



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 NHTC / NHPC
Electric Steam humidifier

Thank you for choosing NORTEC.

INSTALLATION DATE (MM/DD/YYYY)

MODEL #

SERIAL #

CYLINDER #

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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.
- Walter Meier 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 Walter Meier.



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 NHTC 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.
- 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 an 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 Returns on page 14.



Figure 1: Specification Label Location

Humidifier Components

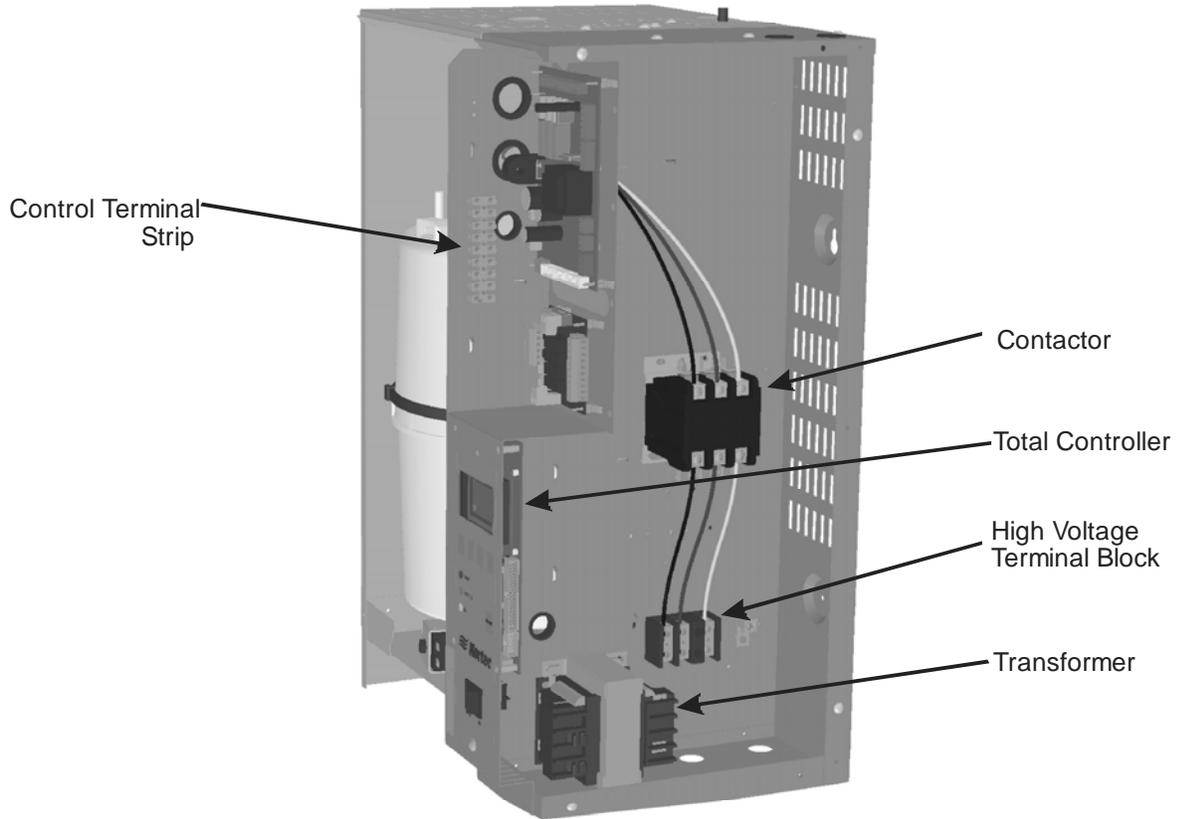
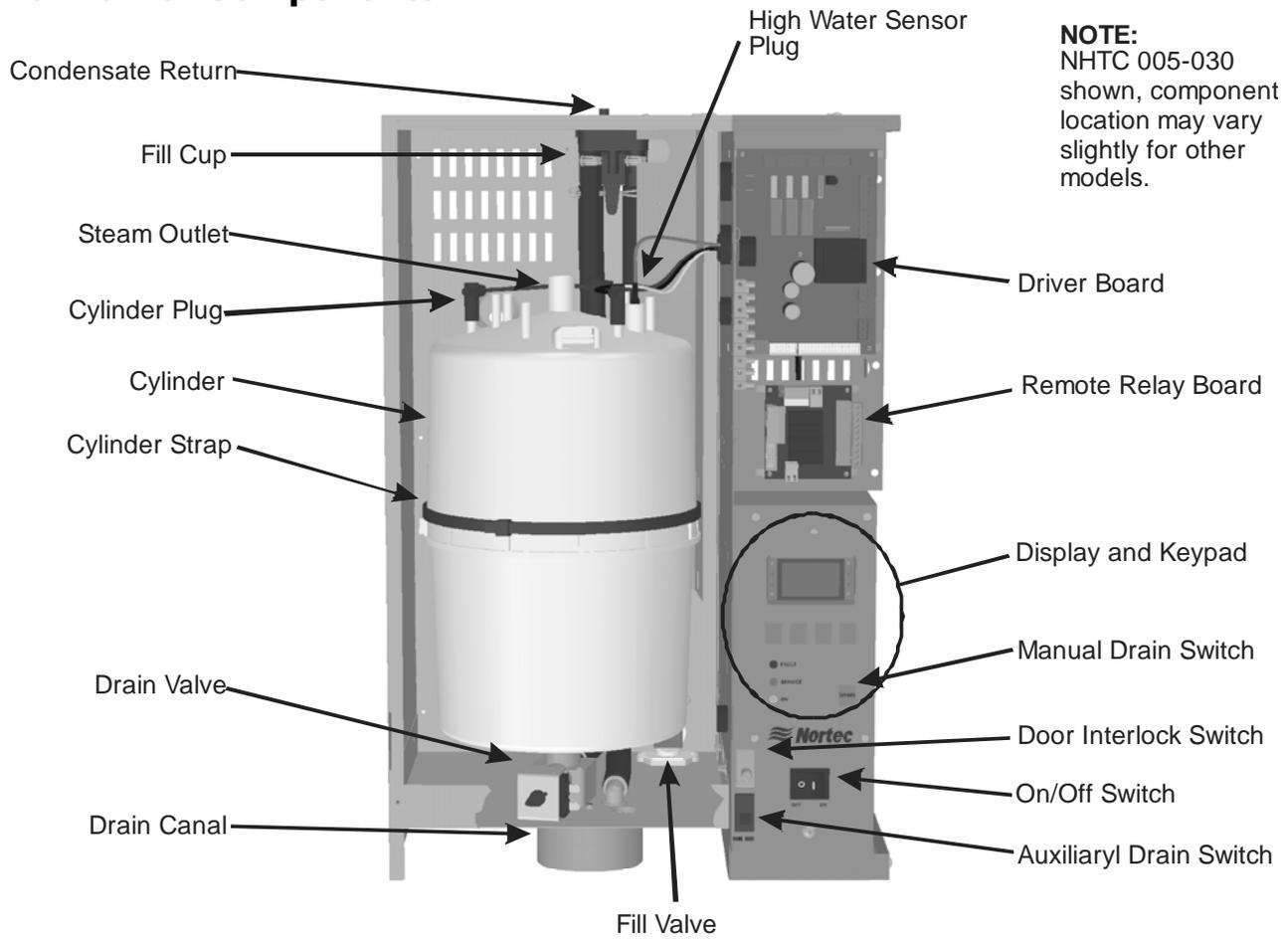


Figure 2: NHTC Humidifier Components

Description of Components

Table 1: Humidifier Components

Component	Function of Component
Auxiliary Drain	Drains water from cylinder by activating drain valve without software.
Condensate Return	Provides a connection to return condensate to humidifier.
Contactor	Turns On/Off power to cylinder electrodes based on a signal from the humidifier's controller.
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.
Display and Keypad	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 humidifier.
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.
Manual Drain Switch	Drains water from the cylinder using software control.
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.
Total 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.

NHTC/PC Models

The NHTC with its Total Controller and state-of-the-art features and options is the most advanced electrode steam humidifier available. The base model NHPC provides steady and reliable humidification using the same proven cylinder technology as the NHTC. The NHTC/PC is available in capacities ranging from 5 lb/hr (2 kg/hr) to 200 lb/hr (90 kg/hr). NHTC/PC humidifiers are packaged in three different cabinets depending on their capacity. Figure 2, NHTC/PC Models shows the configuration and relative size of the three different cabinets. Both the NHTC and NHPC models up to 100 lb/hr (45 kg/hr) are also available with a built on blower pack. Table 2 provides specifications for the NHTC/PC product line.

