



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



NH Series

Installation and Operation Manual

Includes installation, operation
maintenance and troubleshooting
information for your NHRS Resistive
Element Steam Humidifier

Thank you for choosing NORTEC.

INSTALLATION DATE (MM/DD/YYYY)

MODEL #

SERIAL #

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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 NHRS 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 backpressure 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 the 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. 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 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 on pages 10 and 11.
- 5 Ensure steam lines can be routed to distributor or blower pack as described on pages 14-19 and 31.

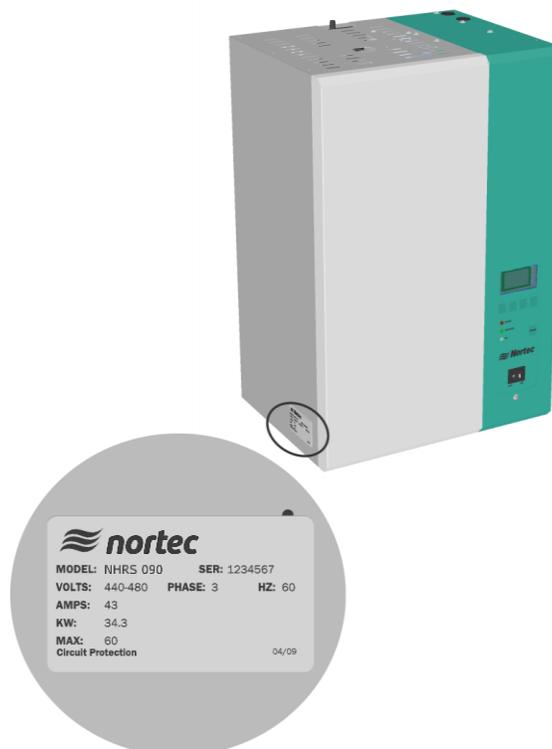


Figure 1: Specification Label Location

Humidifier Components

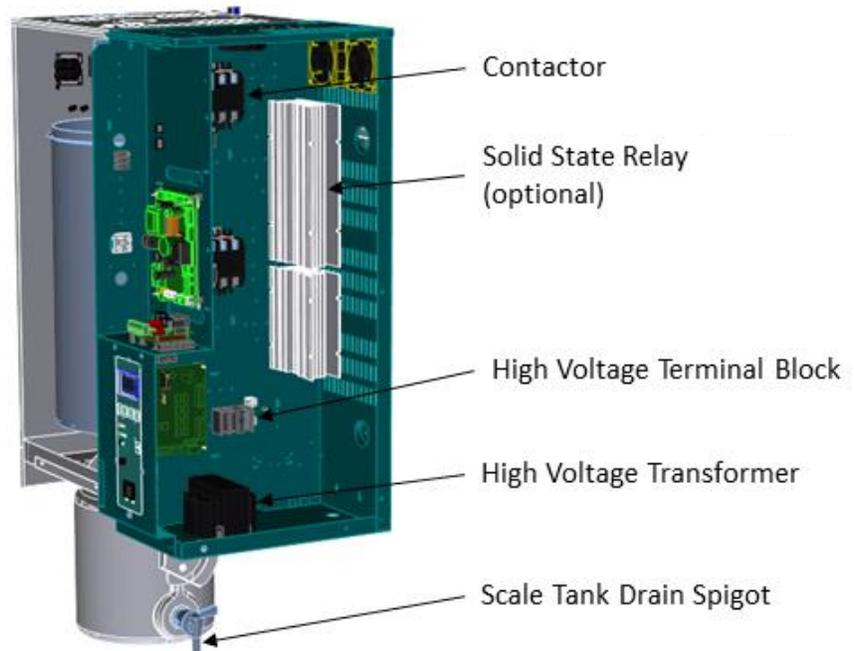
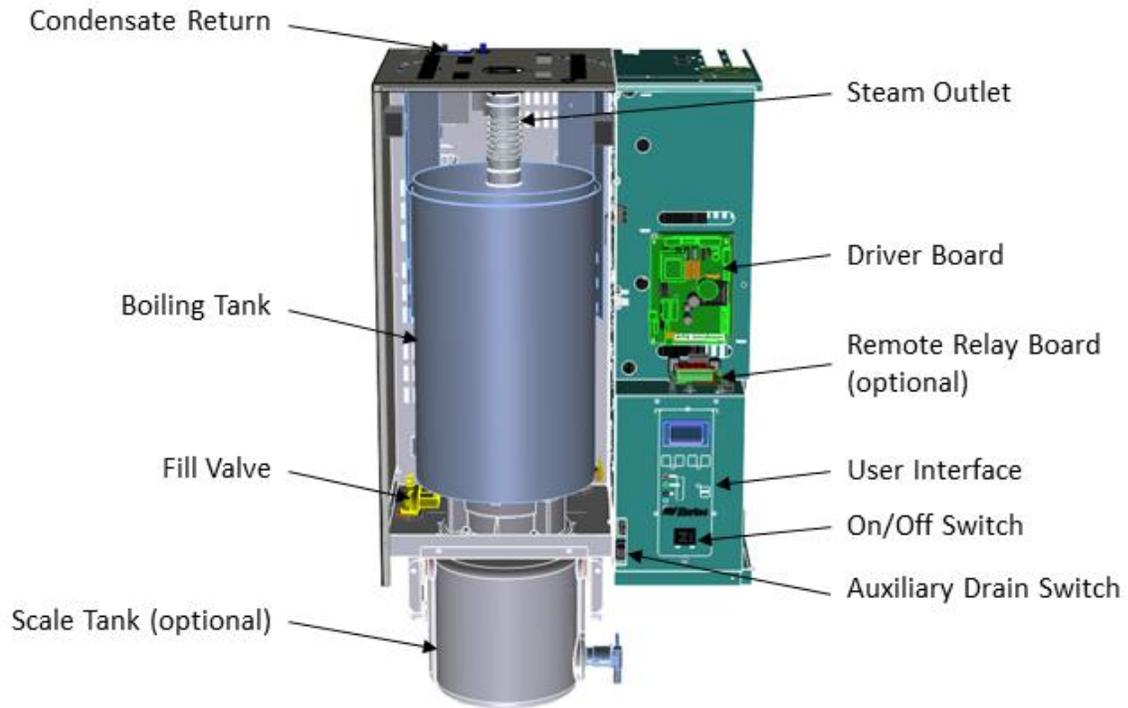


Figure 2: NHRs Humidifier Components

Description of Components

Table 1: Humidifier Components

Component	Function of Component
Auxiliary Drain Switch	Drains water from boiling tank by activating drain pump. Note that initiating a drain in this manner will not induct Drain Water Cooling.
Boiling Tank	Holds resistive elements submerged in water. Current traveling along the internal element wire generates heat which is used to generate steam.
Condensate Return	Provides a connection to return condensate to humidifier.
Contactors	Turns On/Off power to boiling tank elements.
Drain Pump	Drains water from boiling tank.
Drain Water Cooling Valve	Adds cold supply water to water draining from boiling tank to temper drain water to a maximum of 140°F (60°C).
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 Voltage Transformer	Steps primary voltage down to 24 VAC for the controller and internal components such as the fill valve and drain pump.
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.
Scale Tank	Scale created inside the boiling tank (on the elements and the side walls) breaks off and gravitates to the scale tank for easy disposal.
Scale Tank Drain Spigot	Manually activated drain spigot used to empty the scale tank of water before removing and emptying tank of collected scale.
Solid State Relay (optional)	Solid State Relays offer shorter cycles when turning the resistive elements On and Off. Recommended for humidification applications requiring high accuracy.
Steam Outlet	Connect to steam line with steam hose.
User Interface	Controls all functions of the humidifier operation and provides user ability to modify configuration of the humidifier.

NHRS Models

The NHRS is Nortec's flagship resistive element electric humidifier. Since it can accept a variety of supply water types (potable, Reverse Osmosis, De-Ionized), it is very robust and useful in a wide set of applications. The NHRS is available in capacities ranging from 10 lb/hr (4.5 kg/hr) to 180 lb/hr (81.6 kg/hr). NHRS humidifiers are packaged in two different cabinets, depending on their capacity. Figure 3 shows the configuration and relative size of the different cabinets. Table 3 on page 7 provides specifications for the NHRS product line.

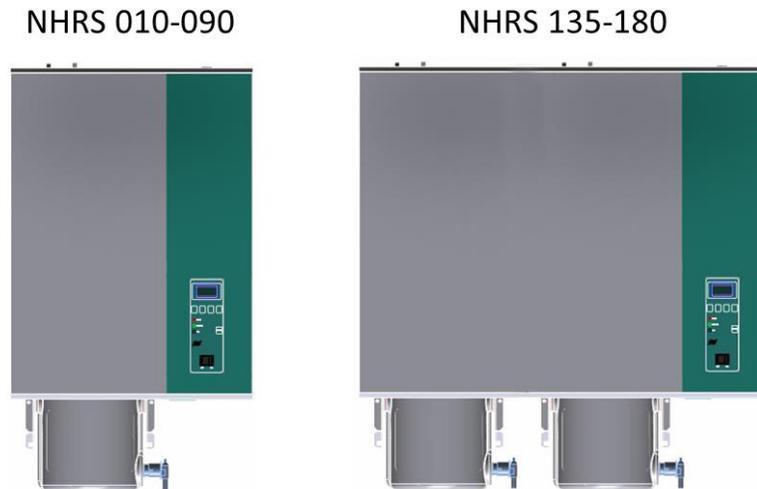


Figure 3: NHRS Models

Double Unit (NHRS 135-180)

NHRS double units have two tanks to provide increased capacity. The construction and installation of double units is identical to units with a single tank with the following exceptions:

- In addition to having two tanks, double units also have two Driver Boards. One Driver Board controls each tank.
- Double units can operate both tanks in series or parallel from a single control signal
- **Parallel Operation** – If configured for parallel operation, only one set of control wiring is required. The tanks operate in parallel giving the advantage of even wear on both tanks.
- **Series Operation** – One tank's output range is 0-50% and the other tank's output range is 50-100%. An advantage is that a lower turndown ratio can be applied to one tank.
- **Hybrid Mode** – One tank operates using Solid State Relay switching, the other tank operates using contactor switching. See P/N 2530631.
- Double units have one primary power connection, but have individual fill, drain, and steam outlet connections for each tank.

Outdoor Model

The NHRS is available for outdoor use, providing a weatherproof enclosure that allows for installation on rooftops in relatively extreme climates. Refer to the installation addendum that is provided with the NHRS Outdoor model to ensure proper installation (P/N 2531550).

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 NHRS humidifier. Refer to the installation instructions that came with the accessories for proper installation and operation.

Table 2: Options and Accessories

Component	Function of Component
Drain Water Cooler, Low Flow	Reduces drain rate from the humidifier by restricting the boiling tank drain outlet diameter, as well as providing a lower-flow drain water cooling valve.
Dual Demand Controller	Consists of a universal math module that compares two demand input signals and outputs the lowest of the two to the humidifier. This option is useful where a high limit modulating demand channel is desired (along with a modulating demand channel humidistat), since the humidifier only allows one modulating input. See P/N 2558776.
Keep Warm (Outdoor standard)	Maintains water temperature in boiling tank at 160°F (70°C) for quick response of the unit to a call for humidity while minimizing health concerns associated with standing water. See P/N 1504561.
Nortec Online/LINKS2	Provides monitoring and control, allowing humidifier to communicate with a Building Management System (BMS). Controller is factory installed and located internally to the humidifier. At the time of ordering, customer must specify the desired protocol: BACnet/IP, BACnet/MSTP, Johnson N2, or LonWorks. Nortec Online provides an internet-based monitoring and control system for the humidifier.
Remote Relay Board	Provides four built-in status relays for remote monitoring capabilities: steam production, unit fault, maintenance/service, and unit power. Relays can interface with a Building Management System (BMS). If one of the above conditions is met, a relay will close which will complete a connection. A signal will be provided to a wire terminal. See P/N 1508069.
Scale Management System	Provides a separate reservoir underneath boiling tank for scale collection. Minerals removed from the boiling tank water during steam production will collect in the scale reservoir rather than in the tank. When minor maintenance is needed, the scale tank is easily removed and emptied.
Solid State Relays	Allow for rapid response upon call for humidity, adapting instantly to humidity demand, allowing for tight control of the in-space humidity.

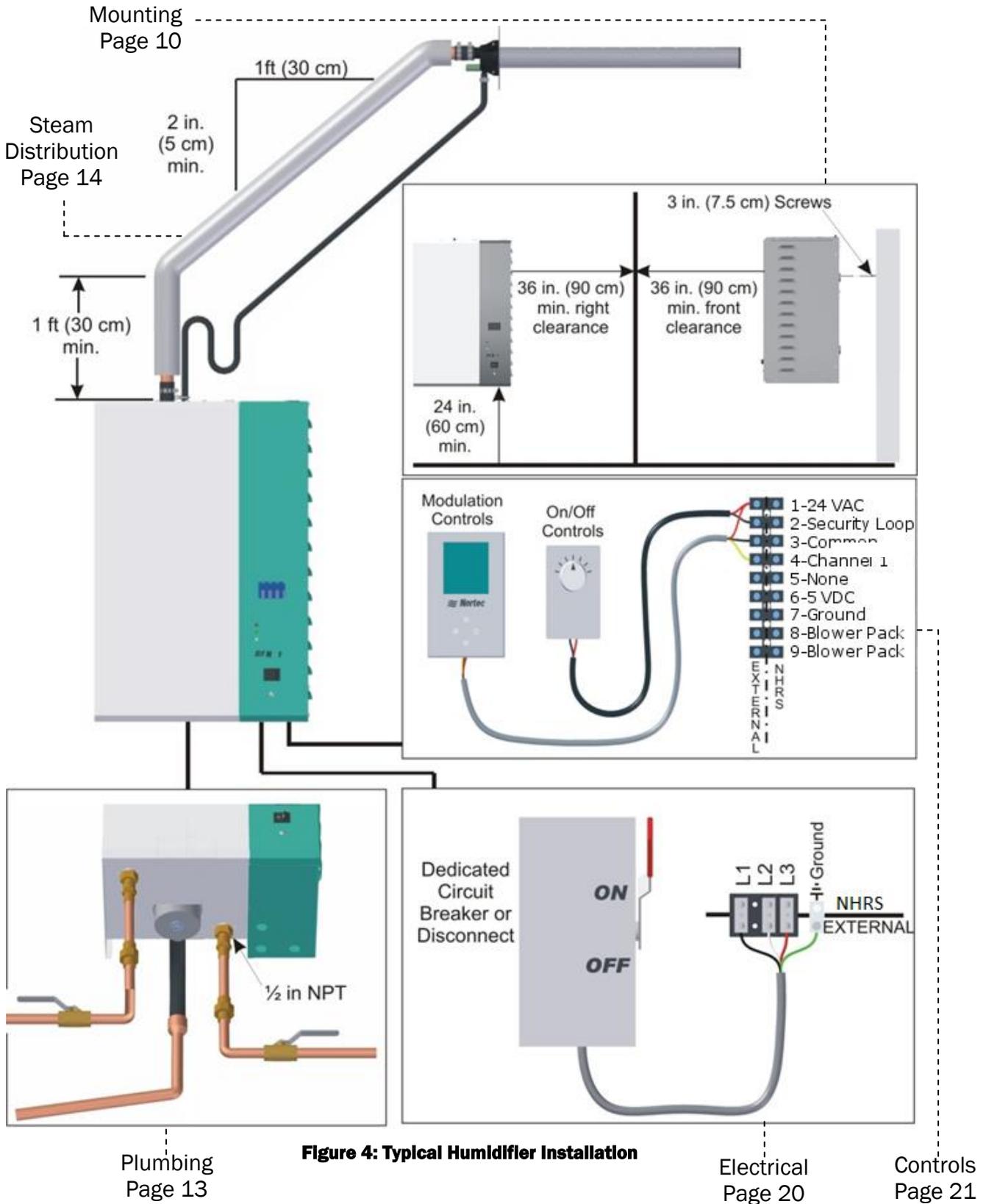
Table 3: NHRS Specifications

Phase	Capacity lb/hr (kg/hr)	Volts	NHRS Part No.	Amps	Max Ext Fuse	kW	Fill gpm (l/min)	Net/Full Weight lb (kg)
1	10 (4.5)	208	2530540	18.4	25	3.83	3.8 (14.4)	119/190 (54/86)
	10 (4.5)	220-240	2530541	15.9	20	3.83		
	10 (4.5)	440-480	2530542	8.0	15	3.83		
	10 (4.5)	550-600	2530543	6.4	15	3.83		
	15 (6.8)	208	2530544	24.5	35	5.10		
	15 (6.8)	220-240	2530545	21.3	30	5.10		
	15 (6.8)	440-480	2530546	10.6	15	5.10		
	15 (6.8)	550-600	2530547	8.5	15	5.10		
	20 (9.0)	208	2530548	36.8	50	7.65		
	20 (9.0)	220-240	2530549	31.9	40	7.65		
	20 (9.0)	440-480	2530550	15.9	20	7.65		
	20 (9.0)	550-600	2530551	12.8	20	7.65		
	30 (13.6)	208	2530552	49.0	70	10.20		
	30 (13.6)	220-240	2530553	42.5	60	10.20		
	30 (13.6)	440-480	2530554	21.3	30	10.20		
	30 (13.6)	550-600	2530555	17.0	20	10.20		
3	30 (13.6)	208	2530556	31.9	40	11.48	7.6 (28.8)	186/330 (85/150)
	30 (13.6)	220-240	2530557	27.6	35	11.48		
	30 (13.6)	440-480	2530558	13.8	20	11.48		
	30 (13.6)	550-600	2530559	11.1	15	11.48		
	45 (20.4)	208	2530560	42.5	60	15.30		
	45 (20.4)	220-240	2530561	36.9	50	15.30		
	45 (20.4)	440-480	2530562	18.4	25	15.30		
	45 (20.4)	550-600	2530563	14.7	20	15.30		
	65 (29.4)	208	2530606	63.8	80	22.98		
	65 (29.4)	220-240	2530609	55.3	70	22.98		
	65 (29.4)	440-480	2530610	27.6	35	22.95		
	65 (29.4)	550-600	2530611	22.1	30	22.95		
	90 (40.8)	440-480	2530612	36.9	50	30.60		
	90 (40.8)	550-600	2530613	29.5	40	30.60		
135 (61.2)	440-480	2530614	55.3	70	45.90			
135 (61.2)	550-600	2530615	44.2	60	45.90			
180 (81.6)	440-480	2530616	73.7	100	61.20			
180 (81.6)	550-600	2530617	59.0	80	61.20			

Installation

9	Typical Humidifier Installation	29	Optional Outdoor Temperature Setback Sensor
10	Location	30	Remote Fault Option Wiring
11	Blower Pack Clearance Requirements	31	Options and Accessories
12	Mounting with Keyholes	32	Keep Warm (Outdoor Standard)
13	Plumbing	32	Nortec Online/LINKS2
14	Steam Distributor	32	Remote Relay Board
15	Steam Lines and Condensate Return	32	Scale Management System
21	Electrical	32	Solid State Relays
22	External Controls		
22	Control Wiring		
22	Duct Humidification		
23	Space Humidification		
24	On/Off Control Wiring		
26	Modulating Control Wiring		
28	Transducer Control Wiring		

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 temperatures between 41 and 104°F (5 and 40°C), and relative humidity between 5 and 95% (non-condensing).
- When possible, install the humidifier below the steam distributor. If mounted above 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 as net output will be reduced as a result of heat loss through the steam line.
- When possible, mount the humidifier at a height convenient for servicing.

