Warning / Fault	Red		4 Humidifier short cycling	4 Observe operation to ensure humidifier can normally run long enough to perform a drain. If not turn on the Short Cycle feature on page 56.
Low Conductivity Warning		Low water conductivity	1 Drain valve leaking	1 Clean drain valve or replace (see maintenance chapter)
			2 Back pressure causing some fill water to go down drain	2a Check for restrictions and proper condensate removal in steam line. 2b If water is going down drain during fill cycle then install fill cup extension kit.
			3 Wrong Cylinder Installed	3 Install cylinder of same model number as was previously installed
			4 Newly installed cylinder not reaching demand for extended time due to Low water conductivity	4a Add 1/4 teaspoon of salt to fill cup. 4b Adjust drain factor to 0.7 in User Defined Settings (see operation chapter) 4c Turn on the Low Conductivity feature on page 56.
Max Level Warning		Water level at top of cylinder or foaming	1 Humidifier has filled to top of cylinder without reaching demand	1 None, for information only, it is normal for a new cylinder to reach max level before water in cylinder is concentrated and for an old cylinder to reach max level near the end of cylinder life. 1b If the cylinder is new, add 1/4 teaspoon of salt to fill cup to assist cylinder in concentrating. 1c Supply water conductivity too low (DI or RO). Change to potable water supply with conductivity above 150 µS/cm.

Display Message	LED	System Detected	Cause	Corrective Action(s)
			2 Water foaming	2 Check if water level is at top of cylinder. If water is not at top there may be foam in the cylinder. Consider the Foam Mode feature on page 55.
No Current Fault	Red	Water level at top of cylinder with no current	1 Current transformer loose on driver board	1 Open disconnect, ensure current transformer spade connectors are secure. Squeeze with pliers if loose.
			2 Primary wire not looped through current transformer.	2 Open disconnect, rewire primary wire through current transformer.
			3 High water sensor plug is on an electrode pin.	3 Install high water sensor plug on cylinder pin with shroud around it.
Remote Disabled Warning		Network shutdown message	1 Network signal received by humidifier to shut down.	1 Normal operation for humidifier on network control. Contact network administrator to enable humidifier.
RH High Warning		RH higher than high RH setpoint	1 Setpoint higher than RH alarm setting	1 If the humidifier is still operating then check and adjust setpoints.
RH Low Warning		RH Lower than low RH setpoint	1 Humidifier not running	1 Check why humidifier is not running and put it into operation.
			2 Setpoint lower than RH low alarm setting	2 Check and adjust setpoints.
Safety Loop Open	Grn Blink	Security loop open (terminal 1 and 2)	1 On/Off device connected to security loop is open	1a Normal operation, no action required 1b Wrong setpoint, A/P not sensing air movement
			2 Loose wire	2 Check wiring to all On/Off devices connected to terminals 1 and 2.
SIM Card Fault	Red	Controller cannot detect a valid SIM card	1 Improper SIM card installation or missing	1 Check that SIM card is installed and socket closed.
			2 Incorrect SIM card	2 Check that the SIM card serial number matches the humidifier's.

Display Message	LED	System Detected	Cause	Corrective Action(s)
Staged Modulation Warning	Red	Slave unit not communicating with Master Unit.	1 Master unit not configured correctly	1 Check configuration of master as outlined in Multi Mode Configuration
			2 Slave unit not configured correctly	2 Check configuration of slave as outlined in Multi Mode Configuration
			3 Wiring to master unit disconnected	3 Check that wire connected to J10 of Master and Slave and that polarity is not reversed
			4 Incorrect wire type used	4 Use 18-24 AWG multi-strand, twisted pair, shielded cable
Unstable Control Warning		Demand swinging from low to high rapidly	1 Improper Proportional and Integral settings in control	1 Adjust proportional and integral settings to reduce swings in demand signal.
			2 Control humidistat installed too close to diffuser or doorway to un-humidified space	2 Install humidistat so that it senses air representative of space being humidified.
			3 Defective control	3 Replace defective control

NH-EL Wiring Diagram (Cylinder A)



 **nortec**
humidity.com

NH-EL SERIES HUMIDIFIER (Cylinder A)
WIRING DIAGRAM
DIAGRAM No. 2569828 REV. E Date: July 4, 2014.