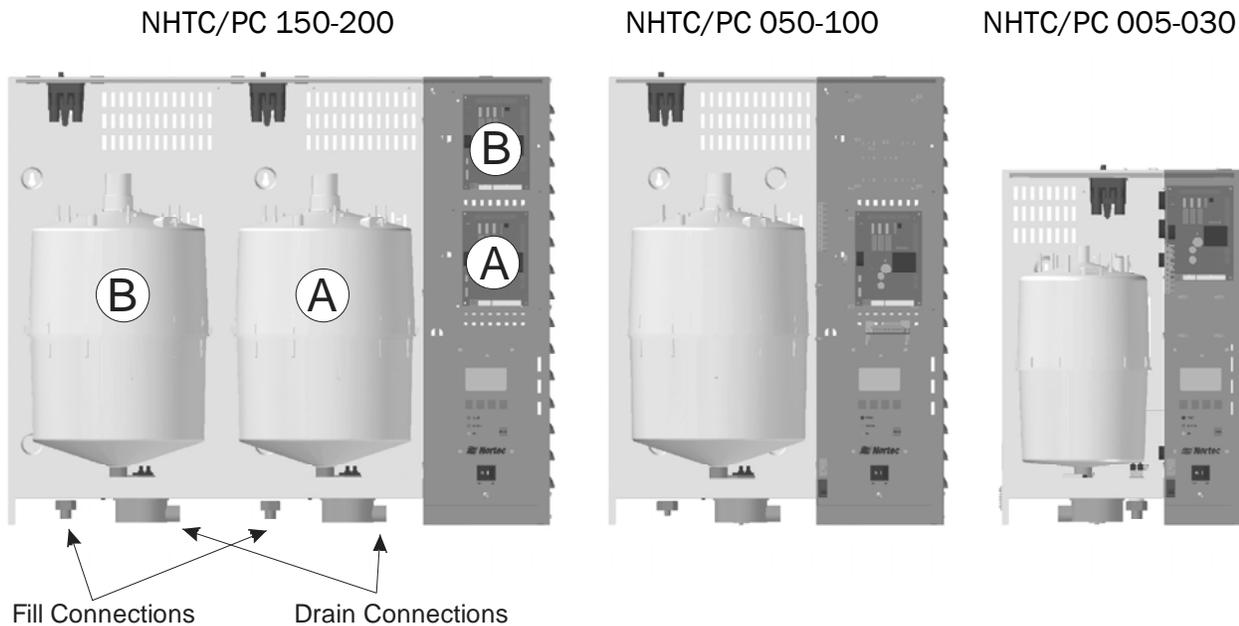


Figure 3: NHTC/PC Models

Double Unit (NHTC/PC 150-200)

NHTC/PC 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;

- In addition to having two cylinders double units also have two driver boards (designated A and B). One driver board controls each cylinder. (see Figure 3: NHTC/PC Models).
- Double units can operate both cylinders in parallel from a single set of control signals or independently based on two sets of control signals (see Multi Mode on page 48 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.
- Double units have one primary power connection but have individual fill, drain, and steam outlet connections for each cylinder.

Outdoor Model

The outdoor model of the NHTC provides a weatherproof enclosure that allows the NHTC to be installed on rooftops in moderately cool climates. Refer to the installation addendum that is provided with the outdoor model to insure proper installation.

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 NHTC/PC humidifier. Refer to the installation instructions that came with the accessories for their proper installation and operation.

Table 2: Options and Accessories

Option / Accessory	Used For
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	Insuring humidification only occurs when air is moving in a duct.
Fill Cup Extension	Increasing the steam back pressure capability of an NHTC/PC
Drain Water Cooling	Cooling drain water to less than 140 °F (60 °C)
Foam Detection Kits	Increasing the range of water quality in which an NHTC/PC can operate.

Table 3: NHTC/PC Specifications

Phase	Capacity lb (kg)	Volts	NHTC Part No.	NHPC Part No.	Amps	Max Ext Fuse	KW	Standard Cylinder	Net/Full Weight lb (kg)		
1	5 (2.3)	110-120	1509620	2521984	15.9	20	1.9	202	60 / 89 (27 / 40.5)		
	10 (4.5)	208	1509621	2521985	18.3	25	3.8	202			
		220-240	1509622	2521986	15.9	20	3.8	202			
		277	1509623	2521987	13.7	20	3.8	202			
		*380	1509624	2521988	10.0	15	3.8	203			
		440-480	1509626	2521990	7.9	15	3.8	204			
		550-600	1509627	2521991	6.3	15	3.8	204			
	20 (9)	208	1509628	2521992	36.6	50	7.6	321			
		220-240	1509629	2522002	31.7	40	7.6	321			
		277	1509630	2522003	27.5	35	7.6	321			
		*380	1509631	2522004	20.0	30	7.6	305			
		440-480	1509633	2522005	15.9	20	7.6	309			
		550-600	1509634	2522006	12.7	20	7.6	309			
	3	20 (9)	208	1509635	2522007	21.1	30	7.6		303	95 / 156 (43 / 76)
			220-240	1509636	2522014	18.3	25	7.6		303	
*380			1509637	2522015	11.6	15	7.6	311			
440-480			1509639	2522016	9.2	15	7.6	311			
550-600			1509640	2522018	7.3	15	7.6	311			
30 (13.5)		208	1509641	2522019	31.7	40	11.4	421			
		220-240	1509642	2522021	27.5	35	11.4	421			
		*380	1509643	2522022	17.4	25	11.4	407			
		440-480	1509645	2522024	13.7	20	11.4	411			
		550-600	1509646	2522025	11.0	15	11.4	411			
50 (22.5)		208	1509647	2522026	47.2	60	17	621	150 / 272 (68 / 124)		
		220-240	1509648	2522027	40.9	60	17	621			
		*380	1509649	2522029	25.8	35	17	603			
		440-480	1509651	2522031	20.4	30	17	607			
		550-600	1509652	2522032	16.4	25	17	607			
75 (34)	208	1509653	2522034	70.8	90	25.5	621				
	220-240	1509654	2522035	61.3	80	25.5	621				
	*380	1509655	2522036	38.7	50	25.5	603				
	440-480	1509657	2522039	30.7	40	25.5	607				
	550-600	1509658	2522040	24.5	35	25.5	607				
100 (45)	208	1509659	2522041	94.4	125	34	621				
	220-240	1509660	2522042	81.8	110	34	621				
	*380	1509661	2522043	51.7	70	34	603				
	440-480	1509663	2522045	40.9	60	34	605				
	550-600	1509664	2522046	32.7	45	34	607				
150 (68)	208	1509665	2522047	141.6	200	51	621				
	220-240	1509666	2522048	122.7	175	51	621				
	*380	1509667	2522049	77.5	100	51	603				
	440-480	1509669	2522051	61.3	80	51	607				
	550-600	1509670	2522052	49.1	70	51	607				
200 (90)	208	1509671	2522054	188.7	250	68	621				
	220-240	1509672	2522055	163.6	225	68	621				
	*380	1509673	2522056	103.3	150	68	603				
	440-480	1509675	2522058	81.8	110	68	605				
	550-600	1509676	2522059	65.4	90	68	607				