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

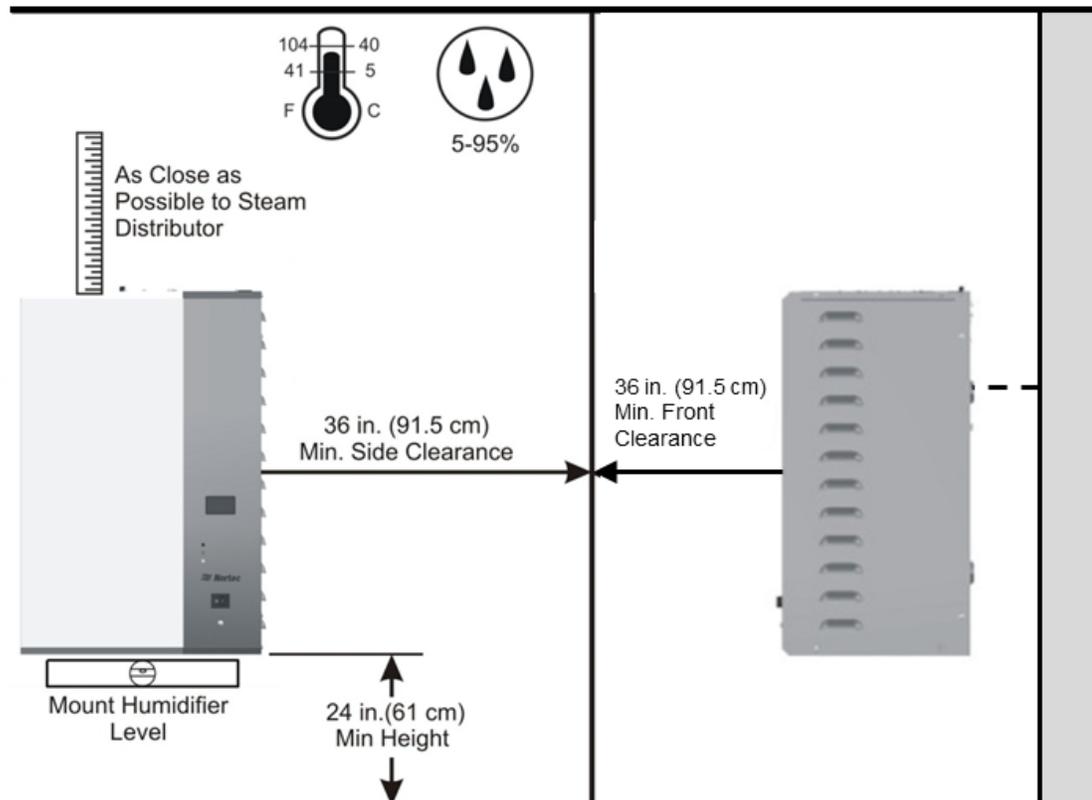


Figure 5: Mounting Location / Clearance

Blower Pack Clearance Requirements

For more information regarding the clearance requirements of the Remote Mounted Blower Pack (P/N 2572615), refer to installation manual (document number 2572641).

Table 4: Clearances for Blower Packs on Low Speed*

Humidifier Capacity lb/hr (kg/hr)	Min. Frontal Clearance Inches (cm)	Min. Overhead Clearance Inches (cm)	Min. Left Side Clearance Inches (cm)	Min. Right Side Clearance Inches (cm)
Up to 30 (13.6)	132 (336)	12 (31)	12 (31)	12 (31)
30-100 (13.6-45.4)	Not recommended	Not recommended	Not recommended	Not recommended

Table 5: Clearances for Blower Packs on High Speed*

Humidifier Capacity lb/hr (kg/hr)	Min. Frontal Clearance Inches (cm)	Min. Overhead Clearance Inches (cm)	Min. Left Side Clearance Inches (cm)	Min. Right Side Clearance Inches (cm)
Up to 30 (13.6)	132 (336)	12 (31)	12 (31)	12 (31)
30-100 (13.6-45.4)	Not recommended	Not recommended	Not recommended	Not recommended

***NOTES:**

Nominal Conditions: 72°F (22.2°C), 43% RH.

Low speed not recommended for 50-100 lb/hr humidifiers.

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 NHRS Series humidifier is wall mounted using keyholes located on the back of the unit cabinetry.
2. Use #12 x 3" (7.5 cm) screws mounted into 2x4" studs or better. Two screws are required for units with one tank (NHRS 10 to NHRS 90 lb/hr). Three screws are required for units with two tanks (NHRS 135 and 180 lb/hr).
3. Keyholes are spaced 16" (40.6 cm) apart center to center as per UL certification standard stud spacing dictates. Insert screws into the studs until there is 1/4" (0.6 cm) of screw exposed. Ensure the screws are level to each other.
4. Raise the unit and place the screws through the keyholes. Make sure the unit is level before tightening the screws to secure the unit in place.
5. Place L-shaped brackets on top of the unit, ensuring the holes are in-line with the studs. Using the appropriate sized wood screw, fasten the L-brackets to the studs, securing the unit from any upwards motion. See Figure 6.

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

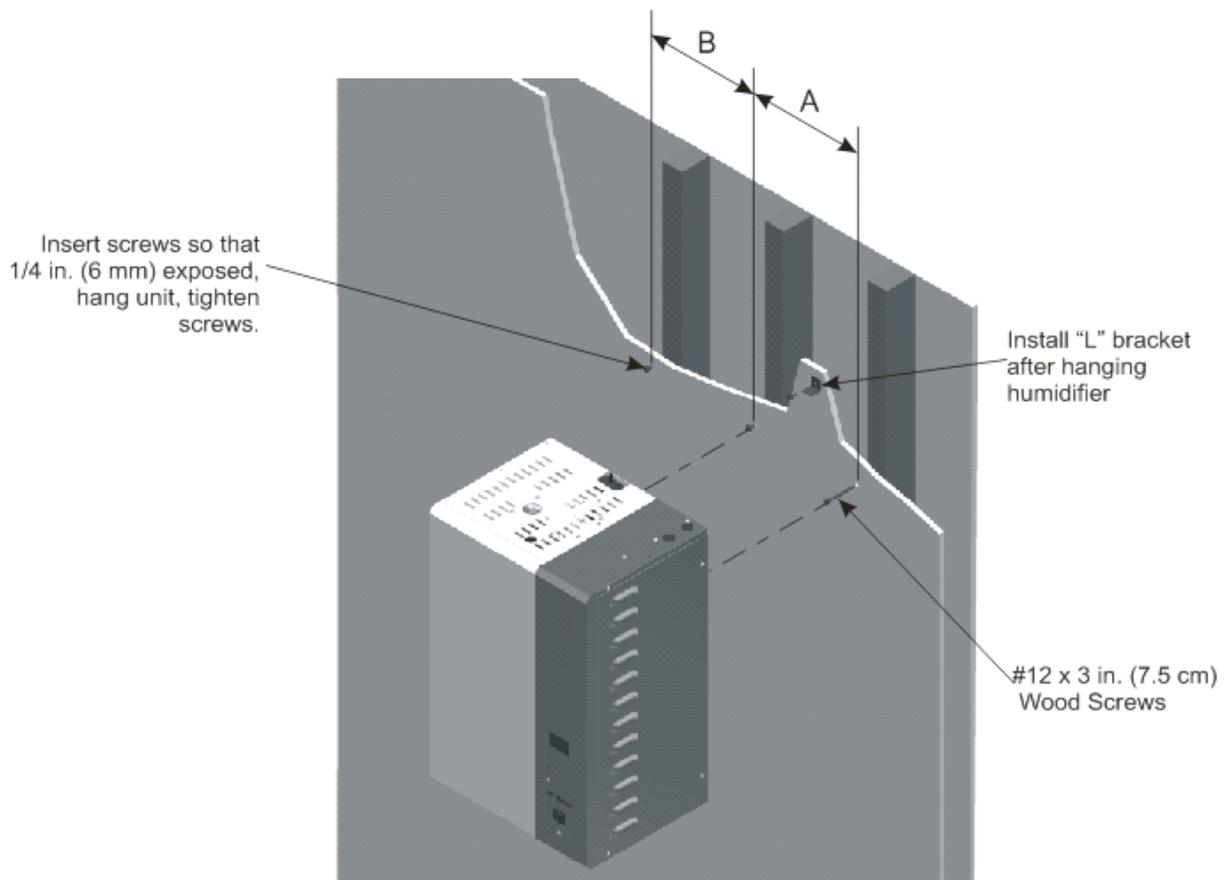


Figure 6: Mounting with Keyholes; A = B = 16" (40.6 cm)

Plumbing

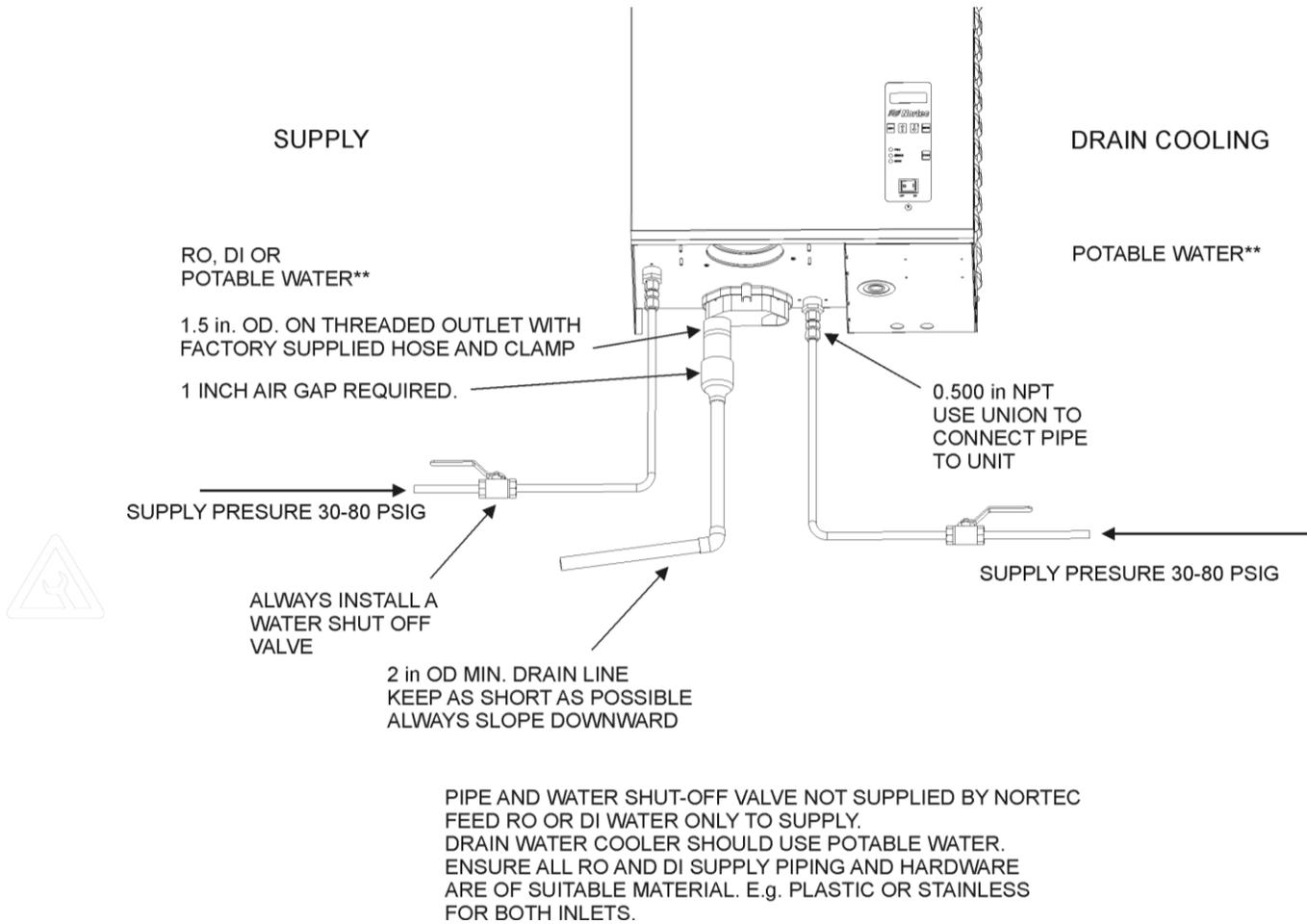


Figure 7: Water Supply and Drain Connection



Note:

- Drain water is very hot, do not drain to public sink.
- 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 have pressure between 30 and 80 psig and have a hardness between 0 and 12 gr/gal. Various types of supply water may be used: soft water, de-ionized, reverse osmosis, or potable.
- 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. Ensure air gap is installed as shown. A restricted drain can cause the boiling tank to become heavily concentrated with minerals and may result in poor operation or water backing up at the air gap.

Steam Distributor

- Steam generated by the NHRS may be distributed directly into a conditioned environment with a Remote Blower Pack (P/N 2572615), or into an air handling system using either Nortec steam distributors or Nortec's SAM-e steam distribution manifold.
- 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 provides common guidelines for locating a steam distributor in a duct.

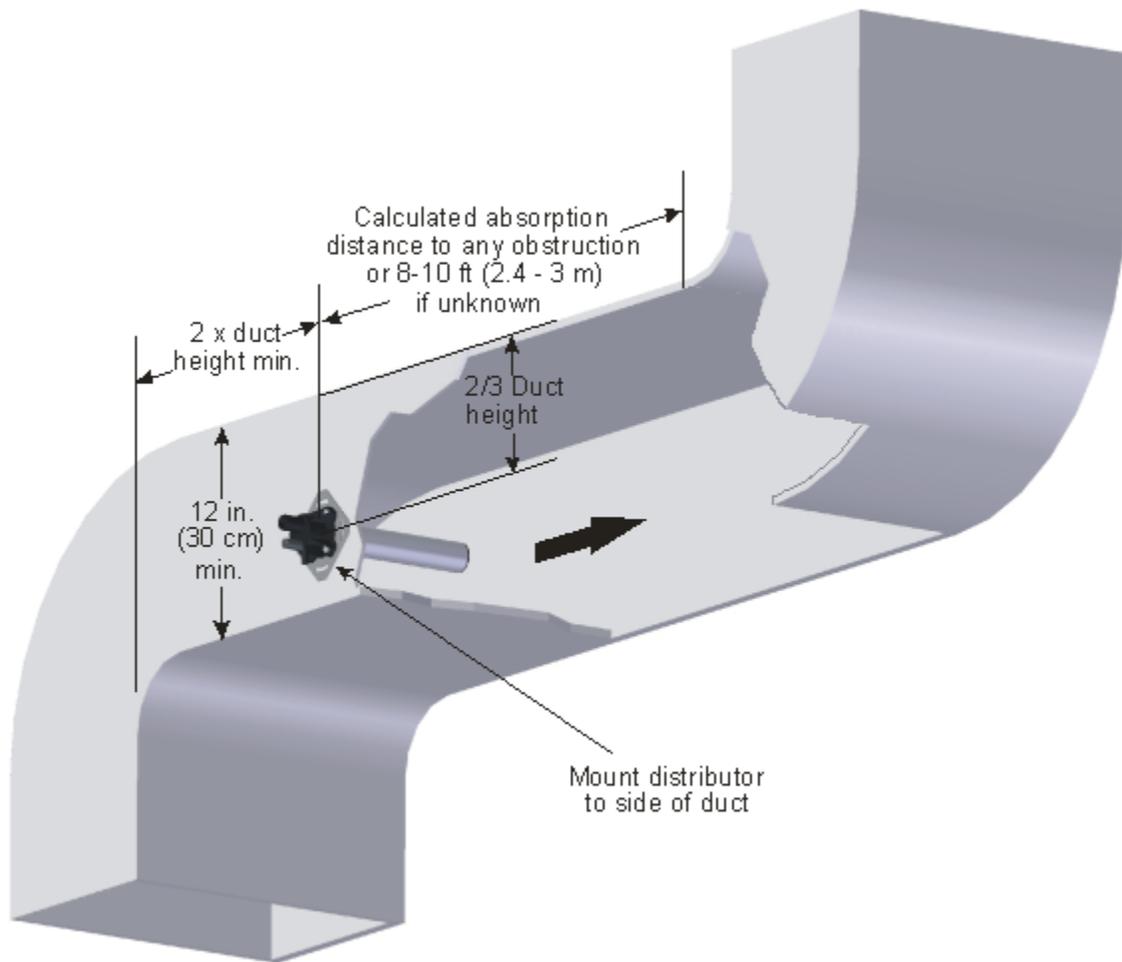


Figure 8: Distributor Location In Duct

Note:

- Install the NHRS as close as possible to whatever steam distributor is used.
- Refer to distributor, SAM-e, or Remote Blower Pack installation manuals for detailed installation instructions (2556592, 1507619, and 2572641, respectively)



Steam Lines and Condensate Return

The following instructions must be followed for installation of steam lines for ASD, BSD, CSD, SAM-e, and Remote Blower Packs. Failure to used material in Table 6 and Table 7 on page 16, or failure to follow any other steam line installation instructions, will result in improper operation and could void warranty.



Danger:

The NHRS 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 NHRS in such a way that backpressure can develop during operation could result in serious injury or damage to property.