Figure 52: Wiring Diagram for NH-EL (Cylinder A)

NH-EL Wiring Diagram (Cylinder B)

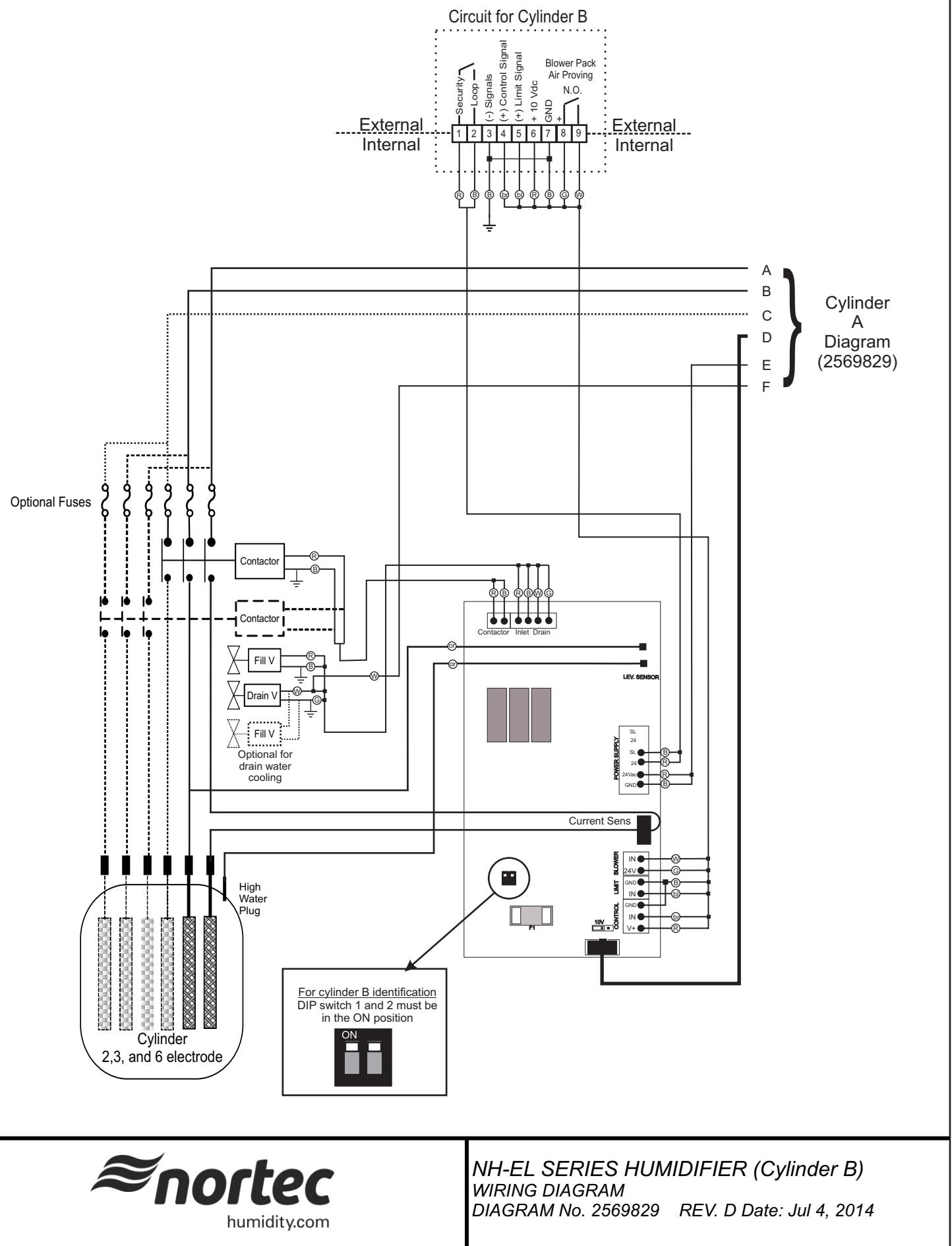


Figure 53: Wiring Diagram for NH-EL (Cylinder B)

Spare Parts

84 NH-EL Plumbing Parts

88 NH-EL Electrical Parts

92 Blower Pack Parts

95 Warranty

Part Ordering

- The following illustrations and tables list the most commonly used NH-EL parts.
- First locate the part you require in the illustration corresponding to your NH-EL unit.
- Find the item number in the first column of the table adjacent to the illustration.
- Read across the table to the column which corresponds to the number of phases, voltage and capacity of your unit.
- To order parts, or help in identifying the part you need, contact your local Nortec agent.