* Not UL Listed

Installation

10 Typical Humidifier Installation

11 Location

12 Mounting with Keyholes

13 Plumbing

14 Steam Lines and Condensate Returns

19 Electrical

20 External Controls

20 Control Wiring

20 Control Location

21 On/Off Control Wiring

23 Modulating Control Wiring

25 Transducer Control Wiring

26 Optional Outdoor Temperature Reset

27 Remote Fault Option Wiring

28 Multi Mode Wiring (NHTC Only)

29 Options and Accessories

29 Built On or Remote Blower Pack

29 Fill Cup Extension

30 Drain Water Cooling

30 Foam Protection

30 Internal Fusing

30 Remote Fault Indication

30 Outdoor Model

Typical Humidifier Installation

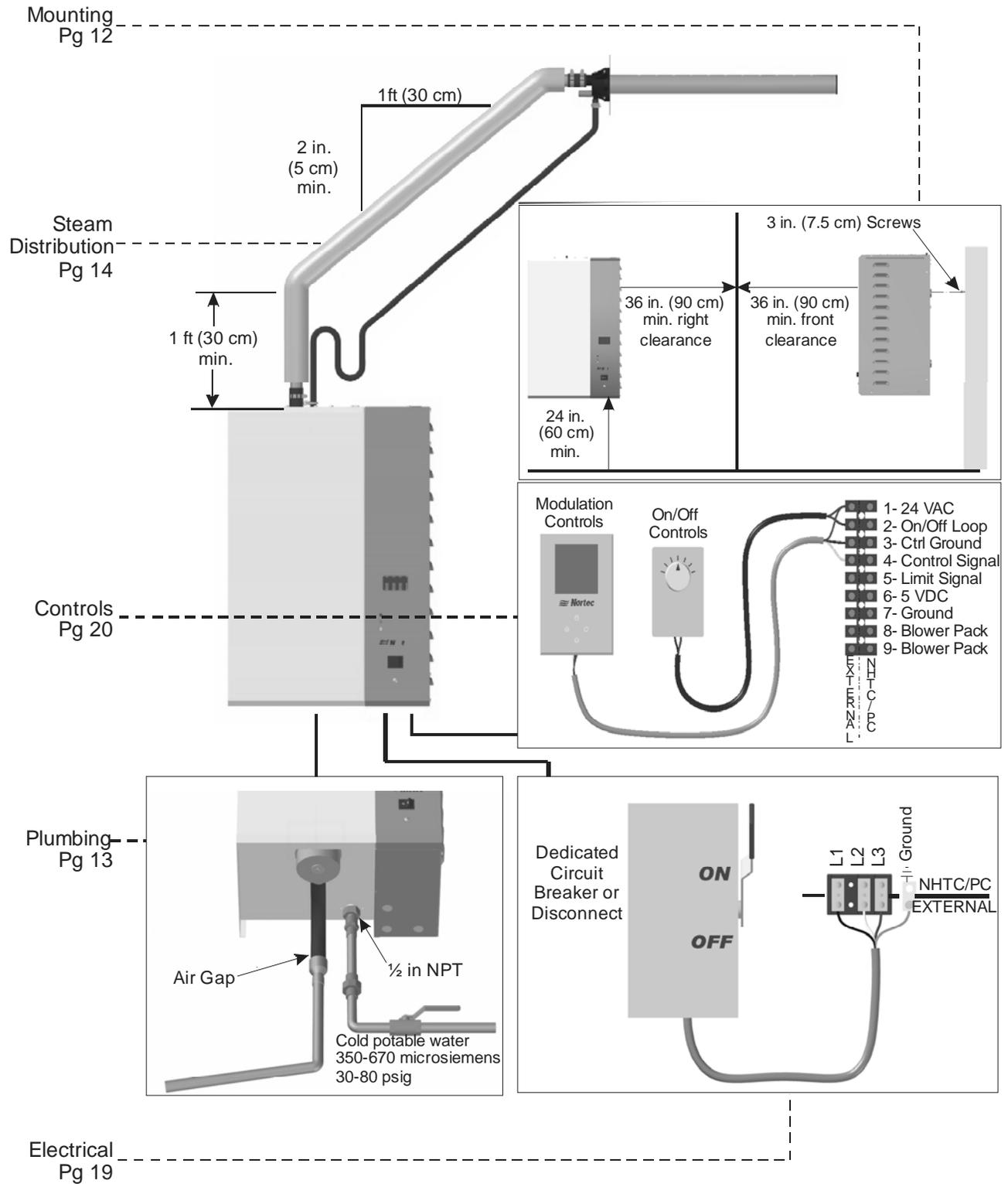


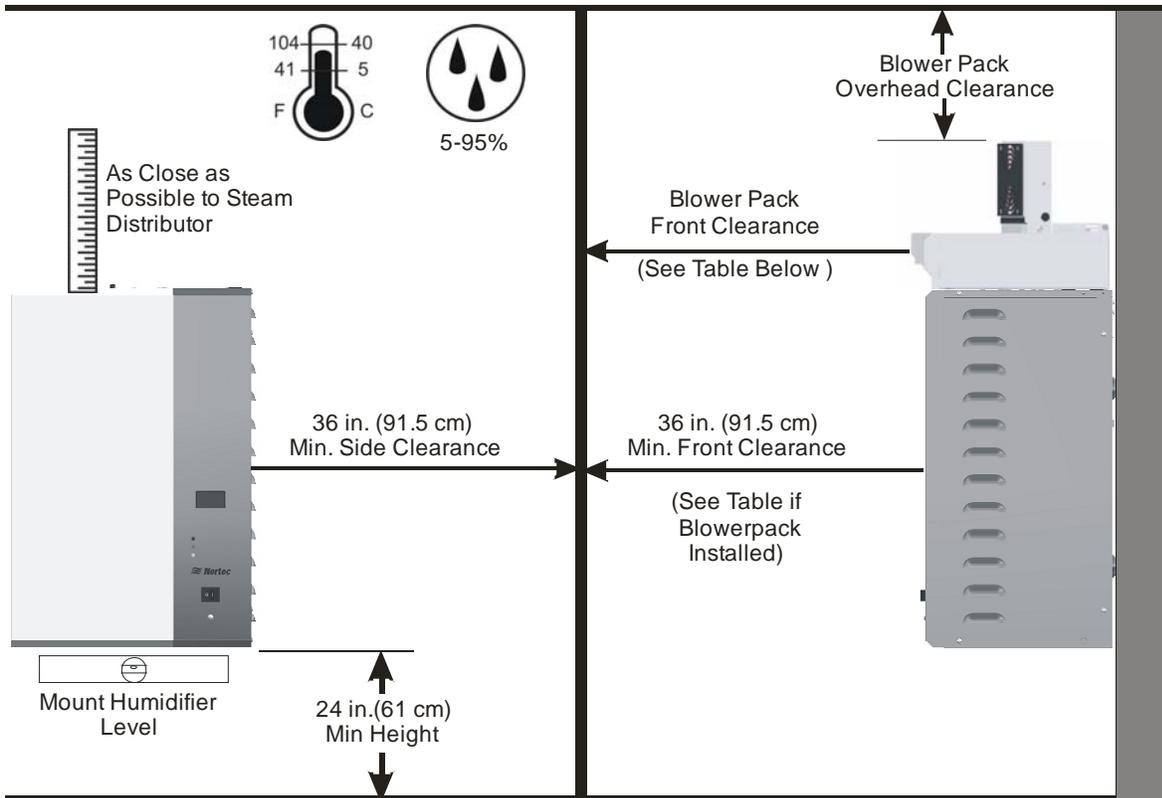
Figure 4: Typical Humidifier Installation

Location

- Mount on a suitable wall or vertical surface. Do not sit the 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 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 then 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 NHTC humidifier at a height convenient for servicing.



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



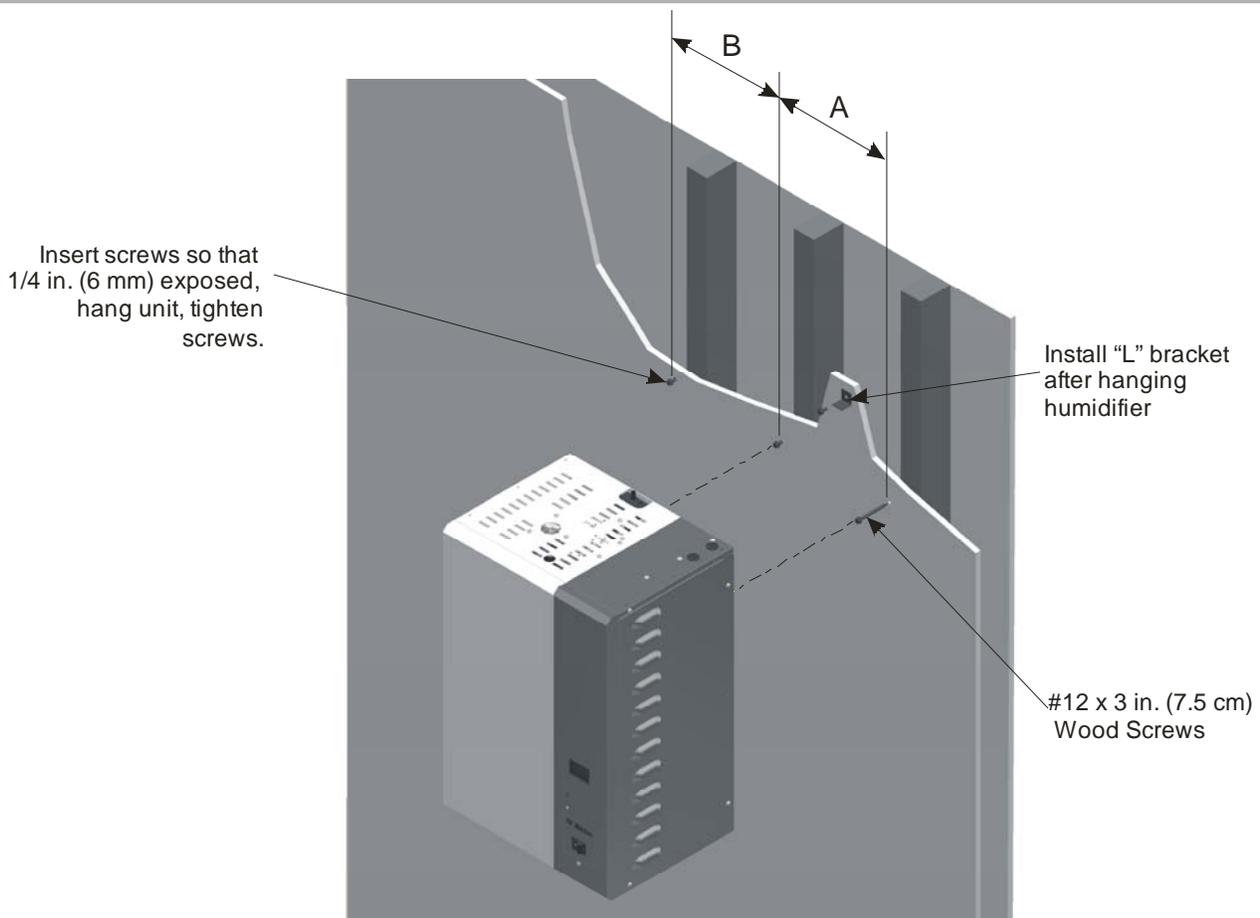
Humidifier Output lb (kg)	Blowerpack Overhead in. (cm)	Blowerpack Front in. (cm)
< 10 (4.5)	18 (45)	30 (75)
20 (9)		36 (90)
30 (13.5)		72 (180)
50 (22.5)	36 (90)	84 (215)
75 (38)	42 (105)	144 (365)
100 (45)	48 (120)	156 (400)

Figure 5: Mounting Location / Clearance

Mounting with Keyholes

- 1 The NHTC Series humidifier is wall mounted using keyholes located on the back of the unit's cabinetry.
- 2 Use #12 x 3 in. (7.5 cm) screws mounted into 2x4 studs or better. 2 screws are needed for a single unit (NHTC 010 to 100). 3 screws are needed for a double unit (NHTC 150 to 200).
- 3 Keyholes are spaced 16 in. (40.6 cm) apart center to center for large units and 10.7 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 3/4" (7.5 cm) if drywall or other spacer is present.



Unit Size	Screws	Dim A in (cm)	Dim B in. (Cm)
5-30	2	10.7 (27.2)	-
50-100	2	16 (40.6)	-
150-200	3	16 (40.6)	16 (40.6)