Table 6: Recommended Maximum Length of Steam Line

NHRS Unit Size	Steam Output (lbs/hr)	Distance ft (m)	Possible Loss ft (m)	Steam Line Size
010	10	15 (4.5)	2 (0.6)	1.5"
015	15	17.5 (5)	2.25 (0.7)	
020	20	20 (6)	2.5 (0.8)	
030	30	25 (7.5)	3 (0.9)	
045	45	35 (10.5)	4 to 5 (1.2 to 1.5)	
065	65	45 (13.5)	5 to 10 (1.5 to 3.0)	2 x 1.5"
090	90	50 (15)		
135	135	50/tank (15)		
180	180	50/tank (15)		

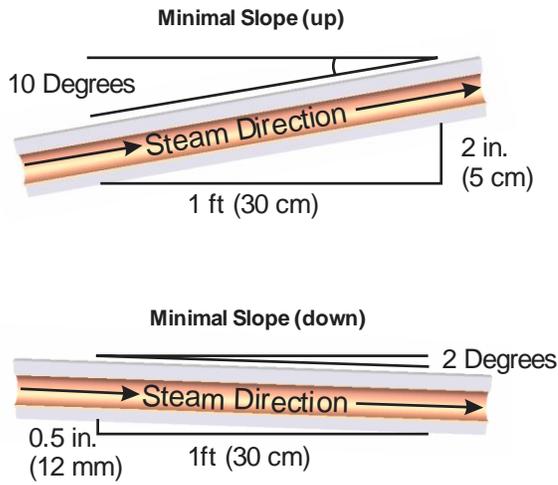
NOTES:

- 1) This chart gives the maximum length of recommended steam line by unit size.
- 2) The use of steam line other than copper, stainless steel, or Nortec steam hose will void the warranty and may cause adverse effects regarding the operation of the humidifier.
- 3) Nortec steam line shall only be used for steam line runs of 10 ft (3m) or less.
- 4) Long steam runs affect accuracy of humidifier and its ability to quickly respond to changes in demand. When tight control is required, ensure steam line run is as short as possible.
- 5) NHRS 135 and 180 have two tanks.

Table 7: Recommended Materials and Sizes for Steam Runs.

Supply Water Type	Tank Size (lbs/hr)	Steam Run ft (m)	Steam Line Material	Steam Line Description
Potable	0-30	0-10 (0-3)	Copper Tube	1.5" MED-L Tubing (1.625" OD)
	0-30	10-30 (3+)	Copper Tube	2.0" MED-L Tubing (2.125" OD)
RO or DI	0-30	0-10 (0-3)	Stainless Steel Tube	1.75" Tube x 0.065" thick
	0-30	10-30 (3+)	Stainless Steel Tube	2.0" Tube x 0.065" thick
Potable	45-90	0-20 (0-6)	Copper Tube	1.5" MED-L Tubing (1.625" OD)
	45-90	20+ (6+)	Copper Tube	2.0" MED-L Tubing (2.125" OD)
RO or DI	45-90	0-20 (0-6)	Stainless Steel Tube	1.75" Tube x 0.065" thick
	45-90	20+ (6+)	Stainless Steel Tube	2.0" Tube x 0.065" thick

Use Appropriate Slope



Insulate Pipe



Figure 9: Steam Line Slope and Installation

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 SAM-e 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.

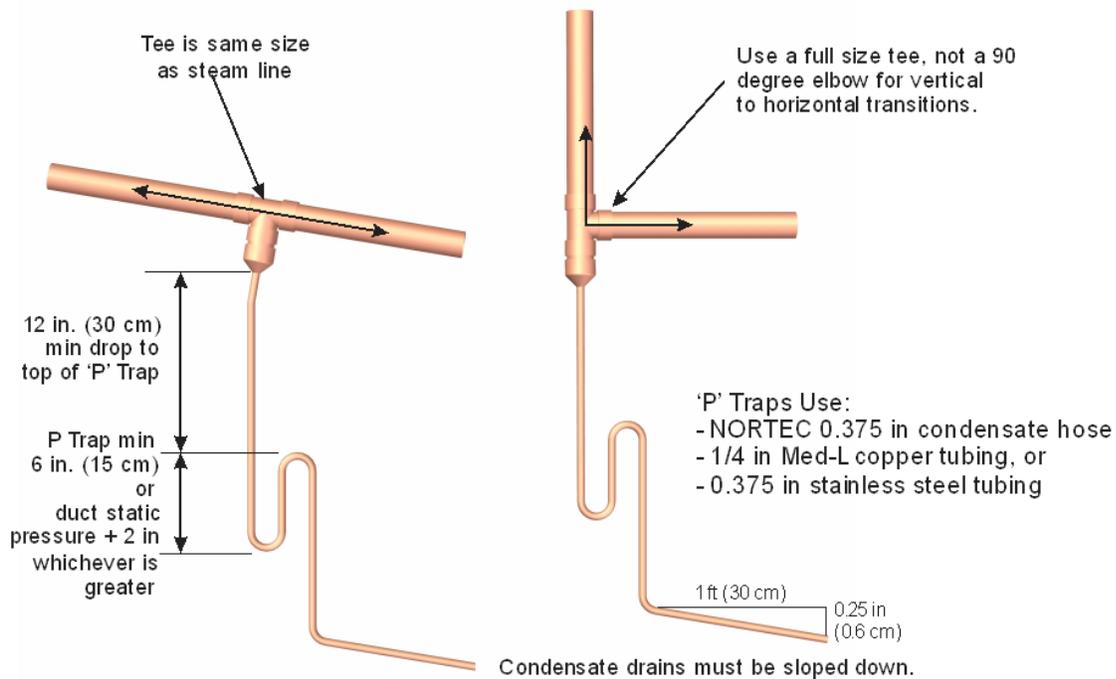


Figure 10: Condensate Traps

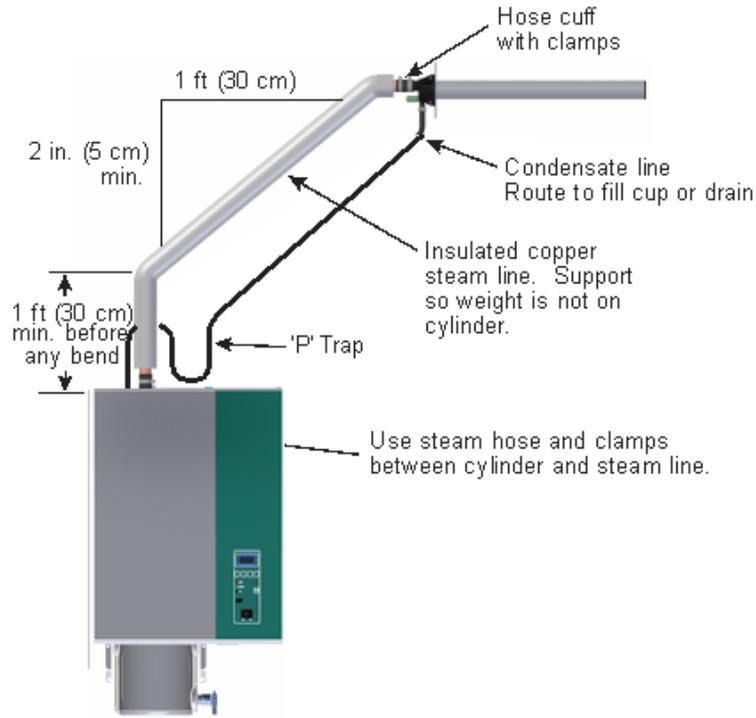


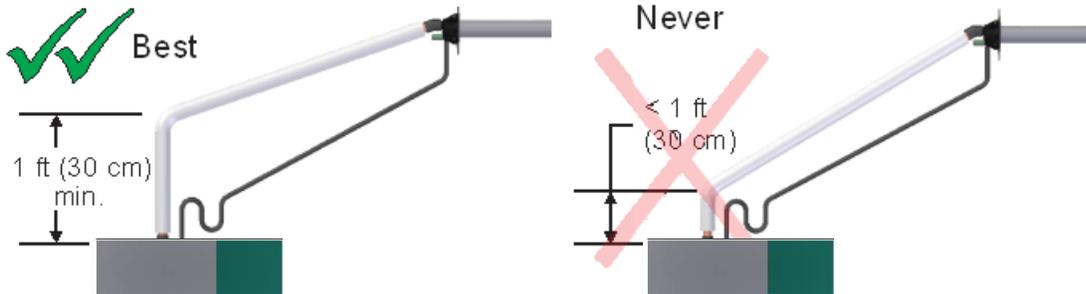
Figure 11: Typical Steam Line Installation

Steam Line Rules

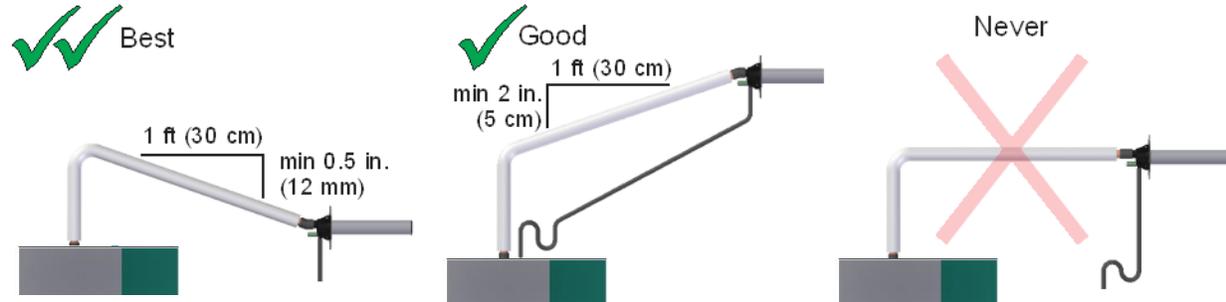
The following 10 points provide rules for installing steam lines connecting the NH humidifier to ASD, BSD, CSD, SAME and remote blower packs. In addition to these rules never use unapproved material for steam lines.



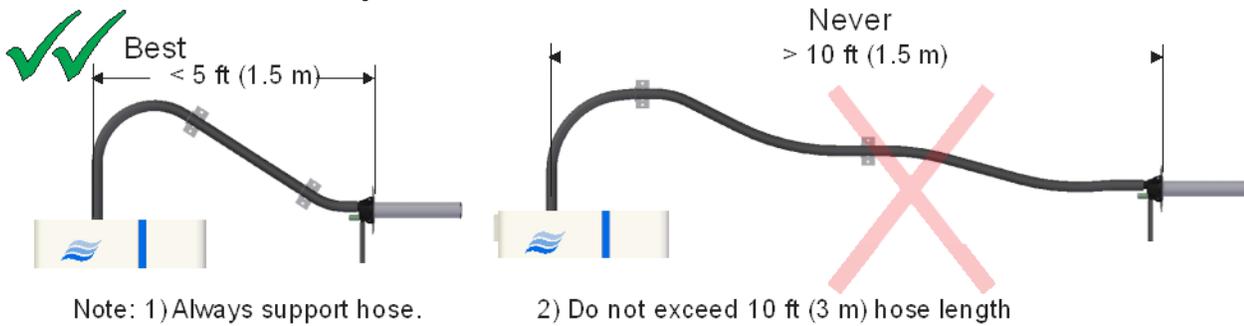
1. Allow a minimum of 12" (30 cm) before first bend in steam line.



2. Slope the steam lines.



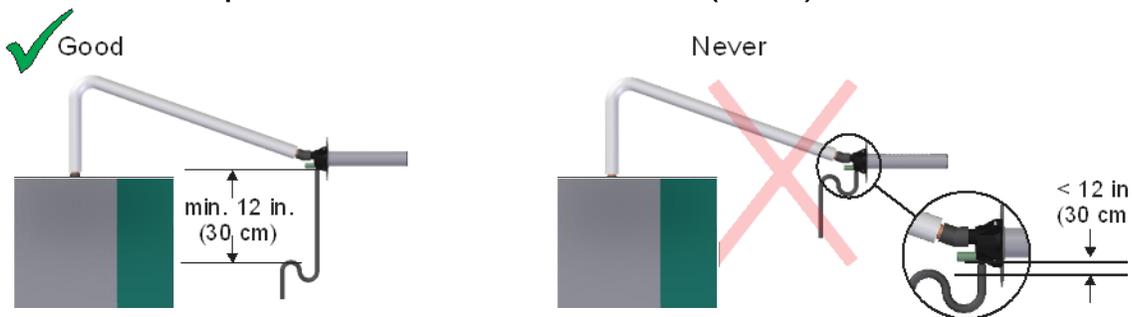
3. Use steam hose only for short distances.



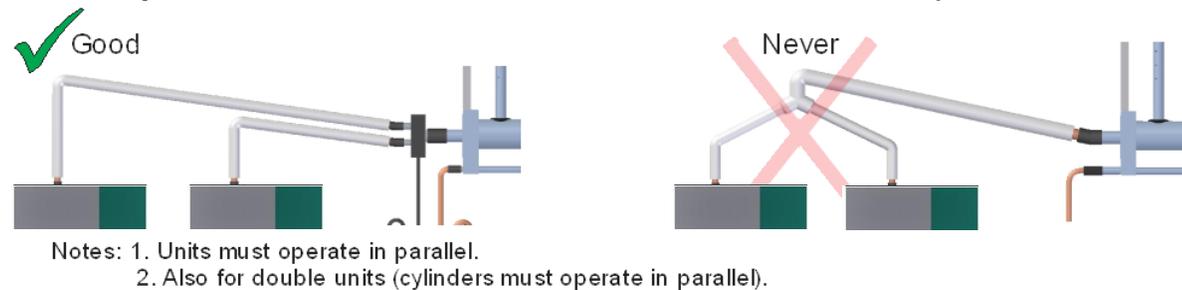
4. For steam hose, maintain minimum 12" (30 cm) bend radius.



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



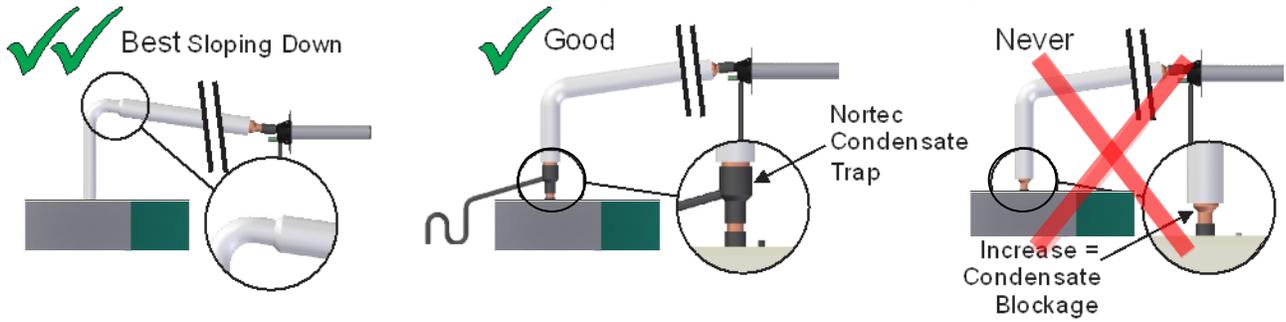
6. Only combine steam lines at steam distributor with Nortec adapter.



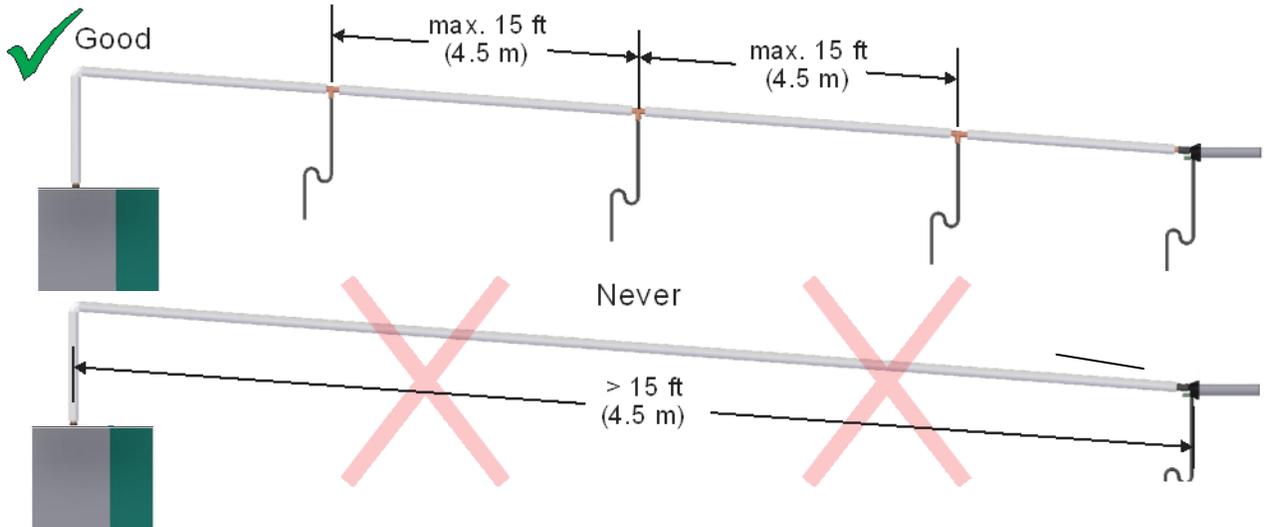
7. Install condensate traps at low points and horizontal to vertical transitions.



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



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



10. In addition, never:



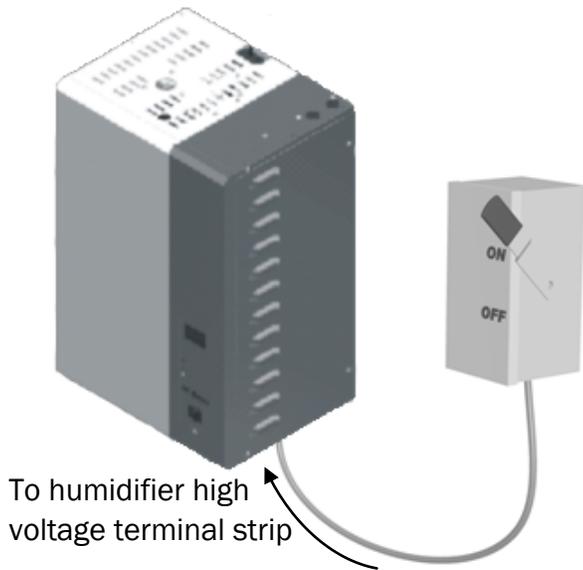
After installation, always

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



Electrical

Caution: Wiring to be performed by a licensed Electrician.