NH-EL Plumbing Parts

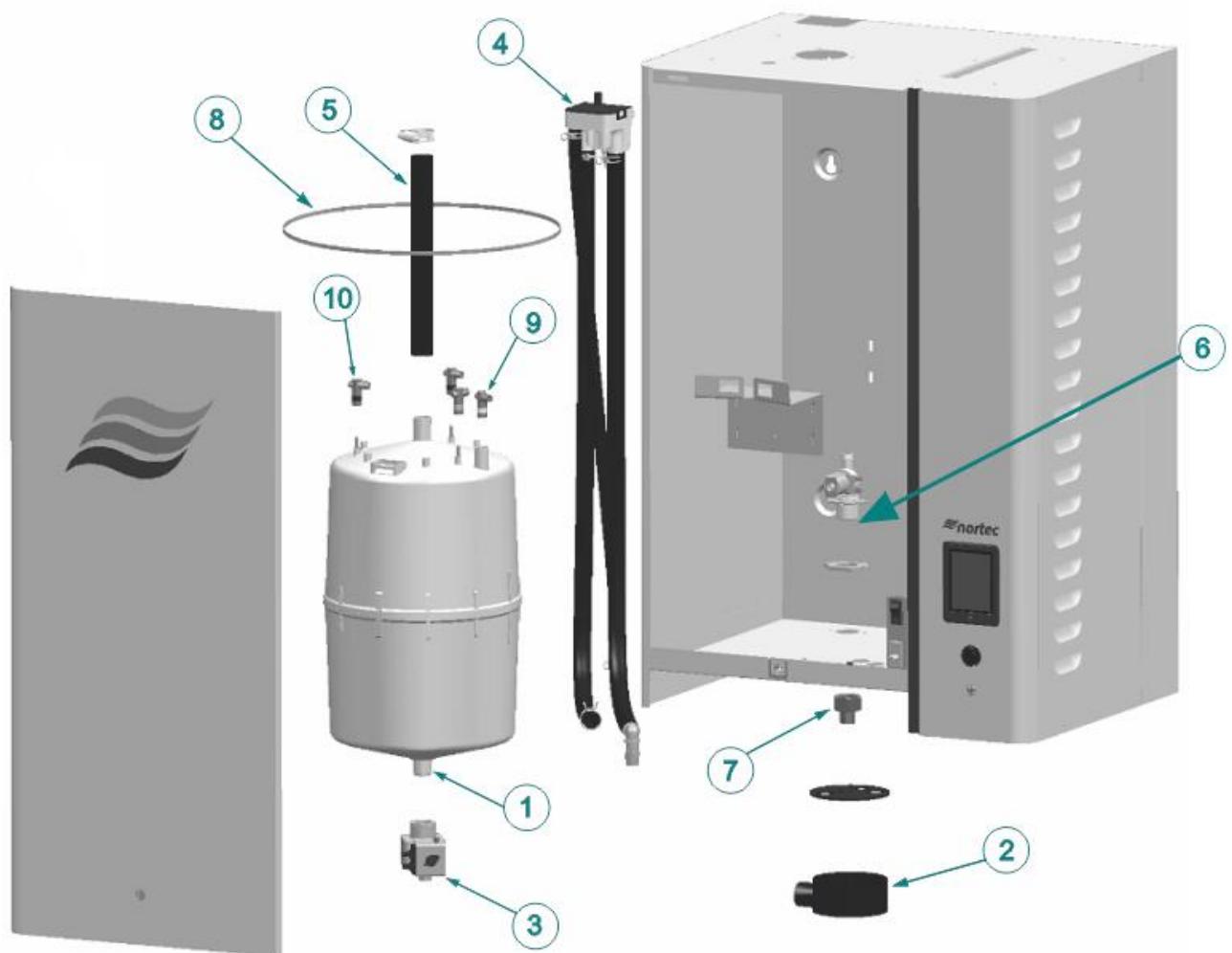


Figure 54: NH-EL Plumbing Parts

NH-EL Plumbing Parts

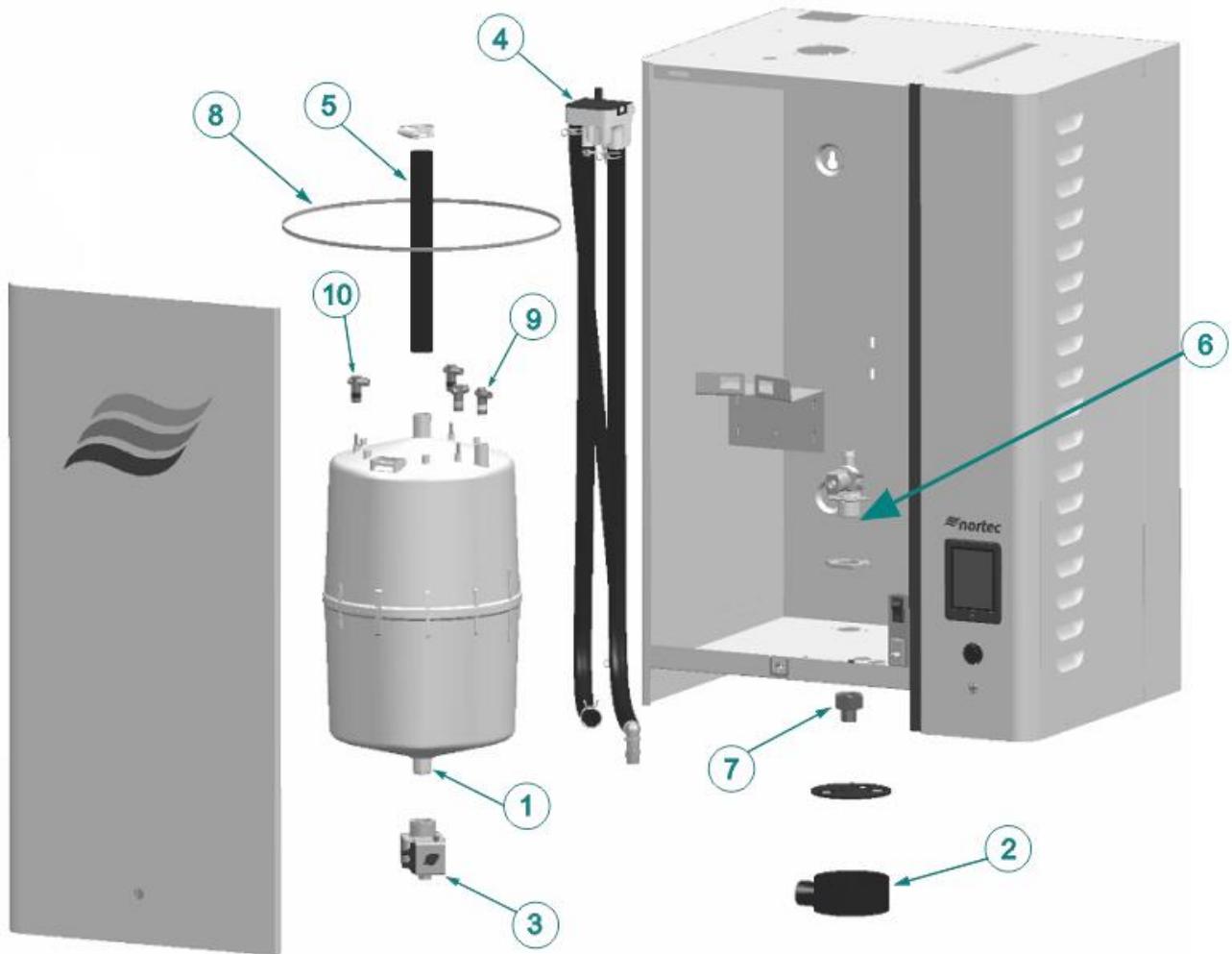


Figure 55: NH-EL Plumbing Parts

Table 13: NH-EL 050-200 Plumbing Parts List

ITEM NO.	DESCRIPTION	NORTEC PART NO.	Volts/Ph	THREE PHASE																	
				MODEL			50			75			100			150			200		
				208/3	220-240/3	380/3	440-480/3	550-600/3	208/3	220-240/3	380/3	440-480/3	550-600/3	208/3	220-240/3	380/3	440-480/3	550-600/3	208/3	220-240/3	380/3
1	CYLINDER 621	1519080	1	1					1	1									2	2	
	CYLINDER 605	1519085			1	1					1	1							2	2	
	CYLINDER 603	1519083			1						1									2	2
2	DRAIN CHANNEL	2573514	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