Figure 6: Mounting With Keyholes

Plumbing

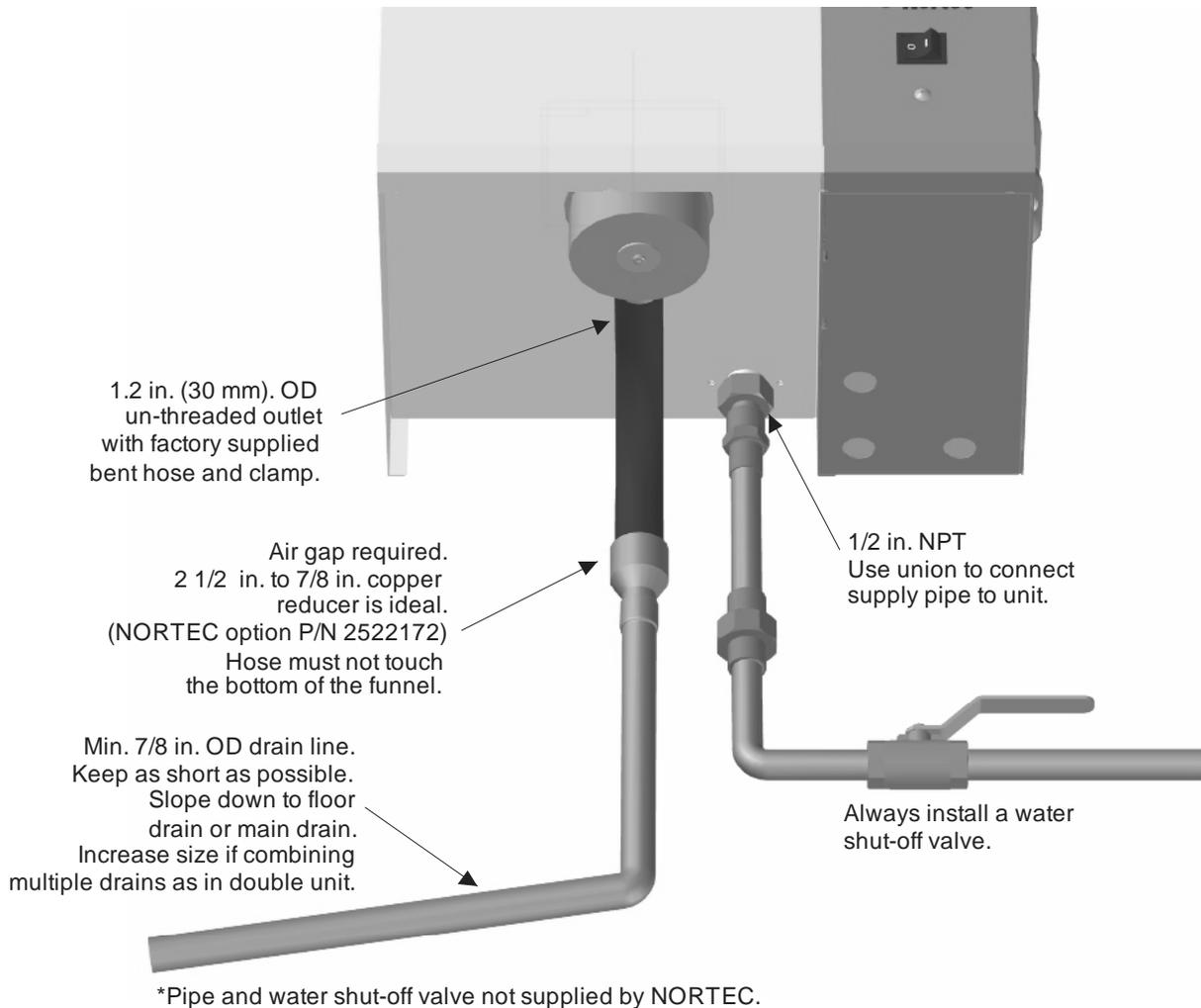


Figure 7: Water Supply and Drain Connection



Note:

- Drain Water is very hot, do not drain to public sink
- Supply cold potable water, 30 - 80 PSIG, 350 - 670 microsiemens
- Do not use plastic pipe for drain or condensate lines.

- All water supply and drain line connections should be installed in accordance with local plumbing codes.
- Supply water should be at 30 to 80 PSIG and be between 350-670 Microsiemens (Hardness 10-20 GPG). Water softener may be used if conductivity remains in recommended range.
- 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 it. Route to a floor drain or equivalent for safety reasons.
- Insure 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 and result in poor operation or result in water backing up at the air gap.

Steam Lines and Condensate Returns



MAIN RULES FOR ATMOSPHERIC STEAM LINES

- Slope the steam lines.
- Trap condensate (Use full size 'T' for Traps).
- Steam lines must not have any restrictions which could cause back pressure.
- Insulate with 1.0 in. (2.5 cm) pipe insulation.
- Follow recommended materials, size and length see tables.

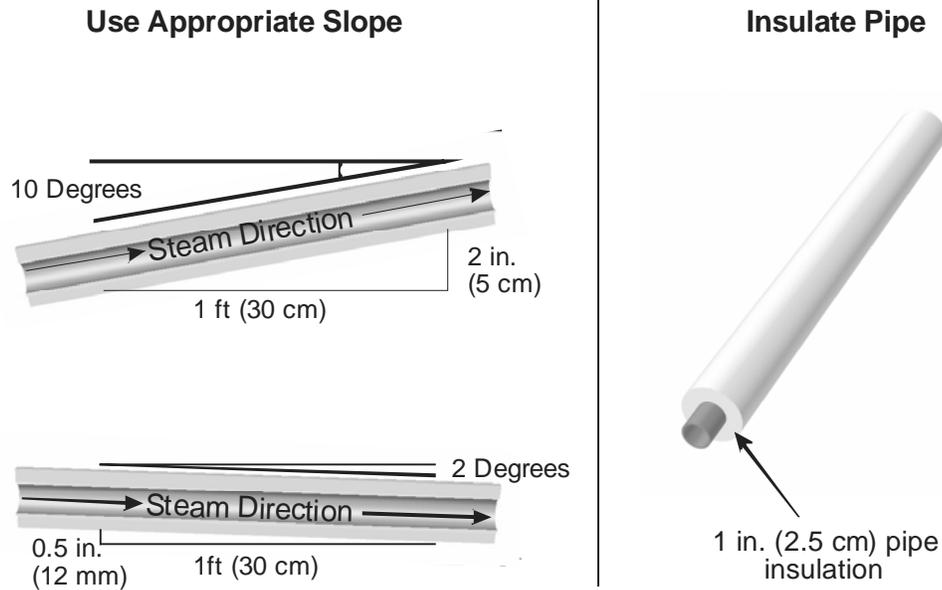


Figure 8: Main Steam Line Requirements

Table 4: Recommended Steam Line Material

Steam Line Material	Lb/hr (kg/hr)	Steam Line Length		Steam Line Description
		ft	m	
Copper Tube	0-30 (0-13)	0-10	0-3	3/4 in MED-L Tubing (7/8 in. OD)
		30+	3+	*1 in. MED-L Tubing (1 1/8 in. OD)
	31-100 (14-45)**	0-10	0-3	0.875 in. Tube x 0.049 in. thick wall
		30+	3+	*1.125 in. Tube x 0.049 inch thick wall
Stainless Steel Tube	0-30 (0-13)	0-20	0-6	1 1/2 in. MED-L Tubing (1 5/8 in. OD)
		20+	6+	*2 in. MED-L Tubing (2 1/8 in. OD)
	31-100 (14-45)**	0-20	0-6	1.750 inch Tube x 0.065 inch thick wall
		20+	6+	*2.0 inch Tube x 0.065 inch thick wall
NORTEC Hose	0-30 (0-13)	< 10	< 3	Part Number 1328810 (7/8")
	31-100 (14-45)**	<10	<3	Part Number 1328820 (1 3/4")

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

** Use one steam lines per cylinder for NHTC/PC 150-200 humidifiers.

Table 5: Maximum Recommended Length of Steam Line

Unit Size	Steam Output (Lb/hr)	Distance (ft)	Possible Loss (lb/hr)	Steam Line Size (in)
NH-005	5	8	1.0	3/4
NH-010	10	15	1.5	3/4
NH-020	20	20 *	2.0	3/4
NH-030	30	25 *	2.5	3/4
NH-050	50	40 **	4.0	1 1/2
NH-075	75	50 **	5.0 to 10.0	1 1/2
NH-100	100	50 **	5.0 to 10.0	1 1/2
NH-150	150	50 /cylinder **	5.0 to 10.0	1 1/2
NH-200	200	50 /cylinder **	5.0 to 10.0	1 1/2

- NOTE:**
- * Use one inch copper steam line for longer runs.
 - ** Use two inch copper steam line for longer runs.
- 1 This table gives the maximum recommended steam run by unit size.
 - 2 The use of steam line other than copper, stainless steel tube or NORTEC supplied steam line will void the warranty and may adversely effect the operation of the humidifier
 - 3 The NH-150 and NH-200 are dual units.

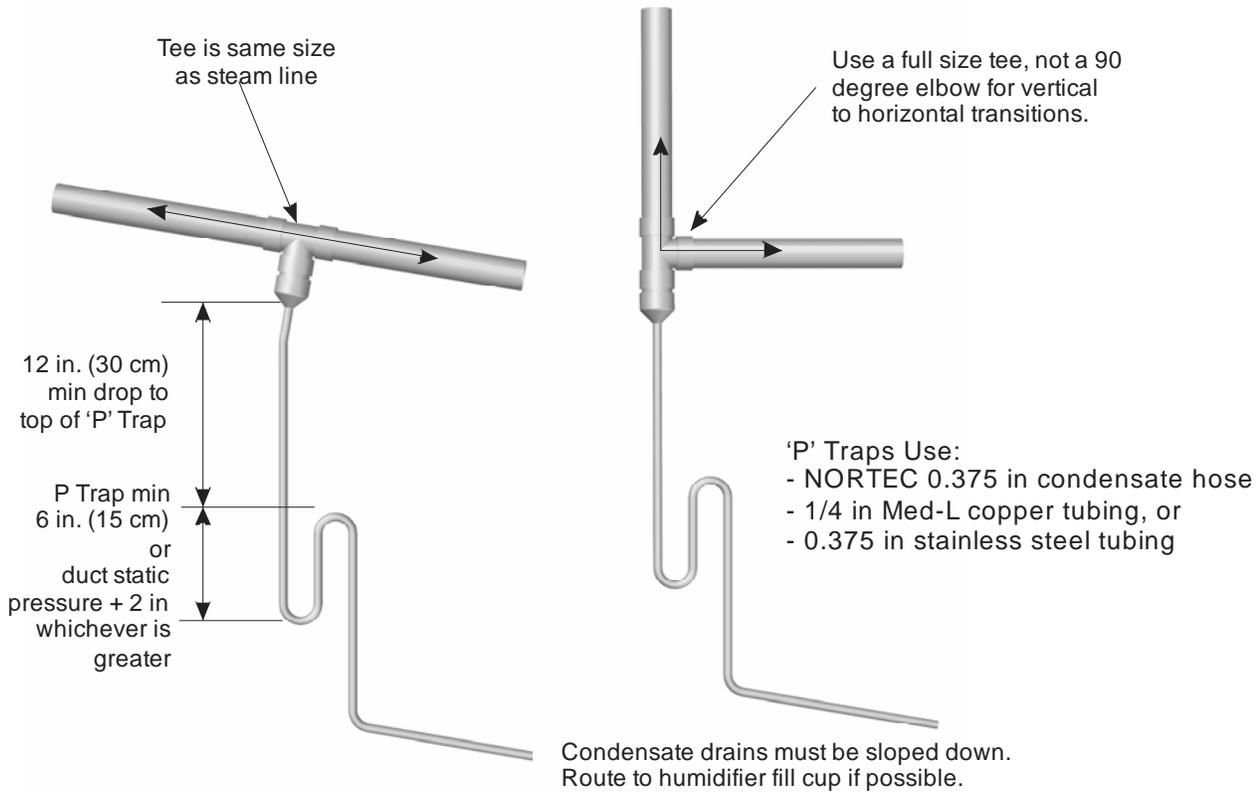


Figure 9: Condensate Traps



- Route condensate back to humidifier fill cup if possible. Condensate will be returned to cylinder from fill cup.
- 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.