To humidifier high voltage terminal strip

Note:

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

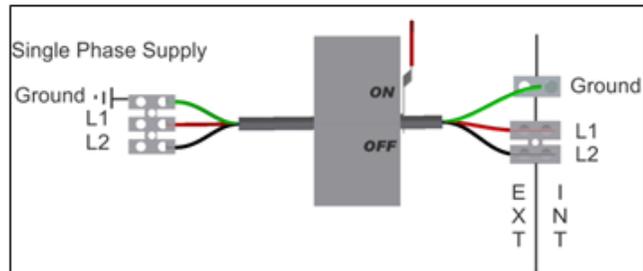
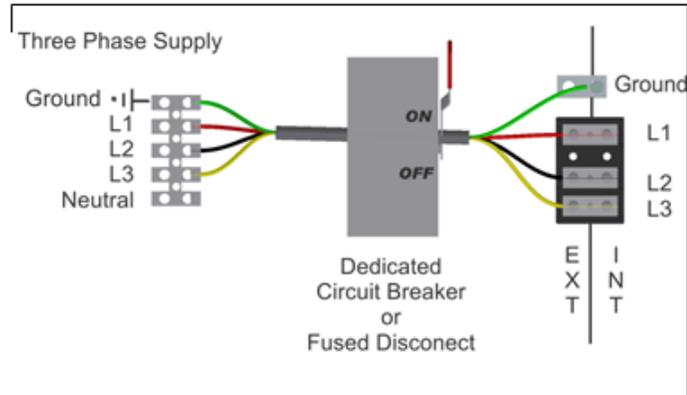


Figure 12: Primary Power Connection

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 NHRS humidifier can be operated with a modulating input or as On/Off.

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



Control Location

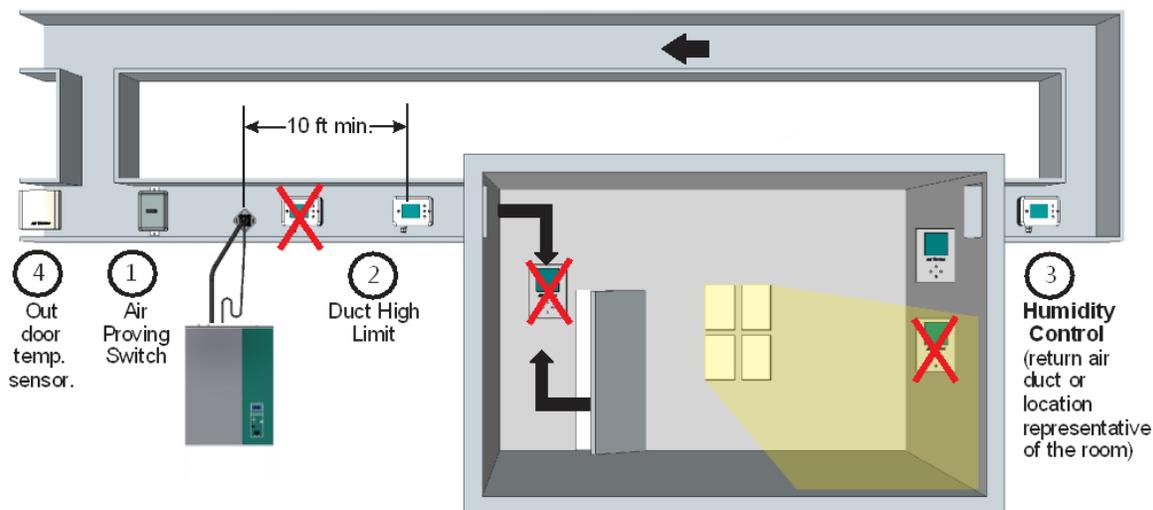


Figure 13: Control Location (Duct Humidification)

Duct Humidification

- 1 Air Proving Switch
 - Locate so that it can sense air flow, or lack thereof.
- 2 Duct High Limit
 - NHRS operates with On/Off control.
 - Locate at least 10 feet (3.0 m) from steam distributor, or far enough that steam is fully absorbed under normal conditions.
- 3 Humidity Control
 - NHRS 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 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

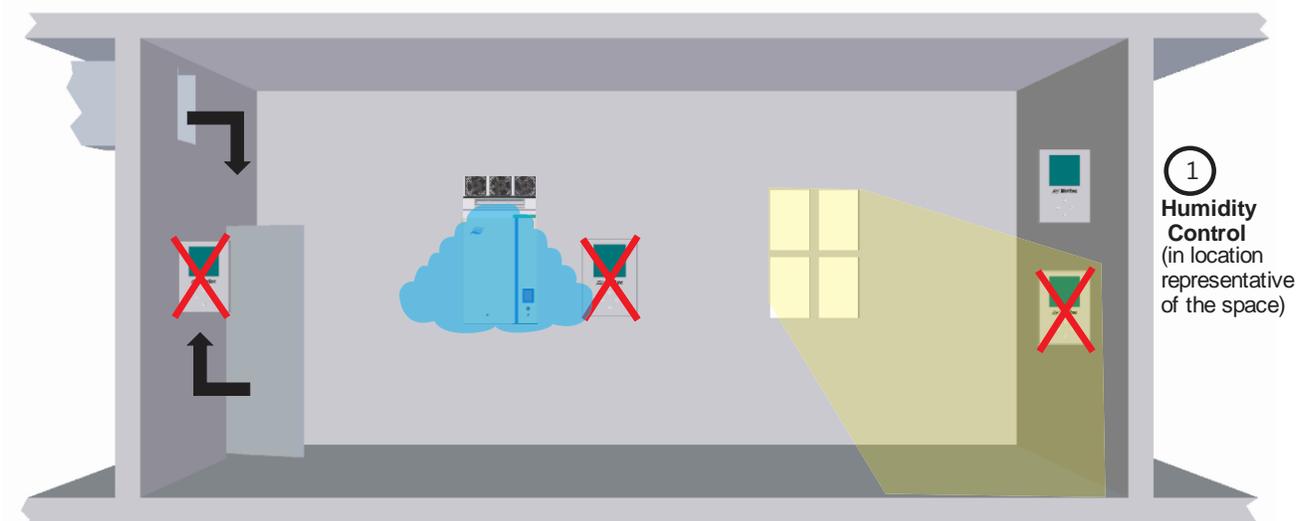


Figure 14: Control Location (Space Humidification)

- 1 Humidity Control
 - NHRS 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 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 outdoor air temperature.