3	VALVE DRAIN + 24V COIL	1456000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
4	FILL CUP ASSEMBLY LARGE	2574142	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
5	LARGE STEAM LINE 1.750 IN. ID IN.	2574132	12	12	12	12	12	12	12	12	12	12	12	12	12	12	24	24	24	24	24
6	VALVE, SINGLE FILL, 2.0 L/min	2573523	1	1	1	1	1	1	1	1	1	1					2	2	2	2	
	VALVE, SINGLE FILL, 3.3L/min	2573524											1	1	1	1				2	2
6*	VALVE, DUAL FILL, 3.3 L/min, 2.0 L/min	2574135	1	1	1	1	1	1	1	1	1	1					2	2	2	2	
	VALVE, DUAL FILL, 3.3 L/min, 3.3L/min	2574136											1	1	1	1				2	2
7	FITTING BRASS 3/4 BSP / WASHER - 1/2" NPT	2574137	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
8	CABLE TIE REUSABLE 5-600 CYL SZ X2	2574139	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
9	CYLINDER PLUG KIT, QTY 3	2573529	2	2	2	2	2	2			2	2				2	2		4	4	
	SUPER PLUG KIT, R-Y-B, NH-EL	2574141					2	2			2	2	2			4	4	4	4	4	
10	HIGH WATER SENSOR PLUG	2577738	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
	OPTIONAL COMPONENTS																				
Not Shown Optional Components	FOAM DETECTION																				
	FOAM DETECTION KIT MEDIUM	2574095	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
	FOAM DETECTION KIT LARGE	2574099															1	1	1	1	1
	FILL CUP EXTENSION FILLCUP																				
	EXTENSION KIT NHTC/NHPC	2574073	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
	DRAIN WATER COOLING																				
	3.3 L/min, 2.0 L/min	2574083	1	1	1	1	1	1	1	1	1	1				2	2	2	2	2	
	3.3 L/min, 3.3L/min	2574085											1	1	1	1			2	2	2