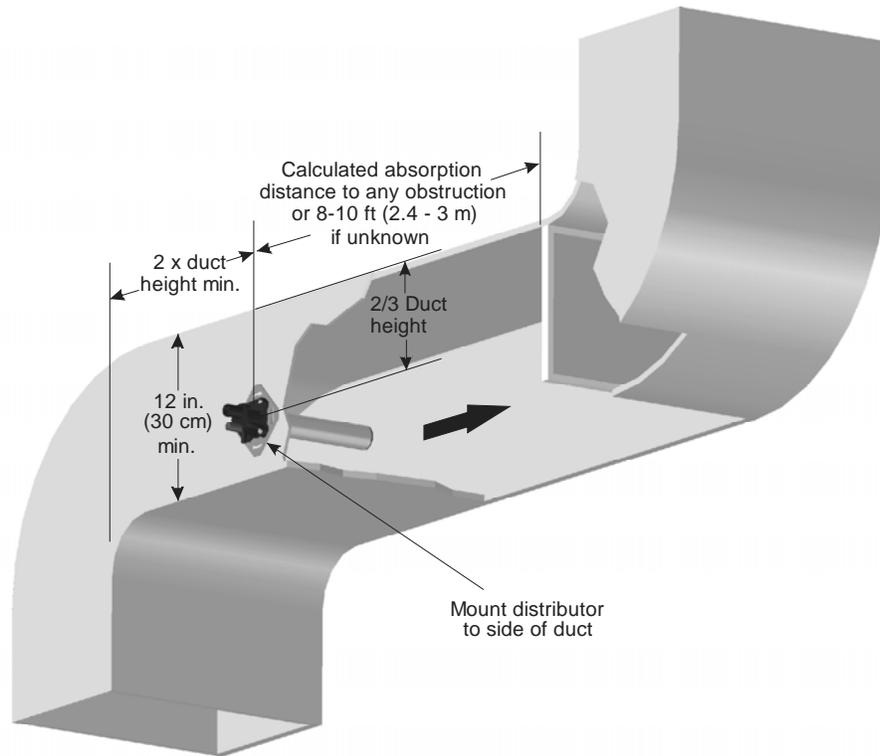


Figure 10: Distributor Location in Duct

Note:

Refer to distributor or SAME installation manuals for detailed installation instructions.

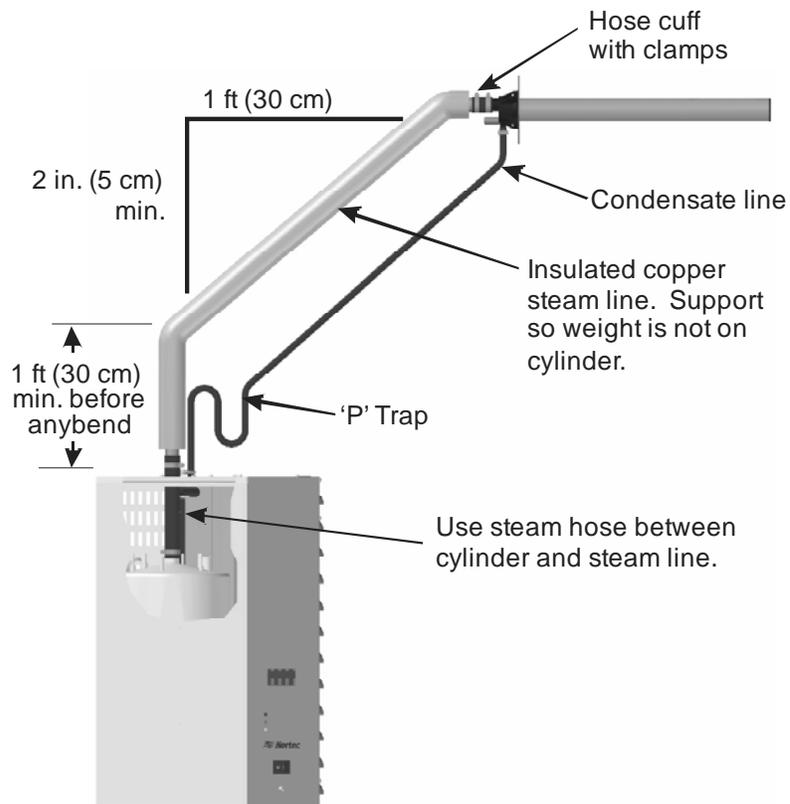


Figure 11: Steam Distributor Above Humidifier (Copper Steam Line)

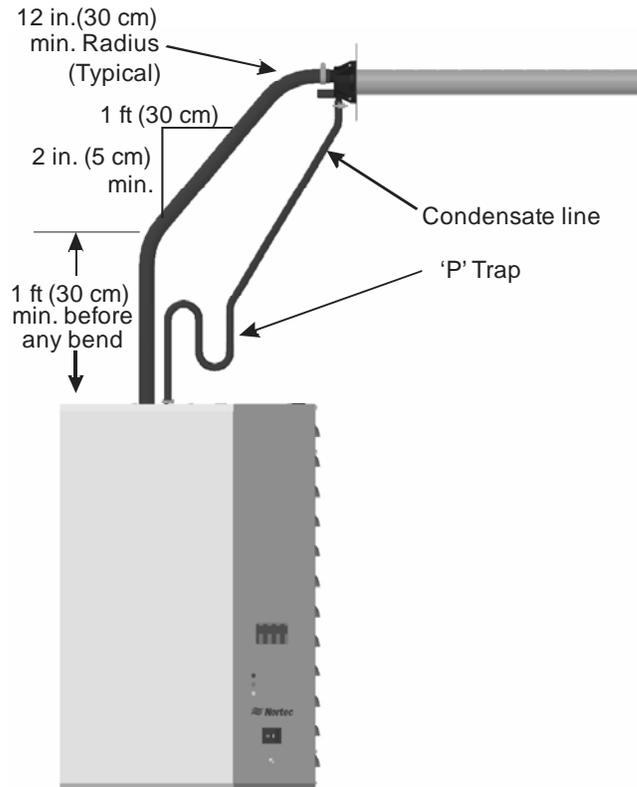


Figure 12: Steam Distributor Above Humidifier (Hose)

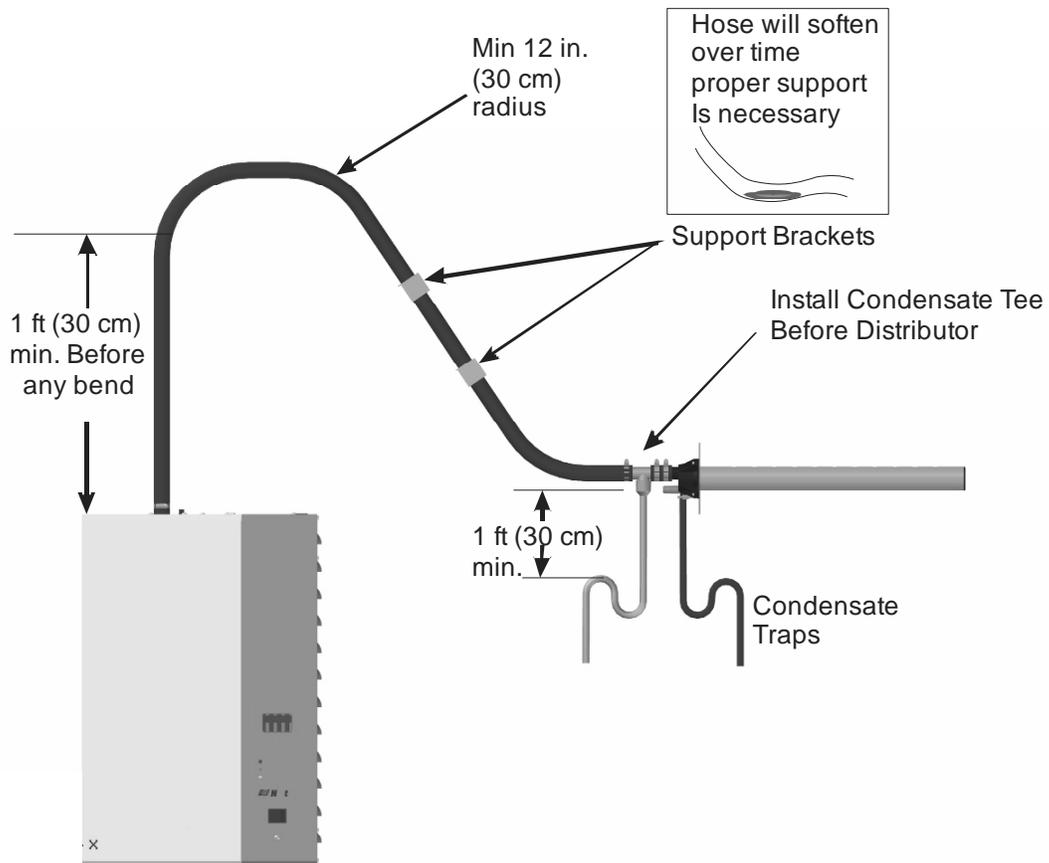


Figure 13: Steam Distributor Below Humidifier (Hose)