On/Off Control Wiring

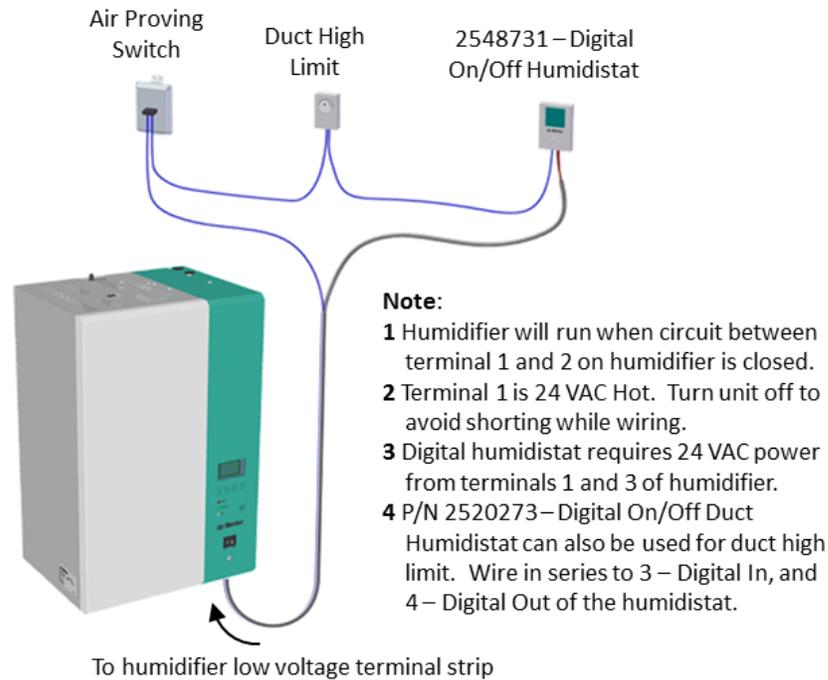


Figure 15: On/Off Controls

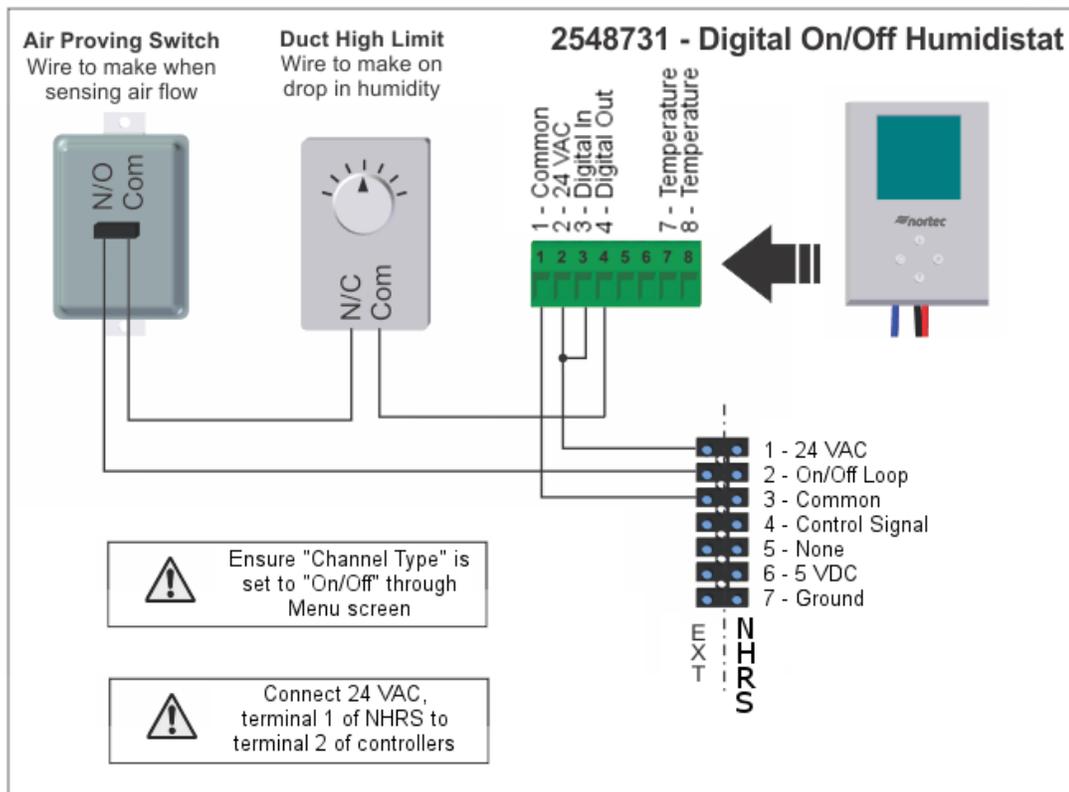


Figure 16: Digital On/Off Humidistat

2520273 - Digital On/Off Duct Humidistat Package

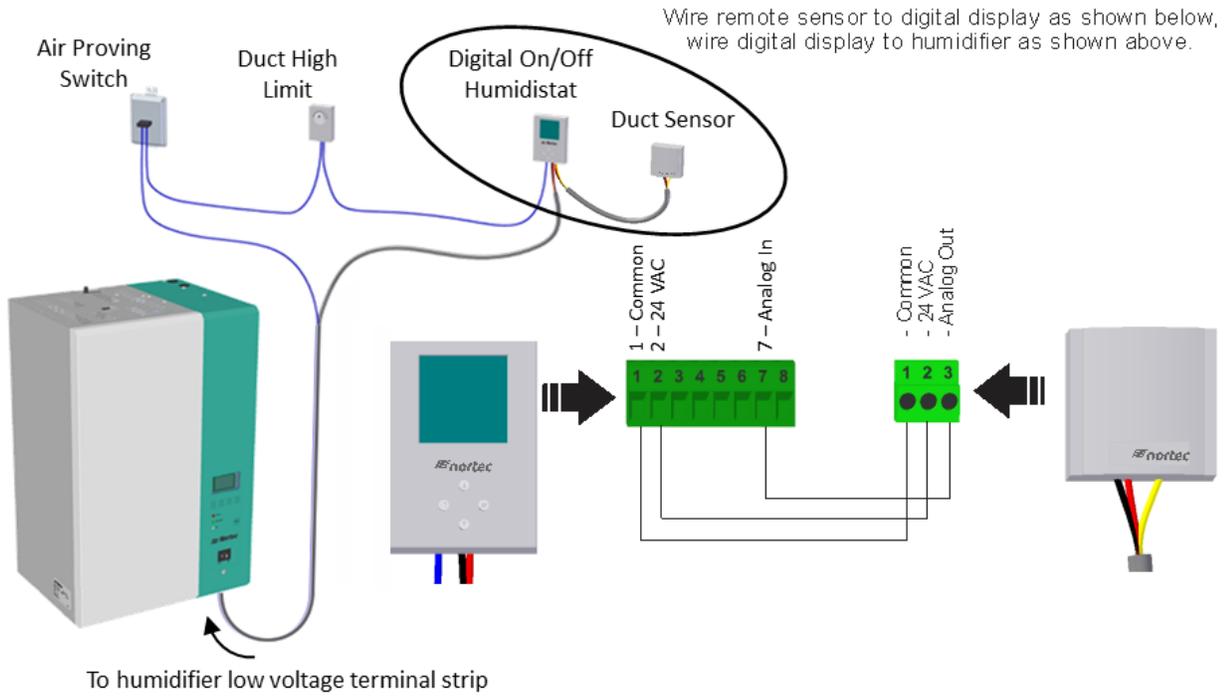


Figure 17: Duct Sensor Wiring

Modulating Control Wiring

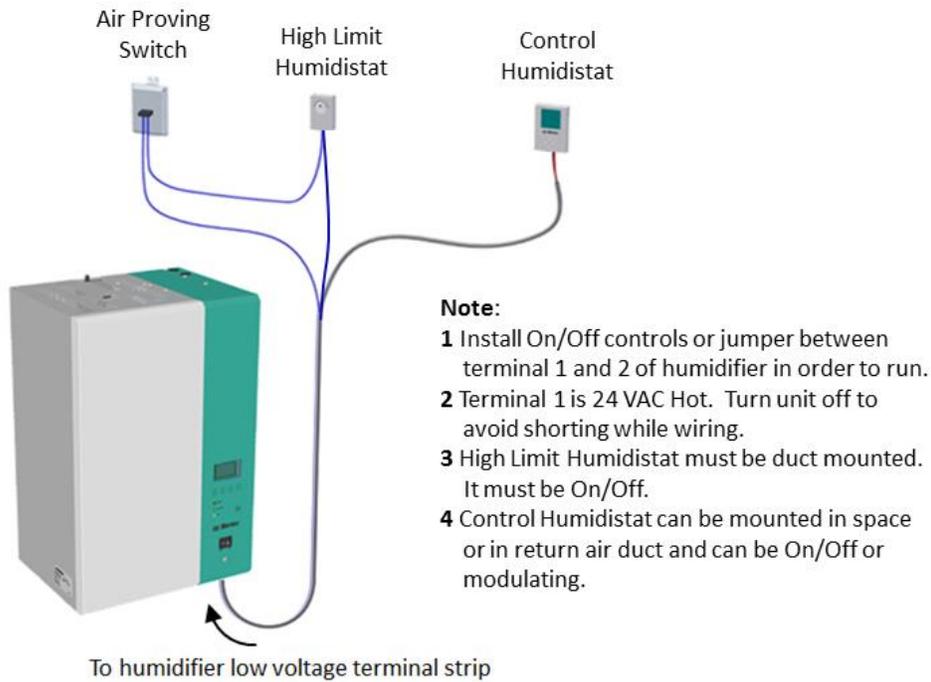


Figure 18: Modulating Controls

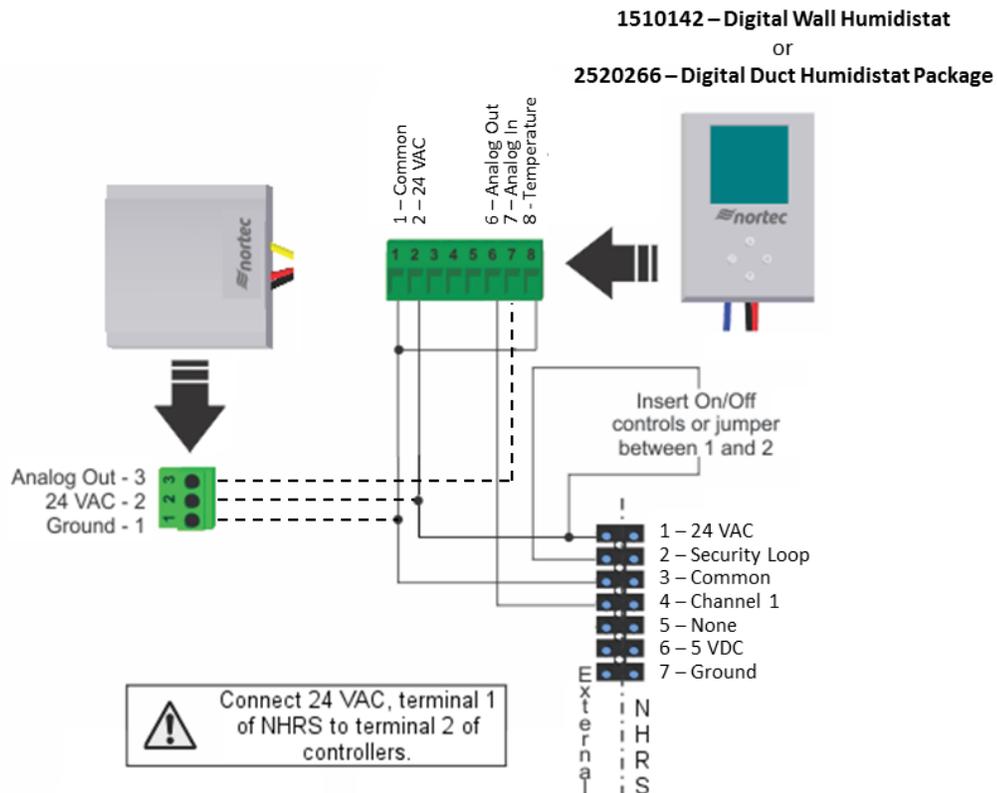


Figure 19: Digital Modulating Humidistats

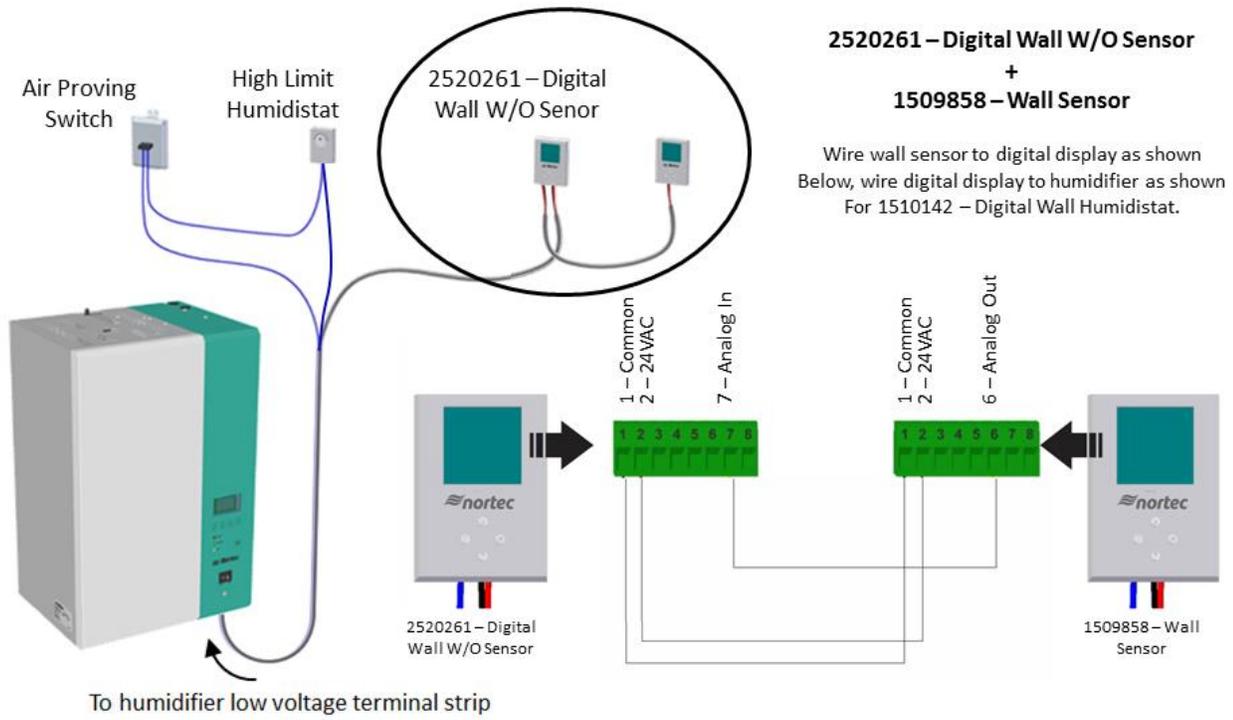


Figure 20: Digital Wall Humidistat - Remote Wall Sensor

Transducer Control Wiring

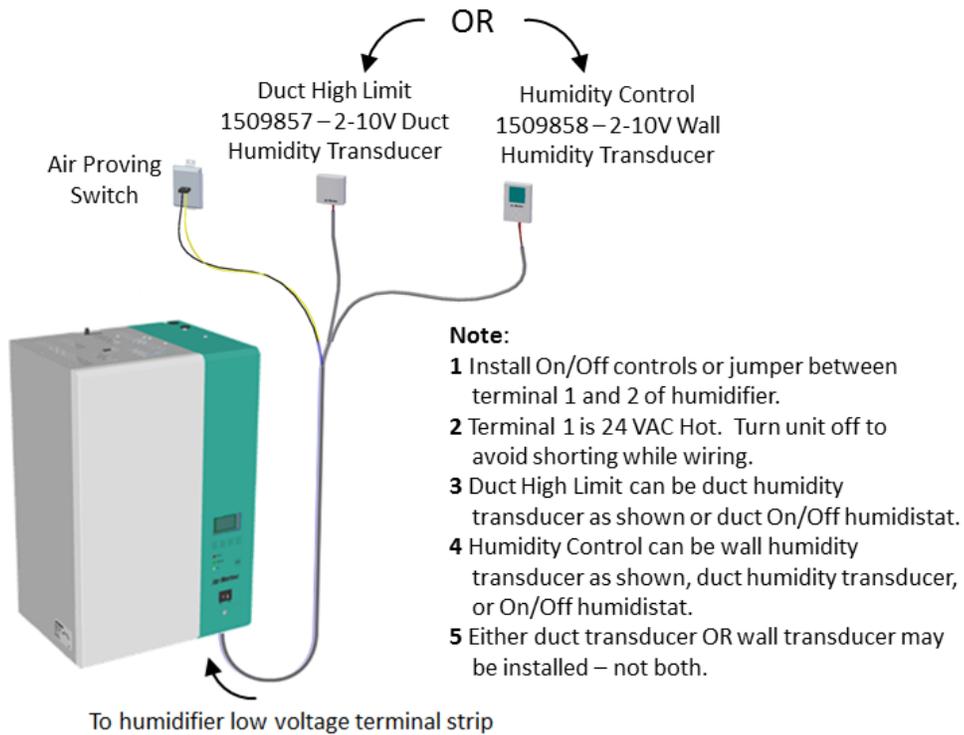


Figure 21: Transducers

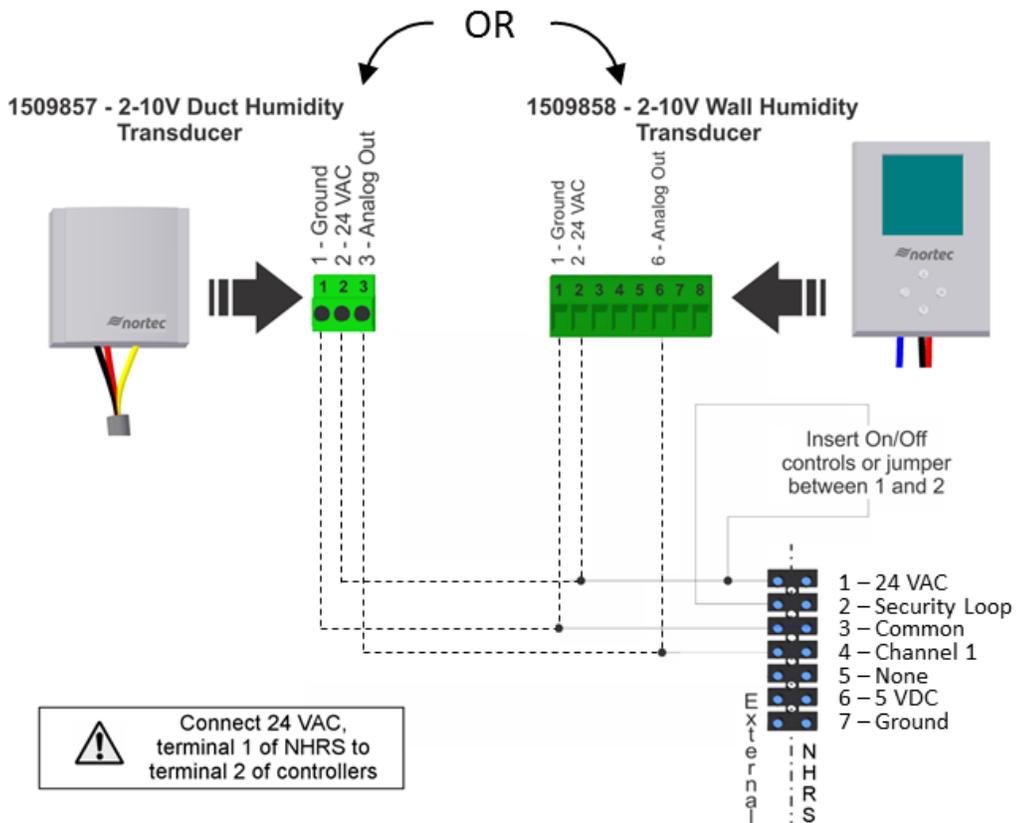


Figure 22: Digital Transducers

Optional Outdoor Temperature Setback Sensor

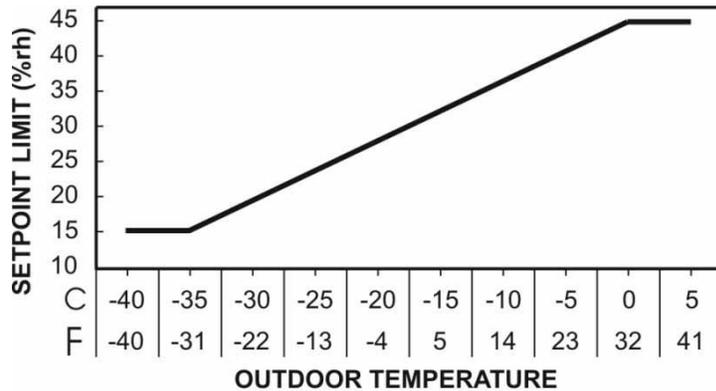


Figure 23: Outdoor Temperature Setback

- 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.

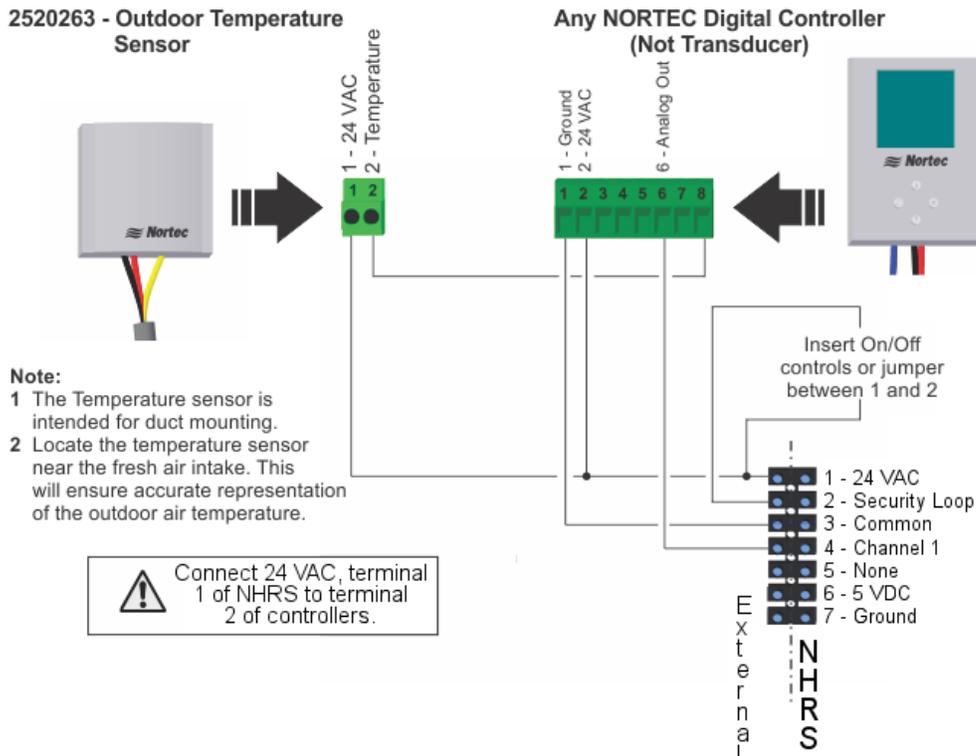


Figure 24: Outdoor Temperature Setback wiring

Remote Fault Option Wiring

The NHRS remote fault option (P/N 1508069) includes four relays that can provide remote status indication. The relays are mounted to a remote fault board which is located as shown in Figure 26. 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.

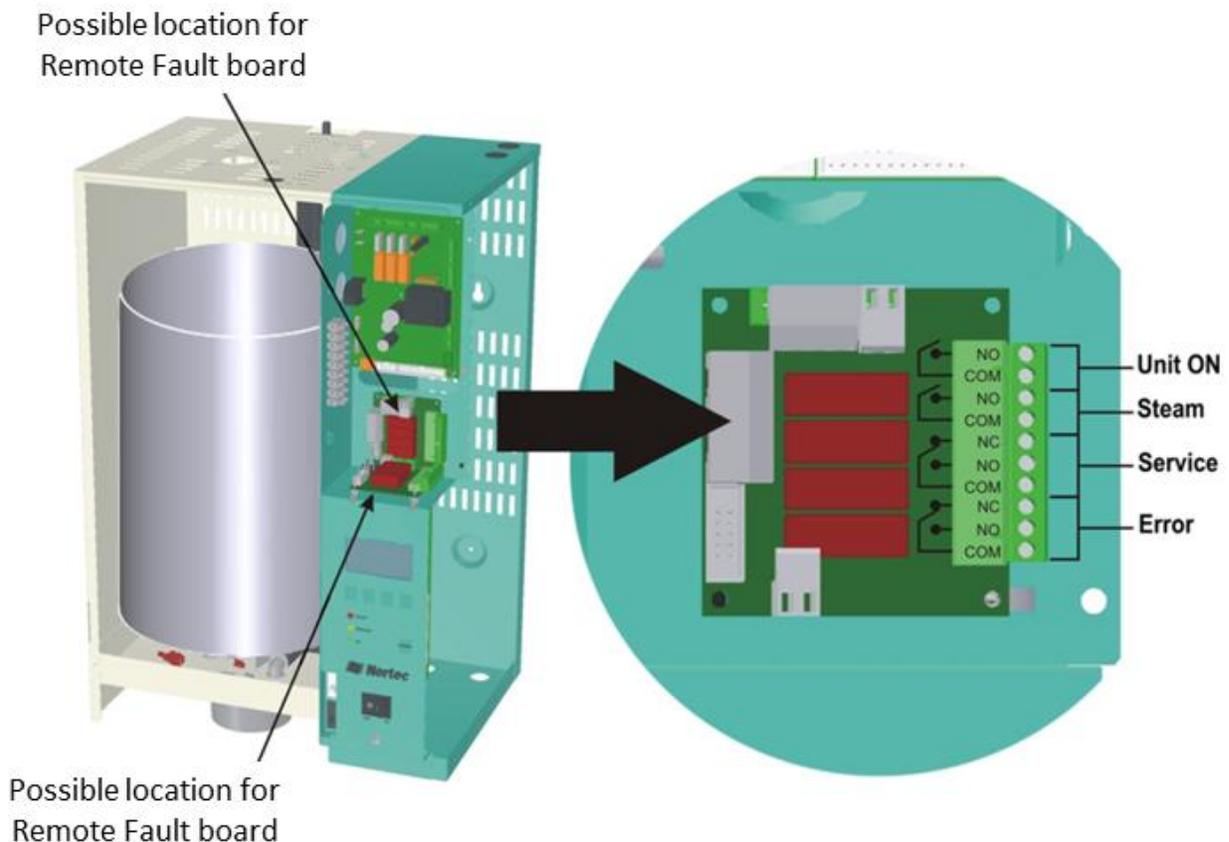


Figure 25: Location of Remote Fault board

Options and Accessories



Note:

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

Blower Pack

Optional blower pack (part number 2572615) can be used to distribute steam to localized areas, or in areas that do not have built-in air distribution systems. Blower packs are available in remote configuration, are piped in the field, and are wired to the humidifier RMBP power source (or a separate power source if the installation requires).

For detailed installation information, refer to the Blower Pack installation and operation manual (document 2572641). Refer to Table 4 and Table 5 on Page 11 for clearance information.

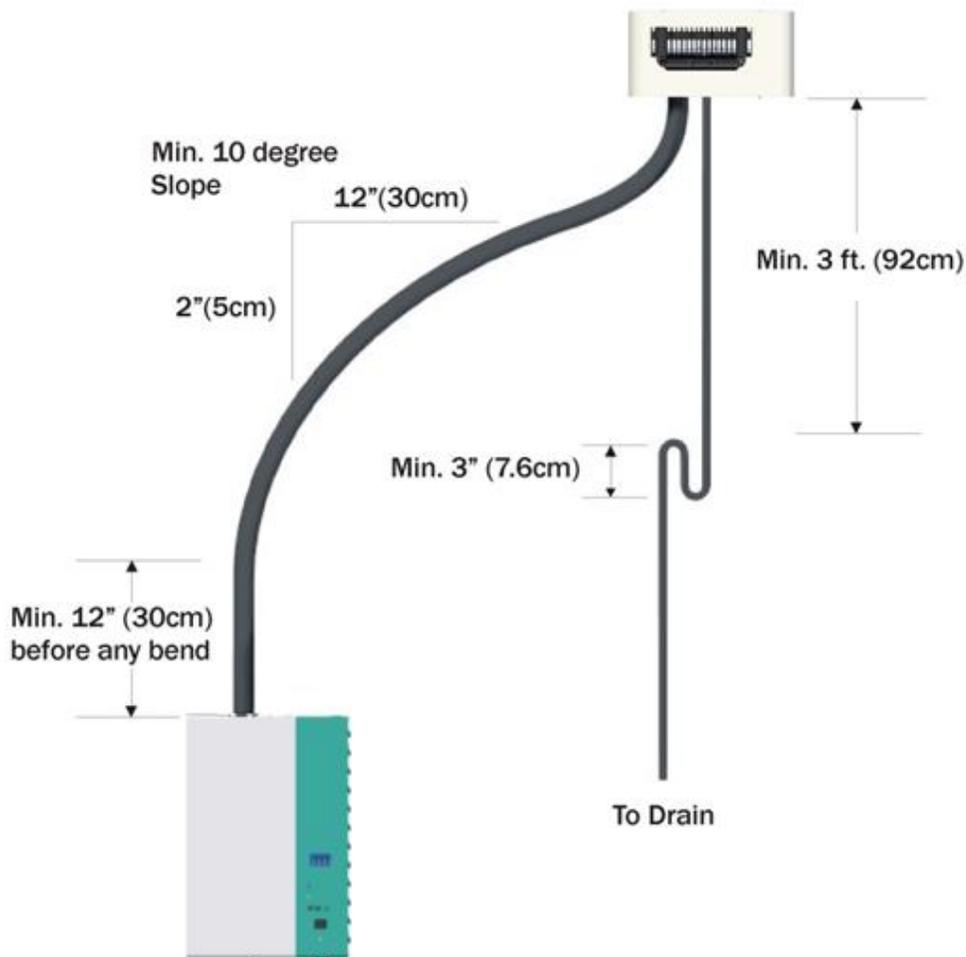


Figure 26: Remote Mounted Blower Pack.