*Optional Components

N/S - Not Shown

** For far tank on double units

NH-EL Electrical Parts

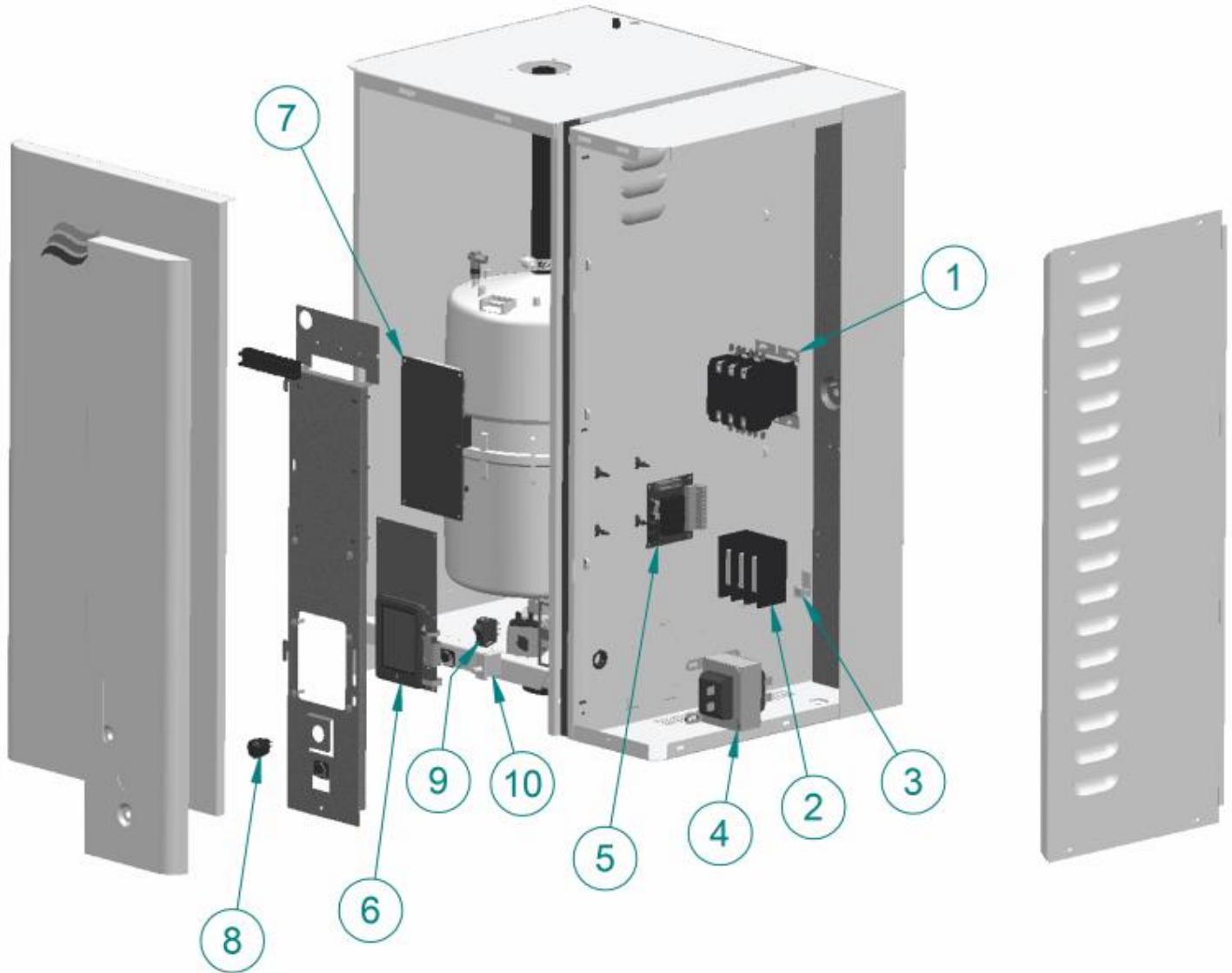


Figure 56: NH-EL Electrical Parts

NH-EL Electrical Parts

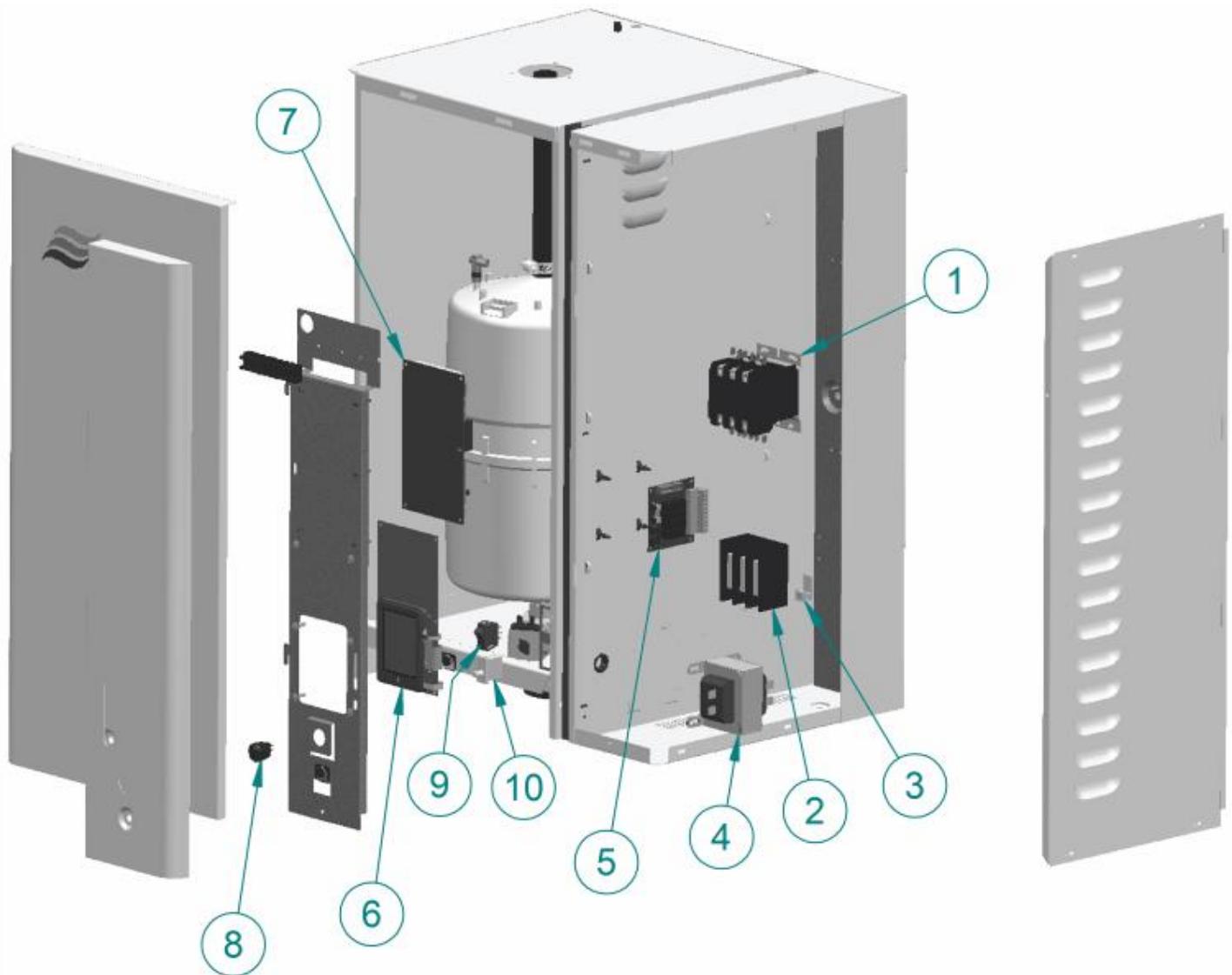


Figure 57: NH-EL Electrical Parts

Blower Pack Parts

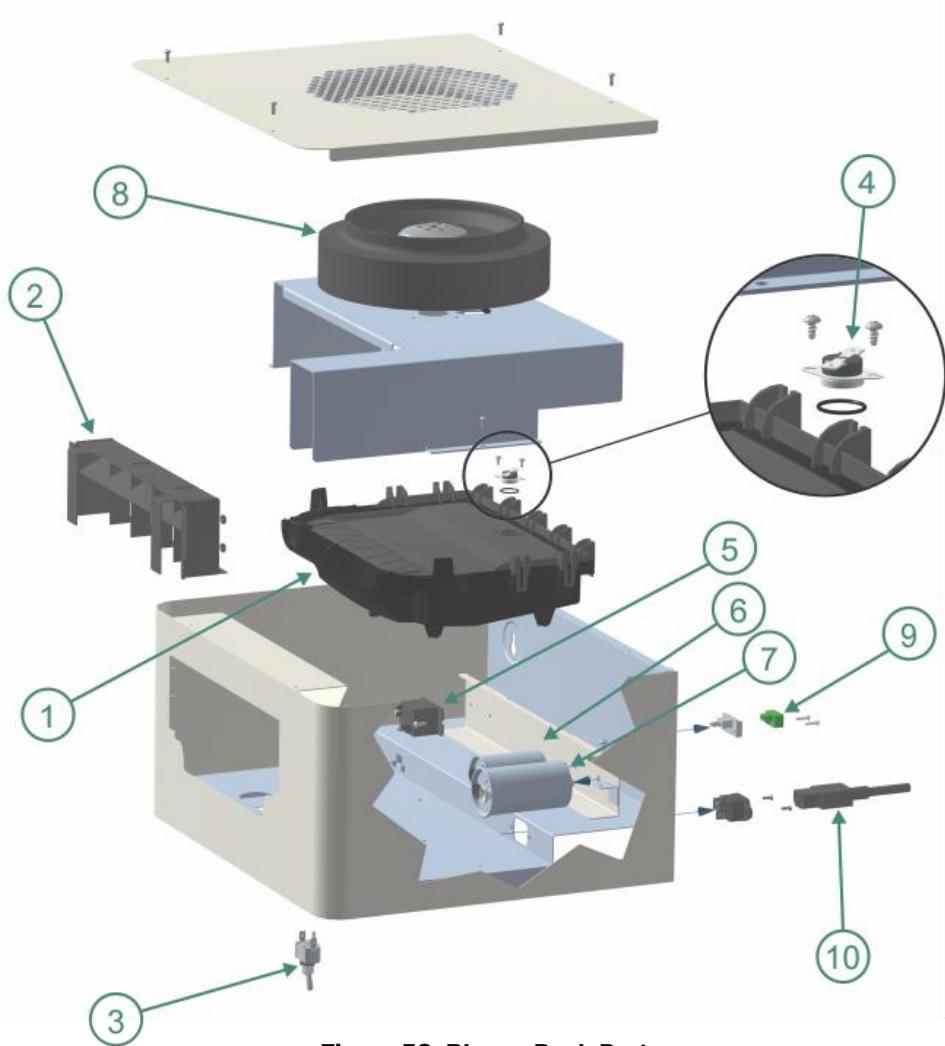


Figure 58: Blower Pack Parts

Table 15: Blower Pack Parts List

Item	Description	Part Number	QTY
1	Distributor Assembly	2573805	1
2	Diffuser Assembly	2573806	1
3	Switch Assembly	2573807	1
4	Thermostat Assembly	2573808	1
5	Relay Assembly	2573809	1
6	Capacitor 8uF (fastening nut included)	2573810	1
7	Capacitor, 20uF (fastening nut included)	2573811	1
8	Fan Assembly	2573812	1
9	Spare fastener kit (included low voltage connector)	2573813	1
10	Power Cable (Connector and Cable together)	2573814	1

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Warranty

Nortec Humidity Inc. and/or Nortec Humidity Ltd. (hereinafter collectively referred to as THE COMPANY), warrant for a period of two years after installation or 30 months from manufacturer's ship