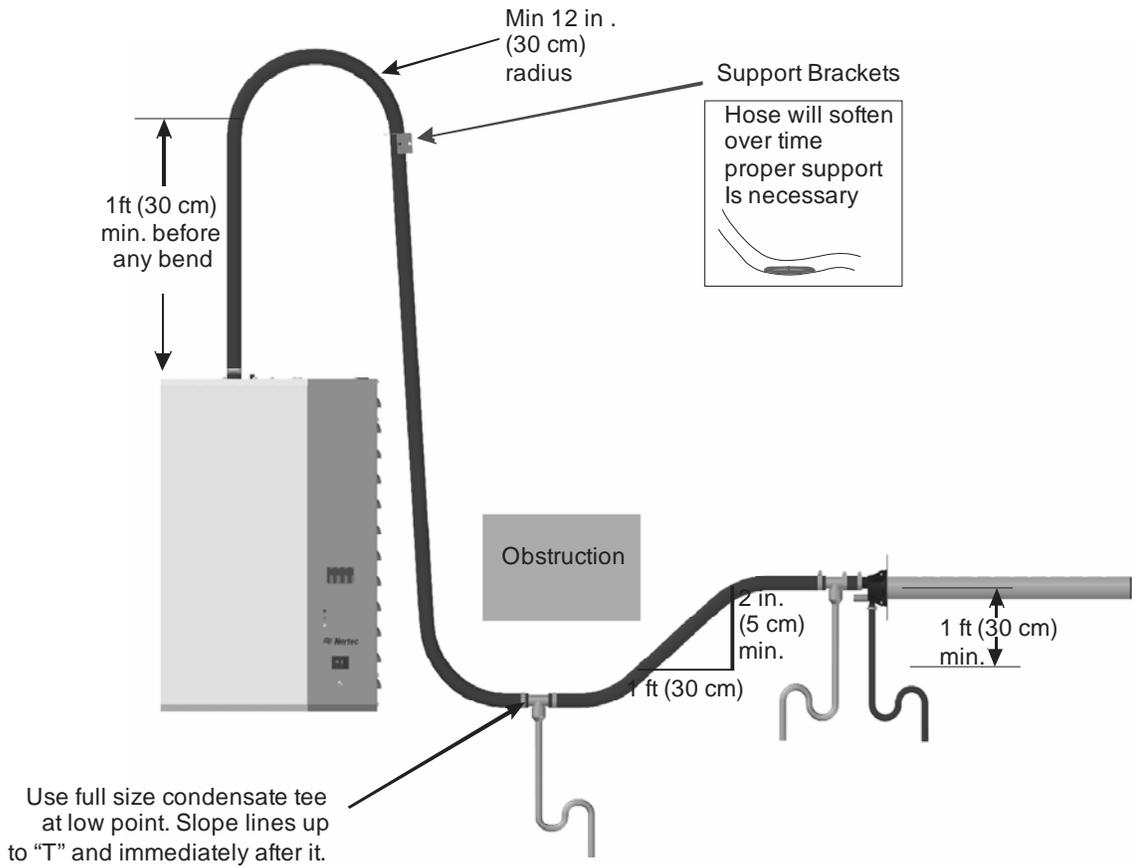


Figure 14: Steam Distributor Below Humidifier and Obstruction (Hose)

Method for Longer Runs With Limited Vertical Space

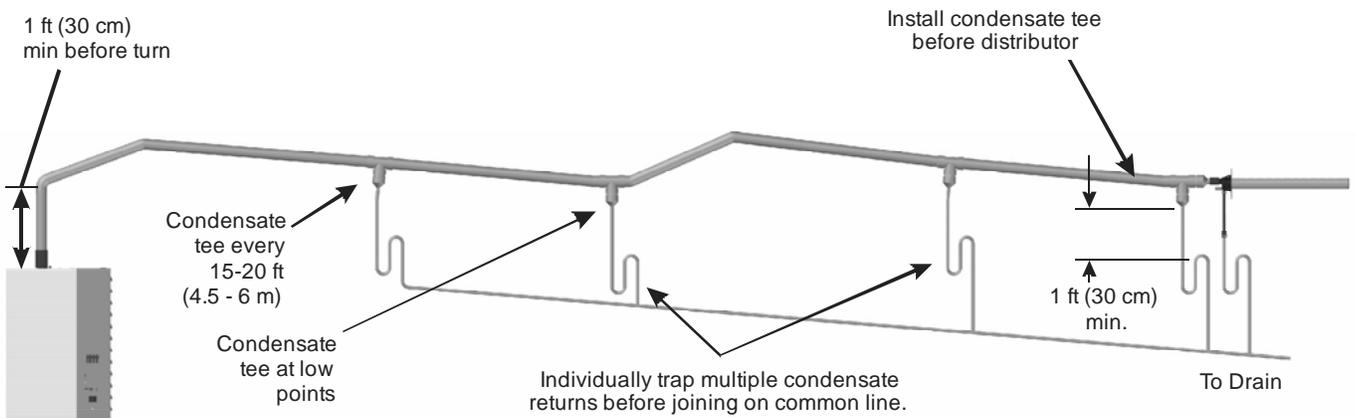
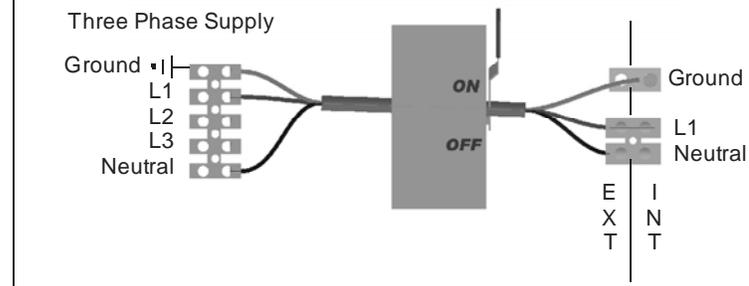
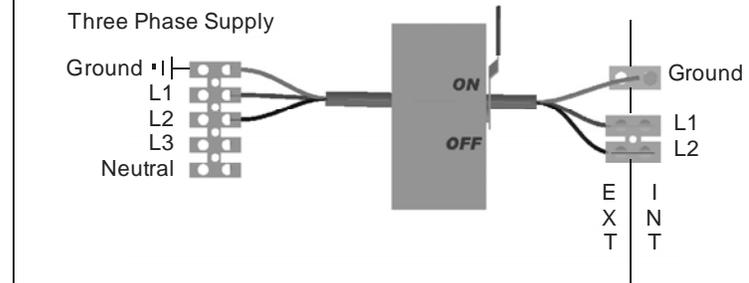
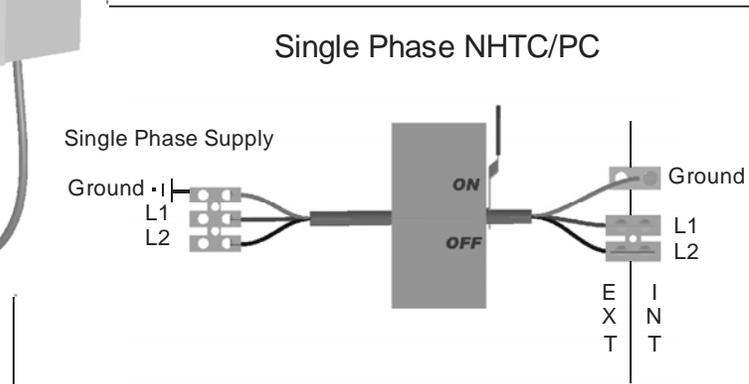
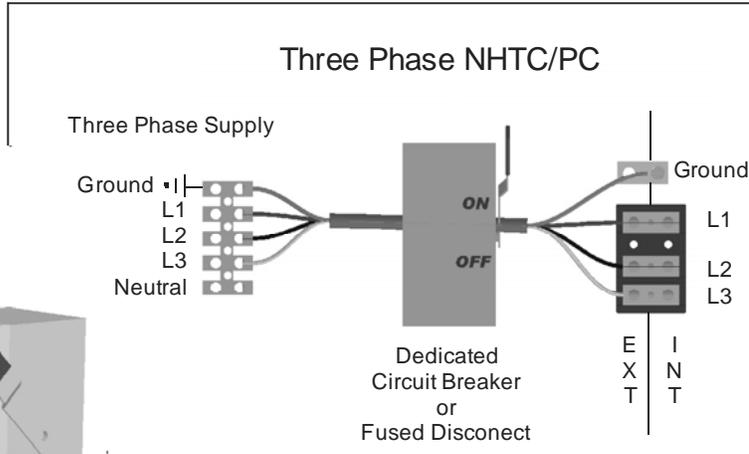
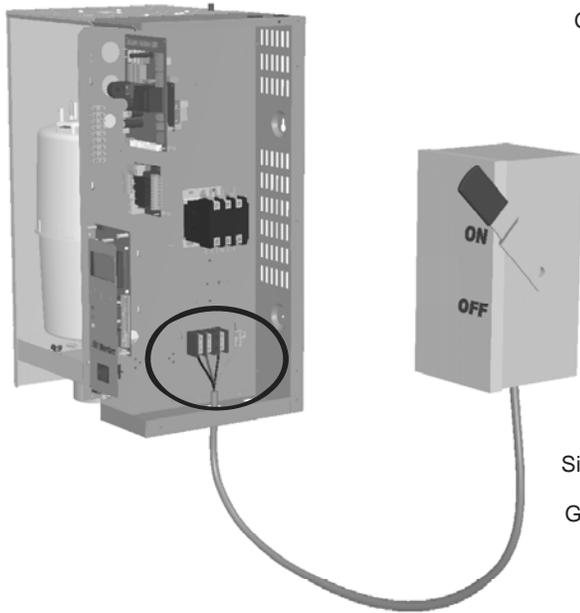


Figure 15: Long Steam Run

Electrical



Caution: Wiring to be performed by a licensed Electrician.