Keep Warm (Outdoor Standard)

Menu configuration setup can be done at factory, which allows the water temperature in the tank to be maintained at 160°F (70°C) for quick response of the unit to a call for humidity. This aids in minimizing health concerns associated with standing water.

Part number 1504561.

Nortec Online/LINKS2

Nortec OnLine enables a humidifier to communicate and be monitored through the Internet. Several configurations are available: Dynamic Host Configuration Protocol (DHCP), Dial-up, General Packet Radio Service (GPRS), Slave, and Static IP. Consult factory for details.

Nortec LINKS provides monitoring and control allowing humidifier(s) to communicate to a Building Management System (BMS). The controller is factory installed and is located internally to the humidifier. Several communication protocols are available: BACnet MSTP, BACnet IP, Johnson N2, and LonWorks. Consult factory for details.

Nortec LINKS2 is a package that includes both items above: a particular communication protocol as well as Nortec OnLine.

Remote Relay Board

An optional remote fault kit is available that can provide remote indication of humidifier status. The relays will activate upon the following humidifier conditions: steam production, unit fault, maintenance/service, and unit power. The kit can be factory or field installed and can interface with a BMS. See Page 30 for wiring and installation.

Part number 1508069.

Scale Management System

The Scale Management System provides a separate reservoir underneath the steam tank for scale collection. The addition of this option reduces maintenance time significantly. Minerals removed from the water during steam production will collect in the scale reservoir rather than in the tank. When minor maintenance is needed, the scale reservoir is easily removed and emptied. Without this option, the NHRS requires more effort during minor maintenance: cleaning of the steam tank and heating elements. More humidifier downtime is required for this maintenance. With the Scale Management System, minor maintenance simply requires the scale reservoir to be emptied, which can be done in a matter of minutes.

Part number 2533179 (two must be ordered for units with two tanks, NHRS 135 & NHRS 180).

Solid State Relays

Solid State Relay Control (SSR Control) allow for rapid response upon a call for humidity by replacing the standard contactors with a higher-performing component. The operating window for the standard contactor is 2 minutes, but the SSRs will cycle in approximately 2 seconds. This allow for quick response and tight control of the humidity. This option is essential where a tight humidity tolerance is required.

Part number will vary according to the capacity and voltage of the unit.

Start Up

34 Installation Check

- 35 NHRS User Interface
- 35 Auxiliary Drain Switch
- 35 Door Interlock Switch

36 Start Up Procedure

- 36 Initial Start-Up Procedure

38 Information Screens

45 How the Humidifier Works

- 45 Start Up
- 45 Automated Operation
- 46 System Drains

47 Selecting an RH Setpoint

Installation Check

Before turning on power to the NHRS, inspect the installation to ensure that it was carried out correctly. Refer to figure below, the NHRS Pre-Start Up Checklist, and the preceding chapter on installation.

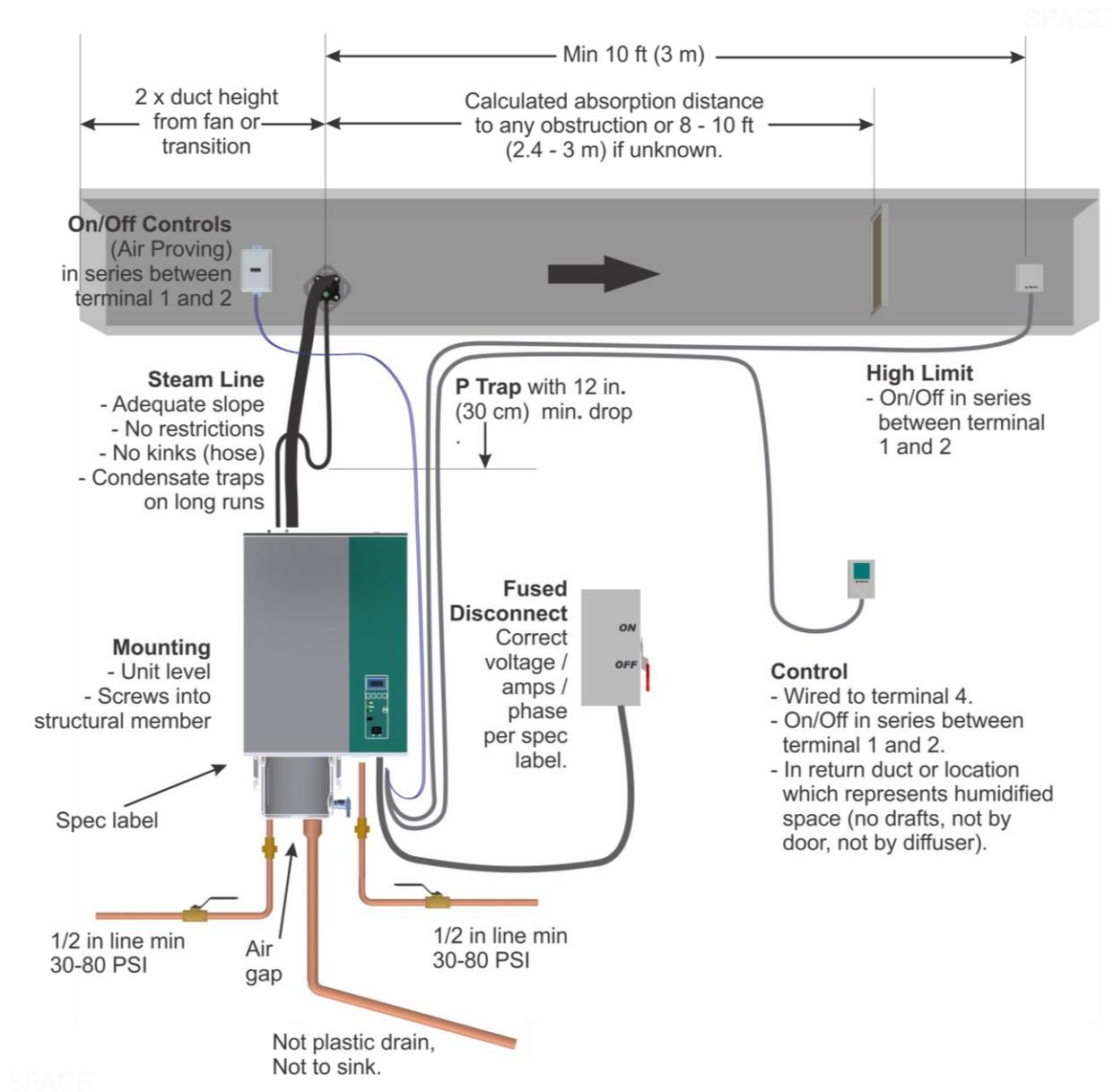


Figure 27: Installation Check

NHRS User Interface

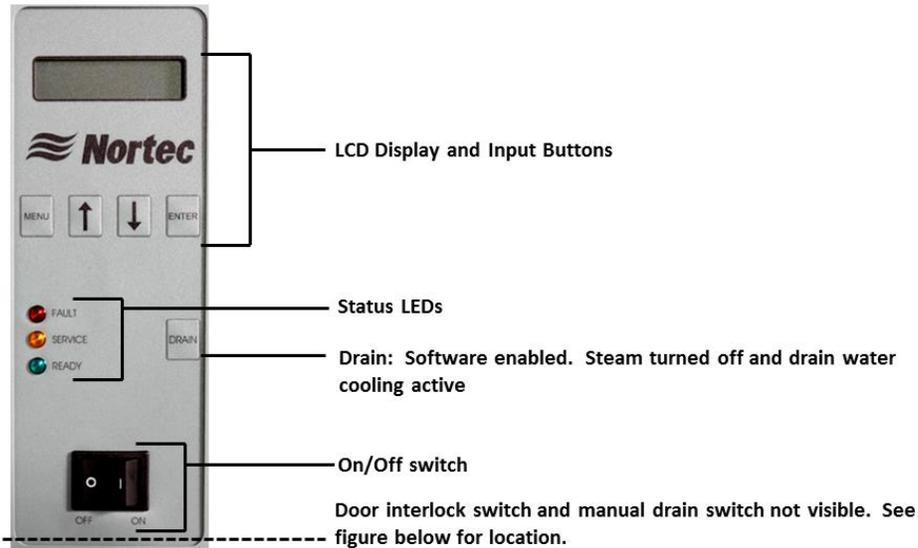


Figure 28: NHRS User Interface

Auxiliary Drain Switch

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

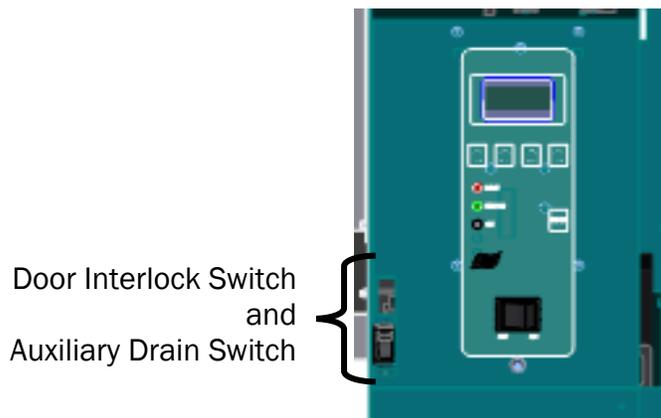


Figure 29: Door Interlock Switch and Auxiliary Drain Switch

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.
NOTE: if the optional Scale Management System is installed, make sure the valve on the scale reservoir is closed.
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 NHRS humidifier will now carry out a system test. The display below appears and the three LEDs light for approximately three seconds.

Test

- If a fault is detected during the system test, a corresponding fault message is triggered.
- If the system test is successful, the steam tank fills up and a float test is carried out (function check on the level unit). The display below appears.

Filling

- If a fault is detected during the float test, a corresponding fault message is triggered.
- When both tests are successful, the NHRS will enter normal operating mode. The display below appears and the green LED lights.

**NHRS
ready**

Initial Start-Up Procedure

The following procedure should be carried out only on the first occasion that the unit is operated:

1. Check the function of the humidifier:
 - a. Switch on the humidification by raising the set humidity value on the humidity controller / humidistat / NHRS Display.
 - b. Switch off the humidification by lowering the set humidity value on the humidity controller / humidistat / NHRS Display.

- c. Check for correct functioning of the monitoring equipment (external safety network).
 - d. Set the desired humidity value on the humidity controller / humidistat.
 - e. Make sure no leaks are present.
- The heating current switches on as soon as the humidity controller / humidistat demands humidity. The yellow LED lights and steam is produced after a short delay (approximately 5 minutes).
2. The operating status is displayed in the LED on the unit as follows:

Table 8: NHRS Operational Status LEDs

LED	Action	Meaning
Green	Constant	Unit Producing Steam
Yellow	Flashing	Major or Minor Service Due.
Red	Flashing	The Unit is trying to self-correct a problem.
Red	Constant	Insoluble Problem
NOTE: Relevant data will be displayed on the NHRS LCD display during normal operation and when in fault		

3. If the humidifier is equipped with the optional Remote Fault Indication, the operating status will be shown as follows:

Table 9: Remote Fault Indication

Relay	Description	Notes
K1	Steam	(N/O) Normally open
K2	Error	(N/O) Normally open Or (N/C) Normally closed
K3	Service	(N/O) Normally open Or (N/C) Normally closed
K4	Unit On	(N/O) Normally open

Information Screens

The NHRS has a “display menu” from which various operating parameters can be viewed. It is not possible to change the values on the display level.

1. Display level operation

- a. Call up the display level with <↑> or <↓>.
- b. <↓> next operating parameter.
- c. <↑> previous operating parameter.
- d. Exit the display level with <Menu>.

2. Description of the operating parameters on the display level.

NOTE: The following describes the individual operating parameters that can be selected using the keys <↑> and <↓>, after the display level has been called up.

a. Steam Production

Steam.Prod[%]
ref.50/act=25

1. Current, actual, and nominal value of steam production are displayed in percentage of total output.
 2. Nominal value: *unit capacity x input signal value*.
 3. Actual value: *max unit capacity x input signal value x capacity limitation*
- If the internal controller is activated, only the actual value is shown. Under the following conditions the actual value may differ from the nominal value: upon activation of the heating power, if capacity limitation is active during the filling cycle of the steam cylinder.

b. Analog Input

Analog Input[%]
25

1. Current value of the signal applied to the analog input in [%] of its max value.
- If the internal controller is active, the displayed value corresponds to the current air humidity (% RH).

c. Internal Controller

Controller Funct
off

1. Internal controller activated (“on”)/deactivated (“off”).
2. Activated with transducer signal.
3. De-activated with demand signal.

d. Working Hours

Elapsed time 623

1. Total of working hours elapsed since initial commissioning of the humidifier.

e. Time Remaining to minor/major service

Time to maintain 600/1200
--

1. Time remaining (in hours) before the next minor/major service.

- Time to maintenance can be adjusted to suit water conditions.
- The stated times are based on 100% steam capacity. If the operation is at a lower capacity, the time should be extended accordingly. For example, average capacity of 50% would double the time to maintenance. Average capacity of 33% would triple the time to maintenance. The servicing intervals are set up using the rotary switch “S2” on the control board.

Table 10: Maintenance Intervals with rotary switch S2

S2 Position	Interval Minor Maintenance	Interval Major Maintenance
0	200 hours	600 hours
1	300	600
2	300	900
3	450	900
4	400	1200
5	600	1200
6	500	1500
7	750	1500
8	3000	3000
9	6000	6000

NOTE: S2 rotary switch is set at factory to “0”.

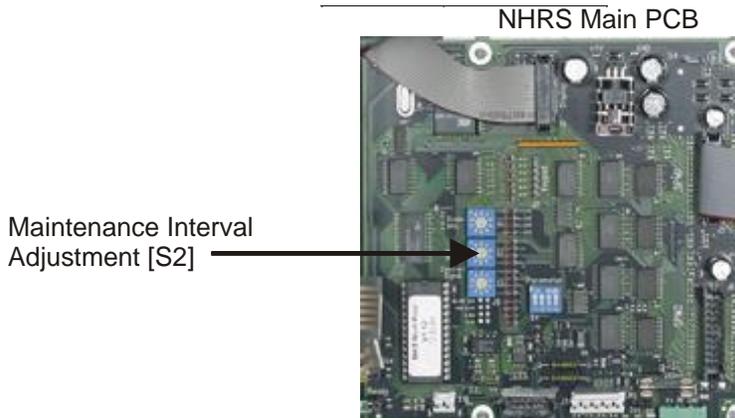


Figure 30: Maintenance Interval adjustment S2

f. Drain Cycle

Drain cycle 4:120

- The following indications are provided for the set-flushing interval
 Left: Switch setting on rotary switch "S1" (4 in example)
 Right: Set flushing interval (120 in example)

- The flushing interval is set on switch "S1" on the control board.

Table 11: Drain Cycle Intervals with rotary switch "S1"

S1 Position	Drain Intervals at 100% Steam Capacity
0	0 min
1	720
2	360
3	180
4	120
5	60
6	30
7	20
8	10
9	5

NOTE: S1 rotary switch is set at factory to "9".

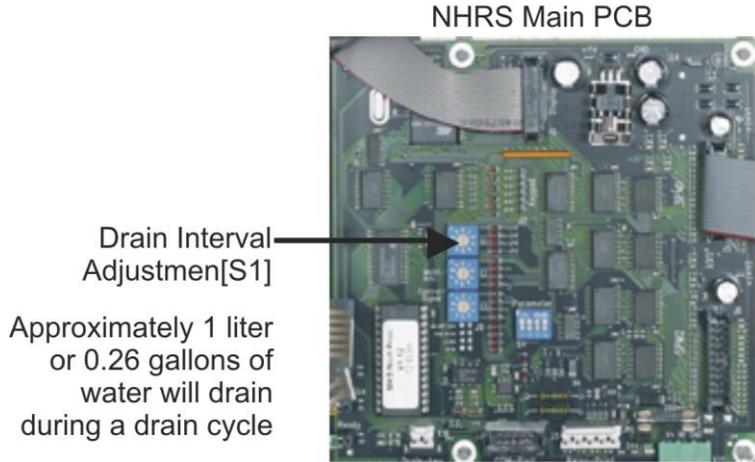


Figure 31: Drain Cycle adjustment S1

NOTE: Water quality conditions resulting in component failures are not covered under Nortec's standard warranty. The factory settings are based on the following water conditions when the unit leaves the factory.

Should you have water conditions more aggressive that the stated parameters, consult the factory for a new drain cycle setting to help improve your scale management.

Table 12: Water quality

Water Parameters	Potable Water	Treated Water
Conductivity	0-1500 μ Siemens	0-50 μ Siemens
Hardness	12 grains per gallon	0 grains per gallon
Silica	12 ppm	0 ppm
pH	6.5-7.5	7
Chlorides	> 50 ppm	> 25 ppm

Nortec recommend performing a semi-annual water analysis to ensure optimal performance.

- g. Stand-by Heating (also known as “Keep Warm”)

**Stand-by-Heating
off**

1. Stand-by Heating activated (“on”) or deactivated (“off”).

NOTE: If stand-by heating is active, the water temperature in the steam tank is constantly kept at approximately 158°F (70°C) by the control board.

- h. Capacity Limitation

**Power Limit [%]
100**

1. To change the Power Limit (Maximum Capacity), complete the following:
- Press both arrow keys simultaneously,
 - Enter code “8808”,
 - Change to desired value, and
 - Press both arrow keys simultaneously.

- i. Inlet Valve Correction

**Inlet Valve Cor
100**

1. Set inlet valve correction (cycle ratio) in % of standard setting value to balance out water pressure variations. Contact factory for more details.