date, whichever date is earlier, that THE COMPANY's manufactured and assembled products, not otherwise expressly warranted (with the exception of the cylinder), are free from defects in material and workmanship. No warranty is made against corrosion, deterioration, or suitability of substituted materials used as a result of compliance with government regulations.

THE COMPANY's obligations and liabilities under this warranty are limited to furnishing replacement parts to the customer, F.O.B. THE COMPANY's factory, providing the defective part(s) is returned freight prepaid by the customer. Parts used for repairs are warranted for the balance of the term of the warranty on the original humidifier or 90 days, whichever is longer.

The warranties set forth herein are in lieu of all other warranties expressed or implied by law. No liability whatsoever shall be attached to THE COMPANY until said products have been paid for in full and then said liability shall be limited to the original purchase price for the product. Any further warranty must be in writing, signed by an officer of THE COMPANY.

THE COMPANY's limited warranty on accessories, not of the companies manufacture, such as controls, humidistats, pumps, etc. is limited to the warranty of the original equipment manufacturer from date of original shipment of humidifier.

THE COMPANY makes no warranty and assumes no liability unless the equipment is installed in strict accordance with a copy of the catalog and installation manual in effect at the date of purchase and by a contractor approved by THE COMPANY to install such equipment.

THE COMPANY makes no warranty and assumes no liability whatsoever for consequential damage or damage resulting directly from misapplication, incorrect sizing or lack of proper maintenance of the equipment.

THE COMPANY makes no warranty and assumes no liability whatsoever for damage resulting from freezing of the humidifier, supply lines, drain lines, or steam distribution systems.

THE COMPANY retains the right to change the design, specification and performance criteria of its products without notice or obligation.

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