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 16: Primary Power Connection

External Controls

Control Wiring

Controls are available from NORTEC as accessories. If controls were not ordered with humidifier they must be supplied by others. The following information is relevant to all controls, factory supplied or otherwise. For wiring use minimum of 18 AWG and keep as short as possible.

The NHTC humidifier can be operated with two modulating inputs. The NHPC has one modulating input which can be used for a duct high limit or humidity control. Both the NHTC and NHPC can be operated as On/Off. See Control Setting on page 52 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

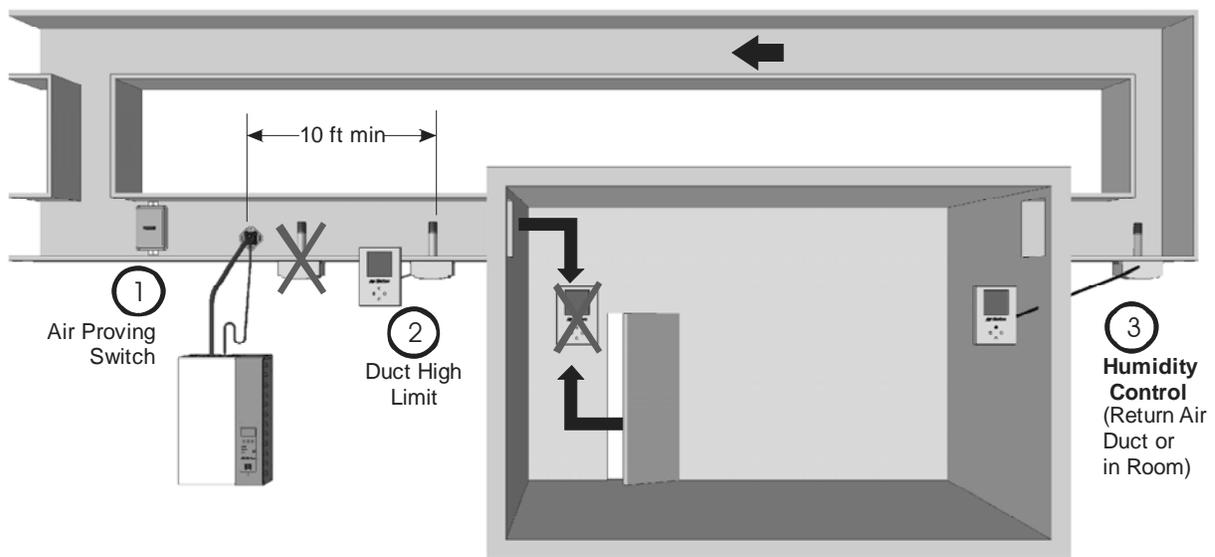


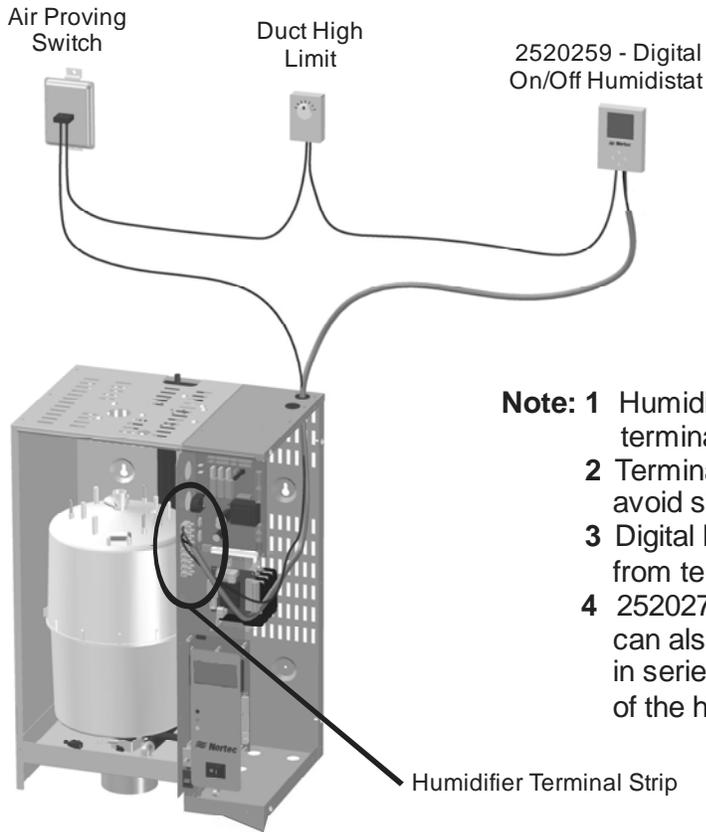
Figure 17: Control Location

- 1** Air Proving Switch
 - Locate so that it can sense air flow or lack of it.
- 2** Duct High Limit
 - NHTC can be modulating, On/Off, or a humidity sensor. NHPC can be modulating or On/Off.
 - Locate at least 10 feet from steam distributor or far enough that under normal conditions steam is fully absorbed.
- 3** Humidity Control
 - NHTC can be Modulating, On/Off, or a Humidity Sensor. NHPC can be modulating or On/Off.
 - 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.

Note: 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.



On/Off Control Wiring



- Note:**
- 1 Humidifier will run when circuit between terminal 1 and 2 on humidifier is closed.
 - 2 Terminal 1 is 24 VAC Hot, turn unit off to avoid shorting while wiring.
 - 3 Digital Humidistat requires 24 VAC power from terminals 1 and 3 of humidifier.
 - 4 2520273 - Digital On/Off Duct Humidistat can also be used for duct high limit. Wire in series to 3 - Common and 4 - Digital Out of the humidistat.