- j. Soft Start

**Soft Start
off**

1. Soft Start activated (“on”), consult factory. Deactivated (“off”), factory default.

k. De-mineral Mode

Demineral Mode off

1. De-mineral Mode activated (“on”), consult factory. Deactivated (“off”), factory default.

l. Serial Interface

Modbus Address

1. Serial Interface activated (“on”), consult factory. Deactivated (“off”), factory default.

m. Full Drain Cycle

Full Drain Cycle

1. Full Drain Cycle activated (“on”), consult factory. Deactivated (“off”), factory default.

n. Flush Cycle

Flush Cycle off

1. Flush Cycle activated (“on”), consult factory. Deactivated (“off”), factory default.

o. Control Signal

**Analog Signal
0-5v (poti)**

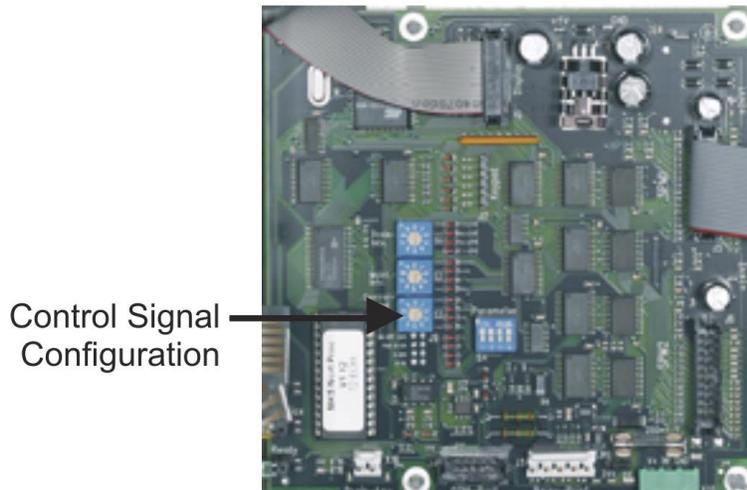
1. Range of the active analog signal in Volts or milliamps.

NOTE: The range of the analog signal may be adjusted using the rotary switch "S3" on the control board.

Table 13: Control signal settings with rotary switch "S3"

S3 Position	Signal
0	No signal selected
1	Spare
2	0-5 VDC
3	0-10 VDC
4	Other
5	1-5 VDC
6	2-10 VDC
7	Other
8	4-20 mA
9	0-20 A

NHRS Main PCB



For On/Off Control select 0-5 VDC (S3 = setting 2) and place a jumper wire over terminals 4 & 6 on the low voltage wiring terminal

Figure 32: Control signal setting S3

p. Software Version

Software Version
vx.xx

1. Displays software version for the steam humidifier.

q. Unit Type

Machine Type
xxlb.xxxv xph

How the Humidifier Works

The NHRS is an isothermal humidifier that produces atmospheric steam at operational pressures of -3 to +6 in. W.C. System operation is based upon regulating the operation of Incoloy immersion resistive heating elements with pulse width modulation via contactor(s) or optional solid state relay(s).

Start Up

1. Upon powering up the NHRS, a brief diagnostic process will be initiated, once this is completed the humidifier will initiate a level sensing test. To initiate this test, it is required that the operational water level be at level 1 or less. If the reservoir is above this level the system will initiate a drain. If the water level is less than level 1, both 1.2 litre per min fill solenoids will be activated in order to recover water level quickly. Once level 1 water level or greater is achieved, the system will fill with only a single solenoid in order to increase the accuracy of the level sensing.
2. The level sensing test will perform a timed fill to water level 4 and initiate a drain process to level 3. If both the fill and drain system successfully operate within the allotted time requirements, the humidifier will assume automated operation. Otherwise the system will generate a fault condition and display diagnostic information.

Automated Operation

1. System operation is initiated by satisfying various control inputs that are specific to the system configurations. Once the configured control inputs are satisfied, and water levels are within operational requirements (level 1-4), steam production can commence.
2. Steam production sequence will vary depending upon hardware configuration. Units with the optional SSR relay kit should progress to step 2.2. Units with standard contactors progress to step 2.1.
 - 2.1. CONTACTORS: Once system demand exceeds 10% the contactors will close. The contactor will pulse width modulate over 120 second cycles. At 11% demand the contactor will be closed for 10 seconds and will increase the length of operation, in relation to an increase in system demand in a linear fashion up to 98% demand. At 98% demand and above the contactor will remain closed for the maximum 120 seconds. Cylinders with multiple contactors will increment operating time sequentially amongst all contactors in order to scale output to demand.
 - 2.2. SSR & CONTACTORS: Once system demand exceeds 4%, the contactors will activate and pulse the SSR to modulate heat production up to 98% demand. At 98% demand and above the SSRs will remain constantly closed. For cylinders with multiple solid state relays the system will increment operating time amongst all SSRs sequentially in order to scale output to demand.
3. Once the contactors close, the fill system initiates pulse fill in order to anticipate evaporation and maintain the operating water level. Operating pulses will increase as the water level decreases, and conversely decrease the filling pulses as water level

increases. This allows the humidifier to continuously evaporate without interruption and prevents larger influxes of cold water that may otherwise interrupt system operation by cooling the boiling chamber.

System Drains

1. System operation will continue in this state until the timer controlled flushing (determined by the S1 dial selector switch on the processor board) is achieved. When triggered, steam production will continue without interruption and the system will initiate a drain of one water level.
2. The timer controlled flushing is based upon system operating at 100% capacity. Operating at a lower system capacity will extend the drain interval by the factor of the reciprocal of system demand (averaged for the length of the flush timer) to the flush timer.

$$\textit{Time to Drain}(\textit{minutes}) = \textit{Flush Timer} \left(\frac{1}{\textit{Average System Demand}(\%)} \right)$$

3. With very low demand this method can lead to exceedingly long intervals between system flushes. In order to prevent the drain interval from becoming excessively long, a function is used to limit maximum wait time before initiating the drain procedure. This roughly equates to preventing the drain interval from exceeding 10 x the Flush Timer setting.
4. Once triggered, the system will wait for a minimum water level of three, so as to not interrupt steam production. If the system drain is triggered by the maximum wait time the system will fill to level four and then evaporate to level three prior to draining. If the level requirement is not achieved the filling pulses of the fill valve will be extended in order to increase the water to levels permissible of initiating the system drain. Once complete the fill valve operation will resume normal pulse control.

Selecting an RH Setpoint

The optimum humidity setpoint depends on the reasons that a conditioned environment 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 conditioned environment 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.

Maintenance and Servicing

49 Minor Maintenance

51 Major Maintenance

Minor Maintenance



WARNING: A qualified service person should perform all maintenance on the humidifier and any other equipment provided by Nortec that requires maintenance.

NOTE: Instruction and details concerning the maintenance of the Nortec equipment must be observed and adhered to without fail. Only the maintenance documented in this manual must be carried out.

- The NHRS will indicate “minor maintenance due” with a yellow flashing LED and a message on the LCD.
- 1. Visual inspection must be performed before minor and major maintenance.
 - a. Inspect all water and steam installations for possible leakage or damage.
 - b. Inspect electrical installation for loose or frayed cables, as well as damaged components.
 - c. Inspect the condition of the unit cabinetry for damage.
 - d. Survey the area surrounding the humidifier – make sure all clearances are met.
- 2. Maintenance
 - a. Manually drain the NHRS by pressing the drain button on the display.
 - b. Turn the unit power to the “off” position.
 - c. Switch the external electrical disconnect to the “off” position (open).



WARNING: The NHRS brings water up to boiling temperatures. The steam tank and plumbing components may be hot. Allow the unit an appropriate amount of time to cool before performing service.

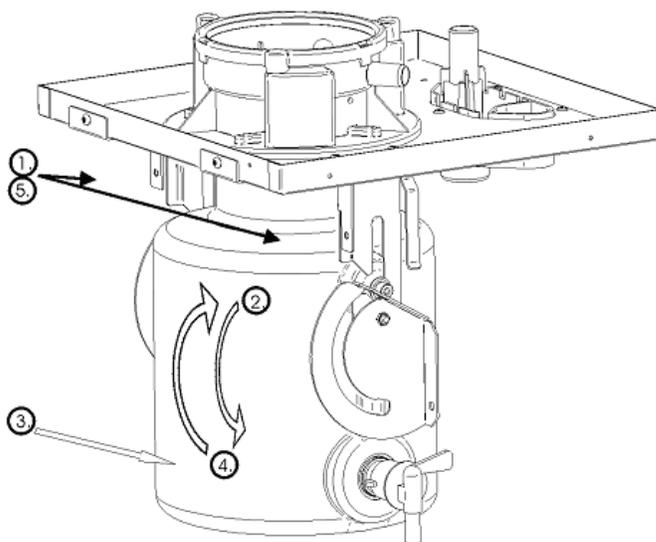
WARNING: High voltage! Disconnect main power before servicing the unit

- d. Remove the screw that holds the front door on the cabinetry in place.
 - e. Remove the Front Panel by sliding the panel upward and away from the unit.
 - f. Confirm that the high voltage feed to the unit is off, then remove the high voltage wires that connect to the top of the steam tank.
- The heating elements will not be affected if they are connected to different power lines when re-installed. When re-connecting heating elements, ensure a tight engagement with a “click” of the connectors.
 - g. Using a slotted screwdriver, loosen the gear clamps that hold the steam line in place.
 - h. Remove the steam line.
 - i. Remove the zip-tie cylinder restraint.
 - j. Lift the cylinder upward, then out of the front of the unit.

CAUTION: Be extremely careful when handling the steam cylinder. If it is dropped and damaged, it will likely not seal properly and the entire cylinder will need to be replaced.



- k. Remove the clamp at the top of the cylinder.
- l. Remove the tank lid with the elements attached.
- m. Remove all scale from the tank.
- n. Inspect the heating elements for damage.
- o. Re-install the equipment in reverse order.
- p. Turn power and water supplied back on to the unit.
- q. Turn on the unit and carry out the steps of the visual inspection once more.



Steps:

- 1 Unlock support bracket by removing locking screws.
- 2 Open both mechanisms by rotating counter clockwise until opening is visible.
- 3 Remove and empty Scale Collector Tank.
- 4 Rotate bracket to close mechanism and raise scale tank.
NOTE: ensure scale tank lines up with opening at bottom of drain pan when raising.
- 5 Lock mechanism by re-inserting two locking screws.

Figure 33: Minor maintenance with optional Scale Management System

- No maintenance re-set is required for Minor Maintenance Interval.

Major Maintenance



WARNING: A qualified service person should perform all maintenance on the humidifier and any other equipment provided by Nortec that requires maintenance.

NOTE: Instruction and details concerning the maintenance of the Nortec equipment must be observed and adhered to without fail. Only the maintenance documented in this manual must be carried out.

Major maintenance items include all those for the minor maintenance service, with the exception that the steam tank must be cleaned at this point. The differences in maintenance requirements are shown below.

Table 14: Minor and major maintenance

Maintenance Item	Unit has Scale Management System?	Minor Maintenance Interval	Major Maintenance Interval
Remove scale tank and empty	Yes	Required	Required
	No	N/A	N/A
Remove steam tank - clean inside, as well as heating elements	Yes	Optional	Required
	No	Required	Required

Resetting Maintenance Indication (Major Maintenance Only)

1. Restore primary voltage to the unit.
2. With the unit in the “off” position, press and hold the drain activation switch.
3. Continue to hold the drain activation switch and turn the main power switch to the “on” position.
4. Allow the unit to undergo initial startup diagnostics. When the diagnostics are complete, release the drain activation switch. The unit maintenance should be cleared at this point.

Troubleshooting

53 General Troubleshooting

55 Wiring Diagrams

57 Start Up Checklists

57 NHRS Electric Steam Humidifier – Mandatory Pre-Start-Up Checklist (p1 of 3)

58 NHRS Electric Steam Humidifier – Mandatory Pre-Start-Up Checklist (p2 of 3)

59 NHRS Electric Steam Humidifier – Mandatory Pre-Start-Up Checklist (p3 of 3)

60 Maintenance Checklists

General Troubleshooting

Most operational malfunctions are not caused by faulty equipment but rather by improper installation, or disregard for planning guidelines. Therefore, 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. The following table gives a list of possible malfunctions, the appropriate alarm or error message, details of their cause, and notes on how to deal with each problem.

Table 15: Troubleshooting errors and warnings

Malfunction / Indication	Cause	Remedy
Min. Filling time too short Error code: 1A/1B Alarm1A fillingtime Error1B Fillingtime	Steam cylinder heavily calcified. Level in steam cylinder and level in the float chamber do not match.	Carry out major servicing.
	Level sensing unit faulty.	Test the level sensing unit is operational by activating a drain and noting if the LED sequence changes, indicating a drain.
Internal safety chain interrupted Error code: 2A/2B Alarm2A Safetychainint Error2 safetychainint	Connection to over-temperature switch on steam cylinder is broken or over-temperature switch faulty.	Check connections or replace over-temperature switch.
	Steam cylinder overheating, over-temperature switch has responded.	Inspect steam cylinder, clean if necessary. Replace over-temperature switch.
	Flat-band cable between control and power board interrupted or not connected.	Inspect connections, connect or replace flat-band cable.
	Door switch is disengaged.	Door switch safety connection is closed by either pushing the switch (such as when the door is installed), or by pulling the switch.
Max. Filling time exceeded (alarm message only) Error code: 3A/3B Alarm3A Water supply	Water feed blocked (main water tap closed, filter valve closed or blocked). Water pressure too low. Inlet valve does not open, filter sieve in Inlet valve blocked or inlet valve faulty. Feed hoses into the steam humidifier not connected or kinked. Level unit not connected. Float in the level unit sticking or level unit faulty.	Check water feed, open main water tap, open or clean filter valve. Raise water pressure (range 1-10 bar). Inspect electrical connections and fuse F2 on supply module. Clean filter sieve or replace Inlet valve. Inspect hoses into unit and connect if necessary. Replace faulty hoses. Connect level unit. Clean or replace level unit.

Table 14: Troubleshooting errors and warnings (continued)

Malfunction / Indication	Cause	Remedy
Max. Boil down rate too long Error code: 4A/4B Error4B SteamtimeAlarm 4Asteamtime	Individual heating elements faulty.	Replace faulty heating elements.
	Main voltage too low or failure of a phase (L1, L2 or L3).	Replace fuses on power board. Check main voltage and connections.
	Steam line too long or not insulated.	Maintain maximum line lengths (max. 15'). Insulate steam lines.
Max. Drain time exceeded Error code: 5A/5B Alarm5Adrain Error5Bdrain	Drain pump not connected or faulty.	Connect or replace drain pump.
	Outlet line from unit kinked or blocked.	Inspect outlet line from unit, replace if necessary.
	Water outlet blocked (external outlet line or siphon blocked).	Clean water outlet line and siphon.
	Hose to level unit blocked.	Clean or replace hose.
Invalid level Error code: 6A/6B Alarm6A Levelindicat Error6B levelindicat	Level unit faulty.	Replace level unit.
	Magnetic field in vicinity of level unit.	Eliminate magnetic field.
Steam pressure (error only) Error code: 7A/7B Alarm7A communication	Steam hose blocked or restricted (water trap).	Inspect steam hose, clean if necessary and install correctly.
	Pressure balance adapter into steam connection fitting blocked.	Remove adapter and clean opening with a needle.
	Duct pressure too high (>1500 Pa).	Inspect ventilation settings.
External safety chain interrupted Error code: none SafetychainexternalA Mainsfailure B	Ventilator lock open.	Switch on ventilator/ventilation system.
	Automatic flow control has responded.	Inspect ventilator/filter of ventilation system.
	Safeties are open.	Servicing, inspect system if necessary.
	Main failure on Unit B.	Inspect voltage supply to Unit B.

Wiring Diagrams

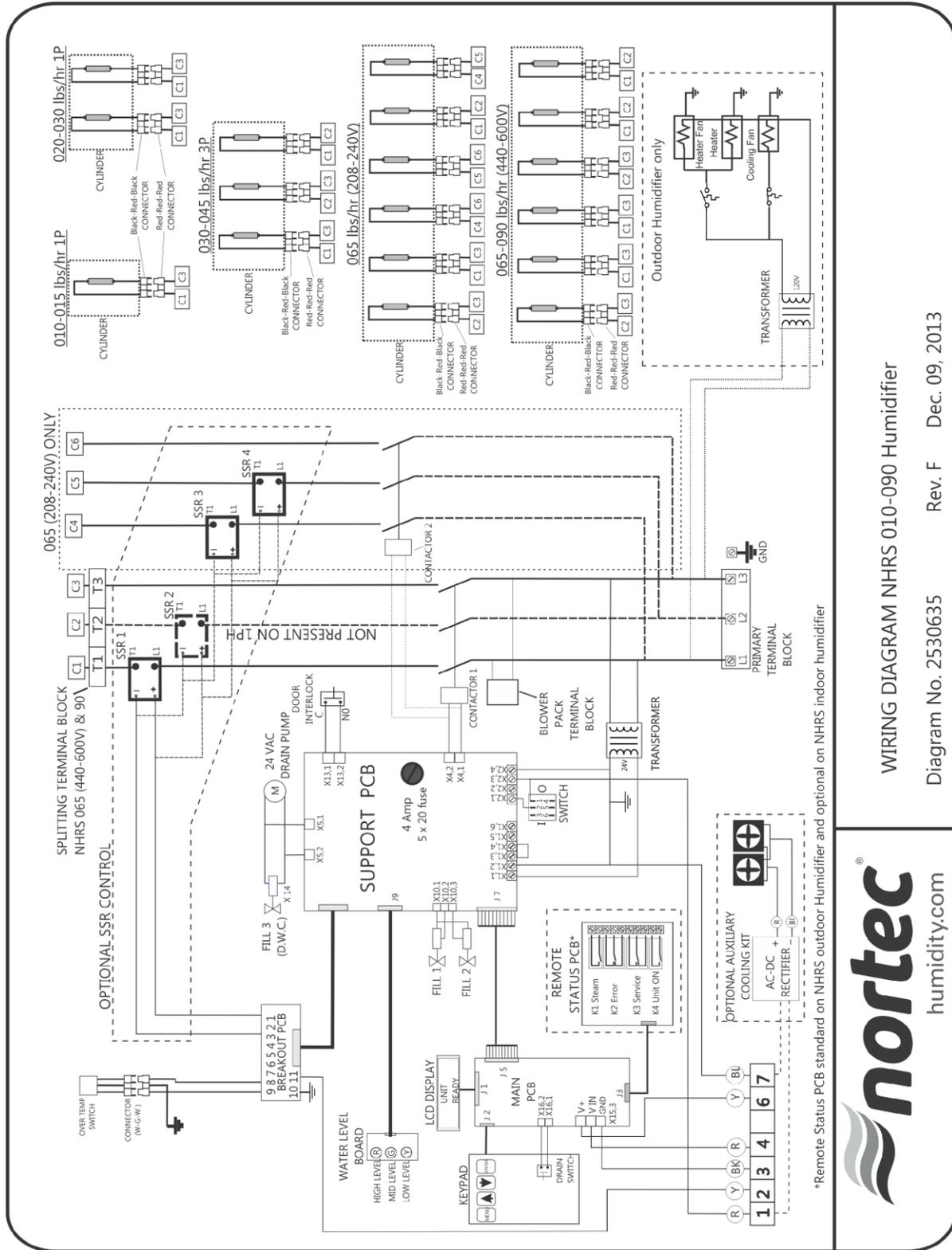


Figure 34: Wiring Diagram (NHRs 010 to 090)

WIRING DIAGRAM NHRs 010-090 Humidifier

Rev. F Dec. 09, 2013

Diagram No. 2530635



*Remote Status PCB standard on NHRs outdoor humidifier and optional on NHRs indoor humidifier

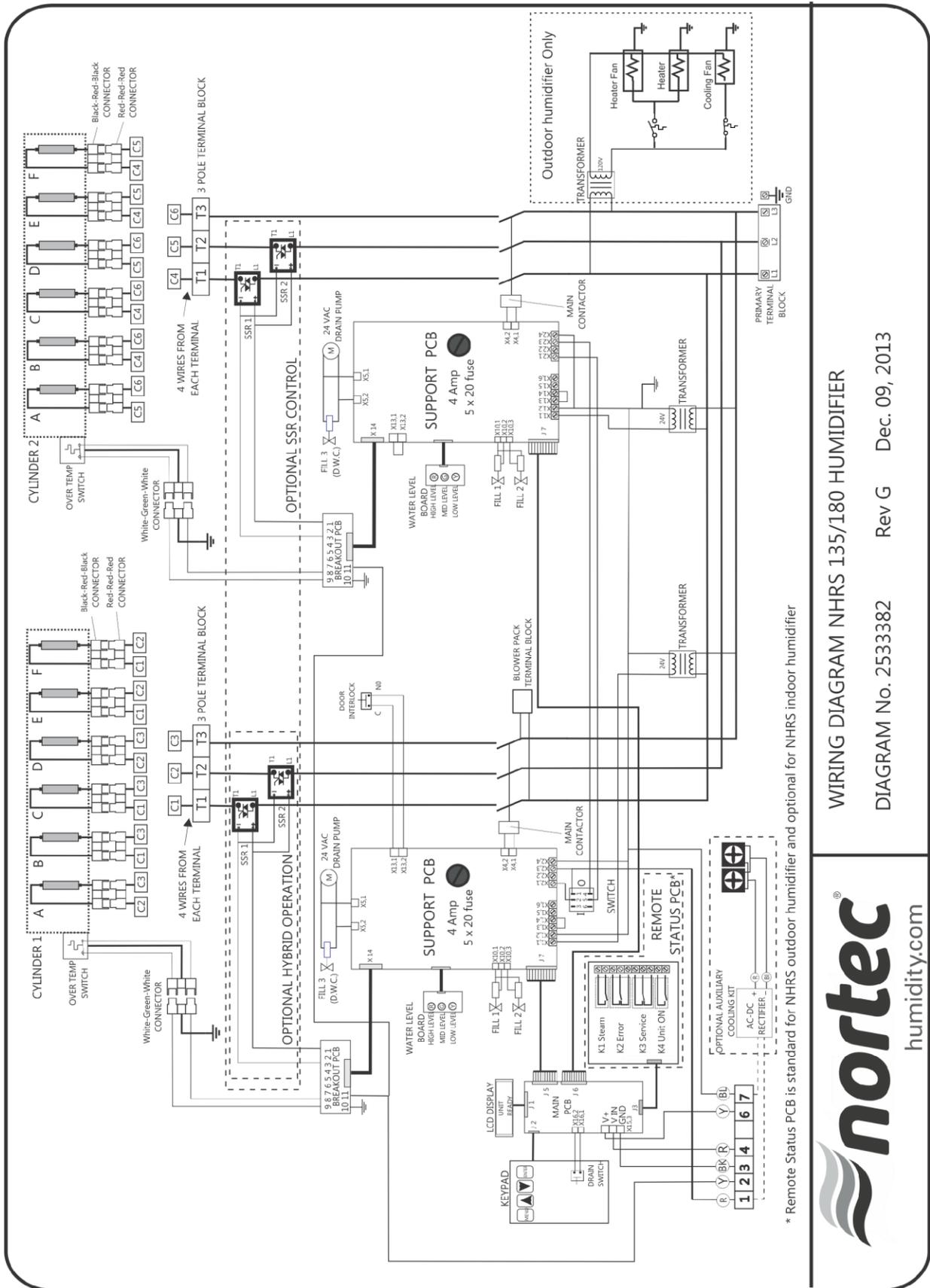


Figure 35: Wiring Diagram (NHRs 135 to 180)

* Remote Status PCB is standard for NHRs outdoor humidifier and optional for NHRs indoor humidifier



WIRING DIAGRAM NHRs 135/180 HUMIDIFIER

DIAGRAM No. 2533382

Rev G Dec. 09, 2013

Start Up Checklists

NHRS Electric Steam Humidifier – Mandatory Pre-Start-Up Checklist (p1 of 3)

Unit Serial #: _____ # of humidifiers: _____ Tag: _____

Unit type: NHRS Voltage: _____V/____ph Steam output: _____lbs./hr

Customer/Job: _____

Address: _____

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

WATER QUALITY:

Well water City water Softened water
Conductivity: _____mhmos Hardness: _____gr. Silica _____ppm

HUMIDIFIER MOUNTING:

Clearances around the unit:	Acceptable	Obstruction
Front (door opens freely?)	3ft min <input type="checkbox"/>	_____
Top (steam lines)	1ft min <input type="checkbox"/>	_____
Bottom (fill, drain, controls)	1ft min <input type="checkbox"/>	_____
Right (main pwr)	3ft min <input type="checkbox"/>	_____
Left (main pwr)	2" min <input type="checkbox"/>	_____

Ensure the scale tank bracket is locked in place

STEAM LINES: CONDENSATE LINES:

Slope up 2" per 12" Sloped back to drain
Slope down 1/2" per 12" Trapped 2" more than static duct pressure
Traps Size _____
Insulated Length/Size _____
90° elbows qty: _____ 45 deg. Elbows qty: _____
Can condensate be trapped anywhere in the steam line? Yes no

WATER LINES:

1/2" at max 4ft from the unit -3/8" connection at fill
Water pressure: 30-80psig

NHRS Electric Steam Humidifier – Mandatory Pre-Start-Up Checklist (p2 of 3)

DRAIN LINES:

Air gap located within 3ft of the unit Slopped to drain Size: _____

WIRING:

No loose wires around the unit or on the PC board? Yes no

CONTROLS:

	Installed	Location/Wiring/Setting
High limit:	<input type="checkbox"/>	_____
Air proving:	<input type="checkbox"/>	_____
Mod controller:	<input type="checkbox"/>	_____
Other:	<input type="checkbox"/>	_____

POWER:

Voltage, amperage rating and fuse corresponds to Spec Label

Disconnect switch located close to humidifier

Field contact: _____ Signature: _____

NHRS Electric Steam Humidifier – Mandatory Pre-Start-Up Checklist (p3 of 3)

Unit Serial #: _____ # of humidifiers: _____ Tag: _____

Unit type: NHRS Voltage: _____V/____ph Steam output: _____lbs./hr

Customer/Job: _____ Address: _____

Start-up by: _____ Date of Start-up: ____/____/____

PRELIMINARY:

Pre-start-up checklist completed? Yes No

If no, return to Pre-Start-up Checklist before going on with start-up procedure.

START-UP PROCEDURE:

The prerequisites for getting power and water into the steam cylinder is as follows:

1. Check that main breaker is on and power is at the unit.
2. Check that main water shut-off valve is open.
3. on/off switch must be switched on.
4. Control circuit 1 - 2 must be made.
5. Modulation humidistat, if present, must be calling.
6. Door interlock switch must be made (interlock switch can be pulled out to operate unit).

NOTE:

The unit will undergo a System Test to ensure integrity of all the components. If the test is successful, the unit will fill and the float test will be carried out. If everything ok, the green light will come on and the display will show NHRS Ready.

OPERATIONAL CHECK:

1. Switch on the humidification by raising the humidity set point on the humidistat/controller.
2. Switch off the humidification by lowering the humidity set point on the humidistat/controller.
3. Check for correct functioning of the external monitoring safeties such as air proving and high limit.
4. When check complete: Set the desired humidity level.

REMARKS:

Maintenance Checklists

Unit Serial #: _____ # of humidifiers: _____ Tag: _____

Unit type: NHRS Voltage: _____V/____ph Steam output: _____lbs./hr

Customer/Job: _____ Address: _____

Maintenance by: _____ Date of Maintenance: ____/____/____

TYPE OF MAINTENANCE*:

Minor maintenance, 2-3 times per year:

- Inspect all water and steam installations for possible leakage or damage.
- Inspect electrical installation for loose or frayed cables, as well as damaged components.
- Inspect the condition of the unit cabinetry for damage.
- Survey the area surrounding the humidifier – make sure all clearances are met.
- If equipped with scale tank: remove scale tank and empty
- If not equipped with scale tank: remove boiling tank, clean inside as well as heating elements.

Major maintenance, at least once per year:

- Inspect all water and steam installations for possible leakage or damage.
- Inspect electrical installation for loose or frayed cables, as well as damaged components.
- Inspect the condition of the unit cabinetry for damage.
- Survey the area surrounding the humidifier – make sure all clearances are met.
- Remove scale tank and empty
- Remove boiling tank, clean inside as well as heating elements.
- Reset maintenance indication

Seasonal maintenance, at the conclusion of the humidification season**:

- All items from “Major maintenance” section.
- Inspect boiling tank for pitting and/or corrosion due to harsh supply water.
- Inspect drain pump to ensure there is no blockage.

* Note that the duration of the maintenance intervals can be set by the user. See Table 10 on page 39 for details. For additional details on maintenance, see section **Maintenance and Servicing** on page 48.

** The “humidification season” is typically the winter months, where cold outdoor air requires heat and humidification before being delivered into a conditioned environment. There are geographical areas where the humidification season is all year long i.e. locations where summer months are very dry.

Spare Parts

62 NHRS Plumbing Parts

64 NHRS Electrical Parts

Part Ordering

- The following illustrations and tables list the most commonly used NHRS parts.
- First locate the part you require in the illustration corresponding to your NHRS 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.

NHRS Plumbing Parts

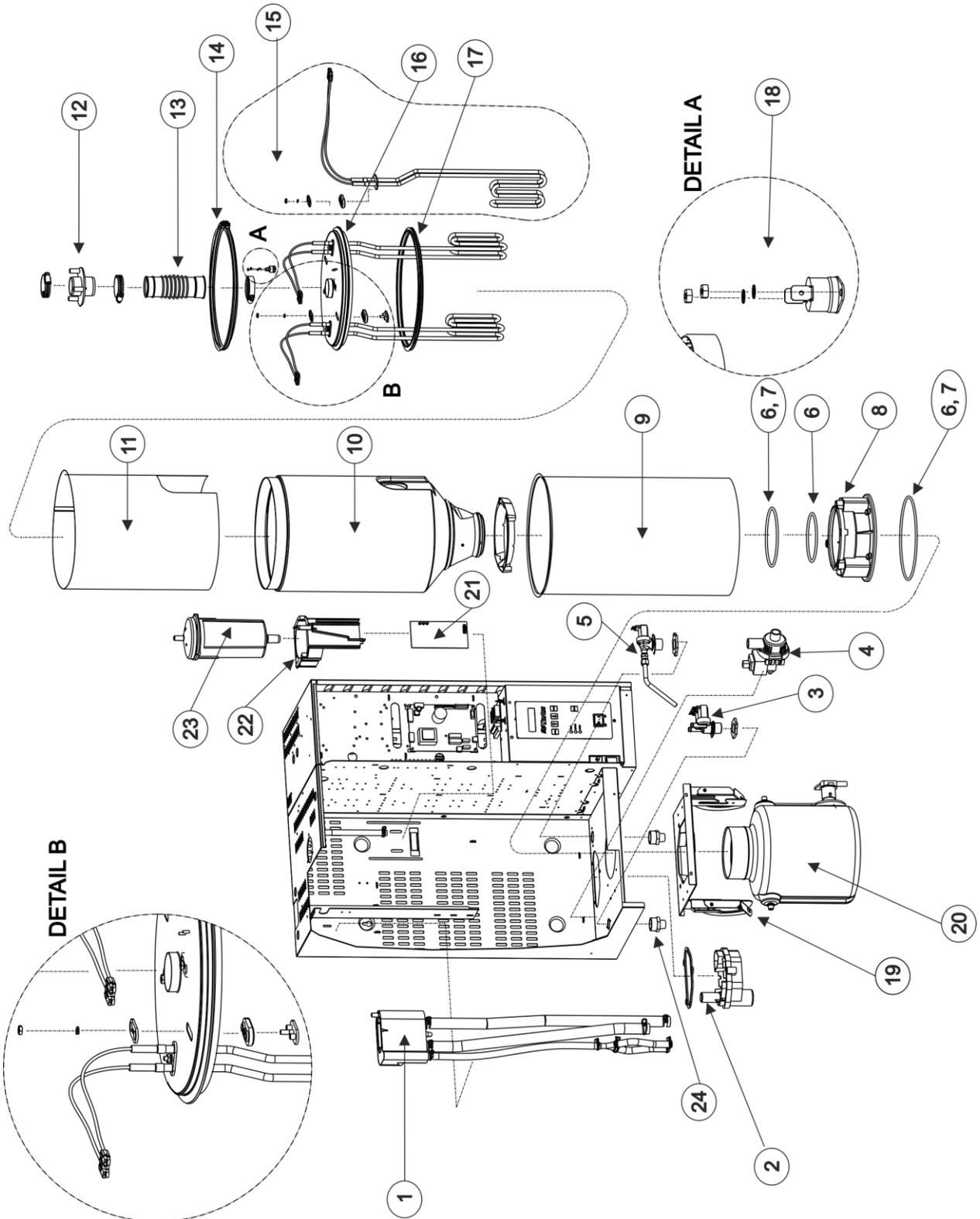


Figure 36: Exploded view, NHRS plumbing parts

Table 16: Exploded view, NHRS plumbing parts

		Spare Parts List NHRS Plumbing Section																							
		Capacity		010/1		015/1		020/1		030/1		030/3		045/3		065/3		090/3		135/3		180/3			
Part Number	Description	208	230	460	575	208	230	460	575	208	230	460	575	208	230	460	575	208	230	460	575	208	230	460	575
1	1508019	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2526944	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	2573527	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1502644	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	2541095	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	2573903	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	2573904	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1116483	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1113772	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1117634	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	1119101	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1509465	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	2557455	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	1109384	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2578492	1				2								3											
	2578493	1				2																			
	2578494		1				2																		
	2578495				1																				
15	2578496						2																		
	2578497					1																			
	2578498								2																
	2578499																								
16	1119102	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17	1110091	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	1502684	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	1505914	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20	2573902	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
21	2511137	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	1113777	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
23	1114768	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24	1509787	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
not shown	1113796	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

NHRS Electrical Parts

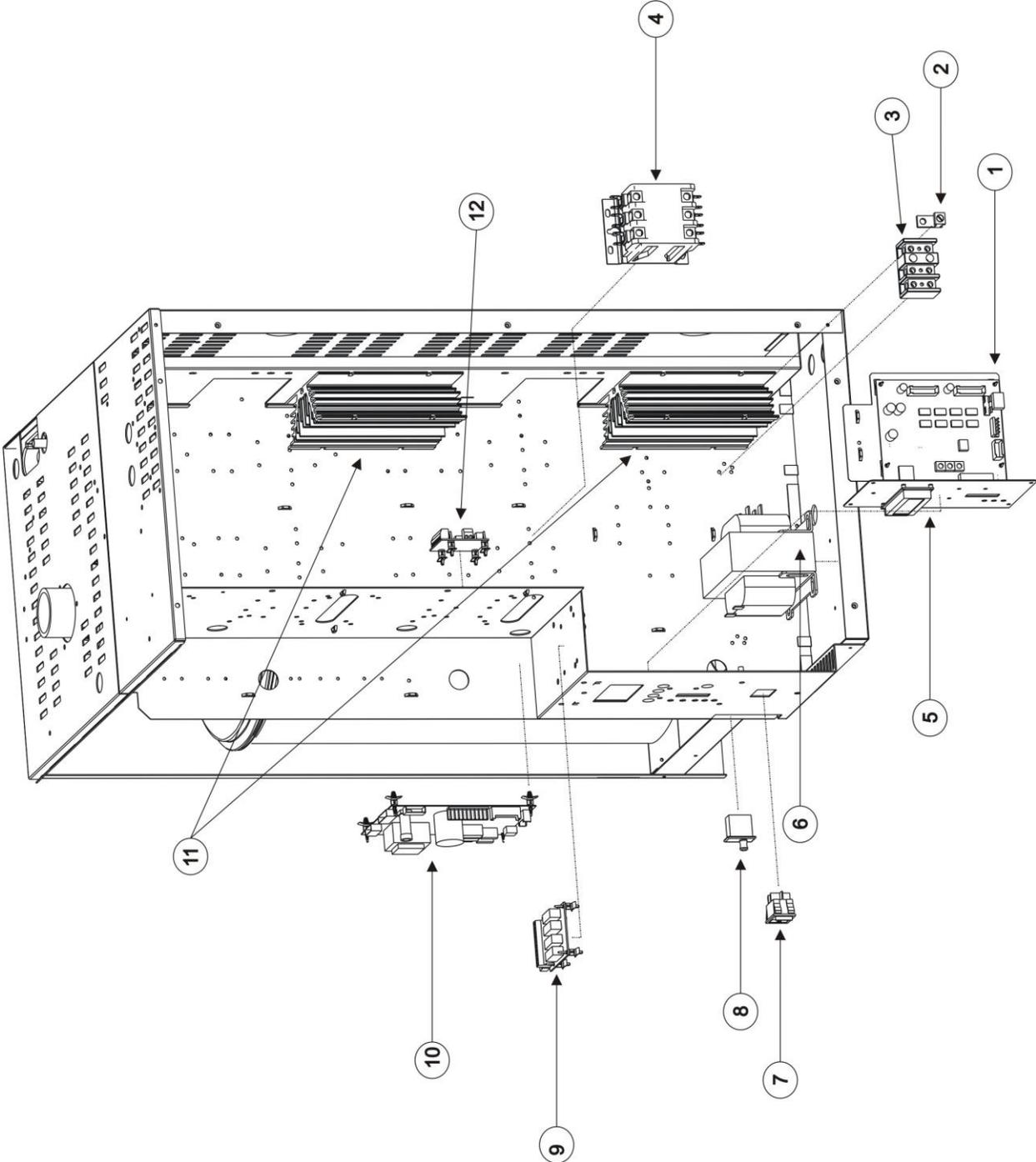


Figure 37: Exploded view, NHRS electrical parts

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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