Figure 18: On/Off Controls

Air Proving Switch
Wire to make when sensing air flow

Duct High Limit
Wire to make on drop in humidity

2520259 - Digital On/Off Humidistat

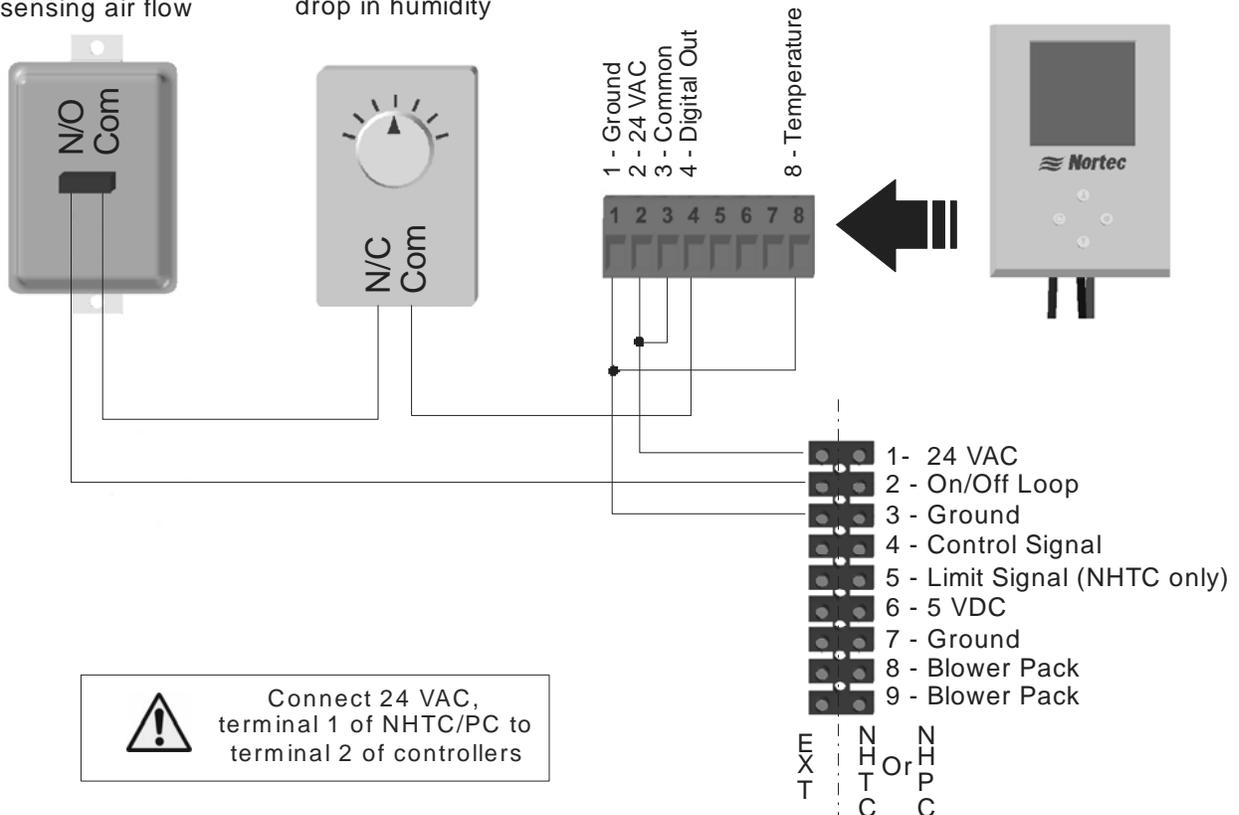


Figure 19: Digital On/Off Humidistat

2520273 - Digital On/Off Duct Humidistat Package

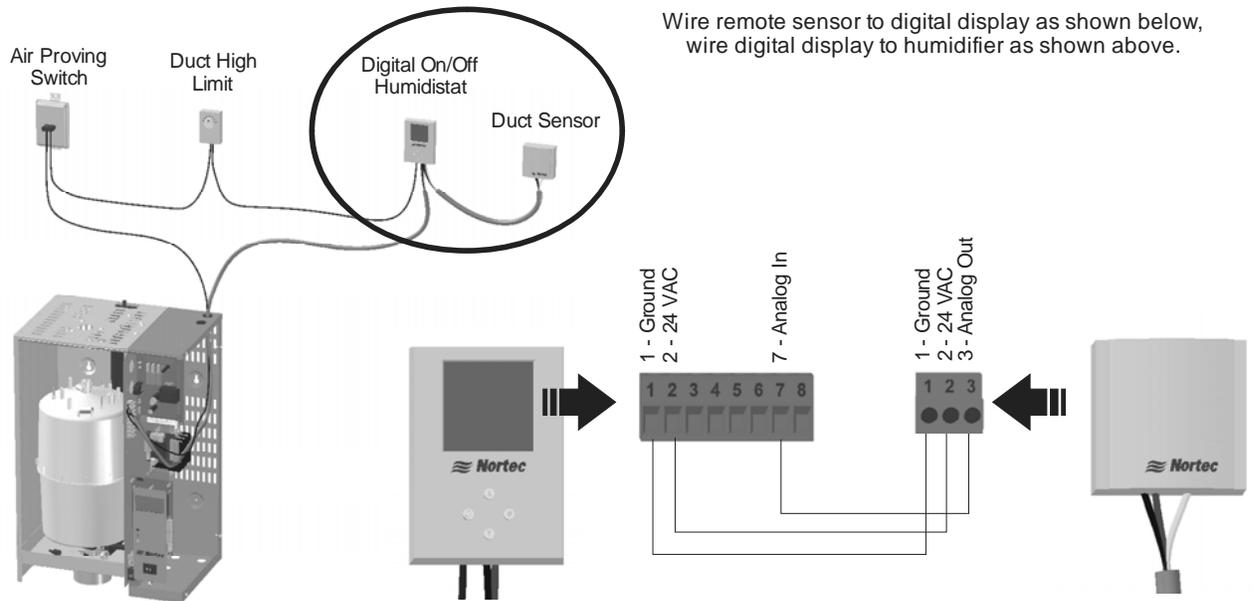
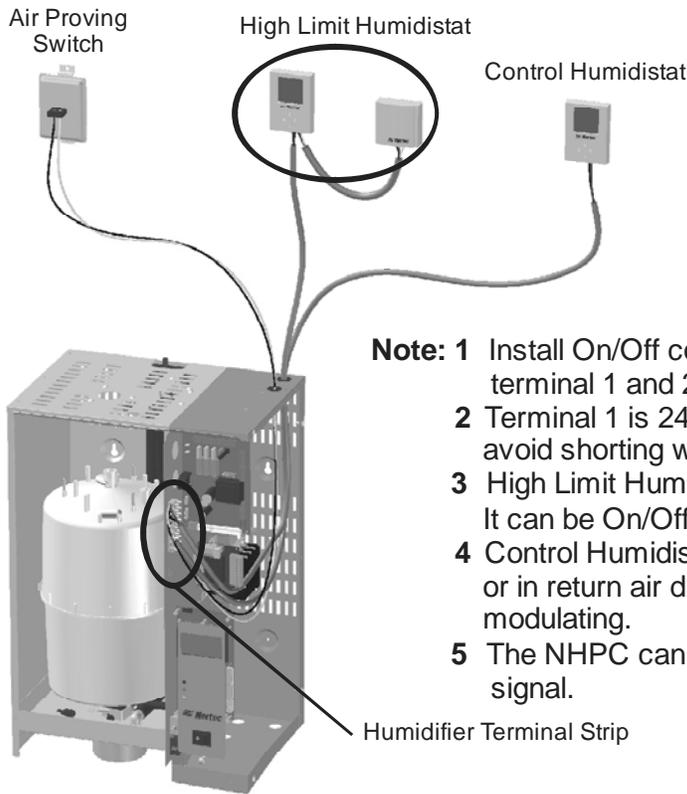


Figure 20: Duct Sensor Wiring

Modulating Control Wiring



- Note:**
- 1 Install On/Off controls or jumper between terminal 1 and 2 of humidifier in order to run.
 - 2 Terminal 1 is 24 VAC Hot, turn unit off to avoid shorting while wiring.
 - 3 High Limit Humidistat must be duct mounted. It can be On/Off or modulating.
 - 4 Control Humidistat can be mounted in space or in return air duct and can be On/Off or modulating.
 - 5 The NHPC can only accept one modulating signal.

Figure 21: Modulating Controls

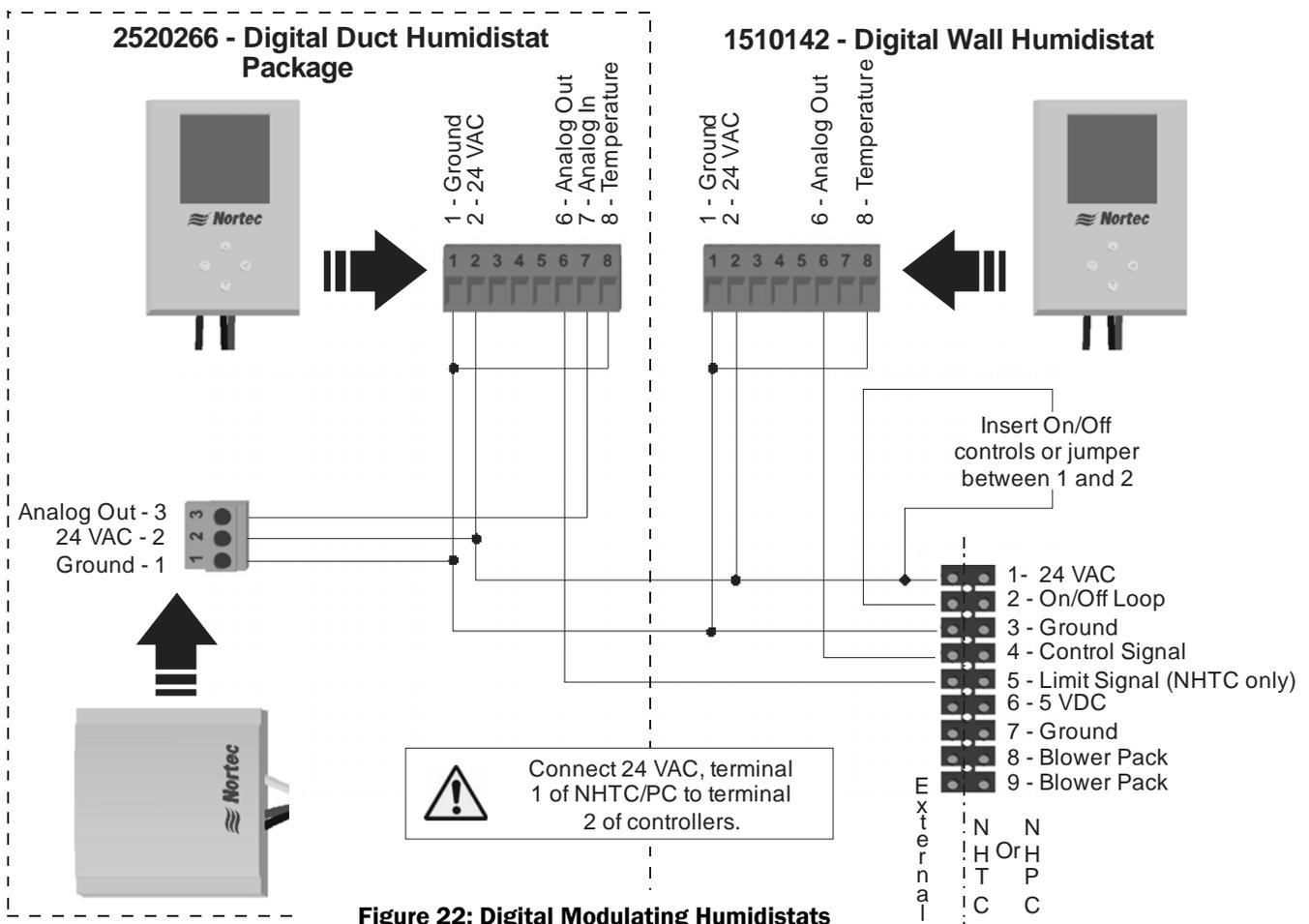
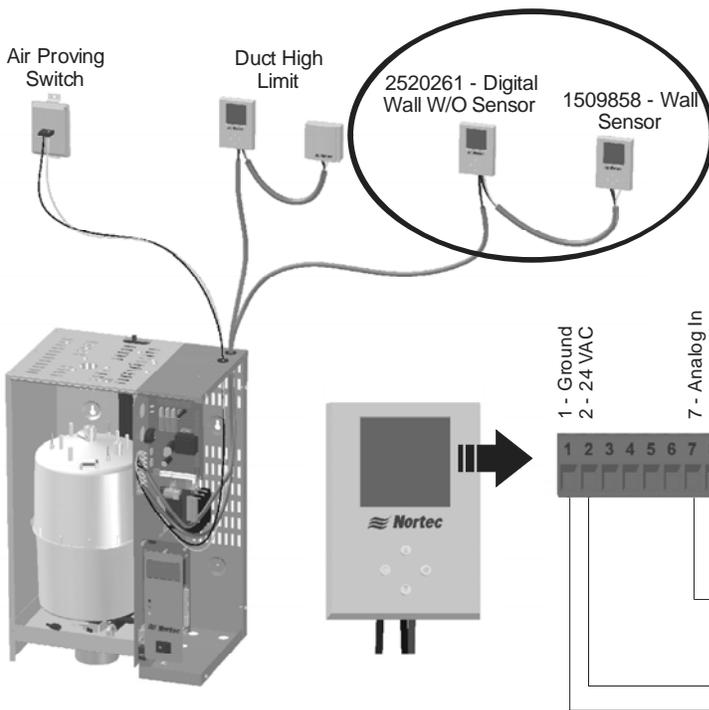


Figure 22: Digital Modulating Humidistats



2520261 - Digital Wall W/O Sensor

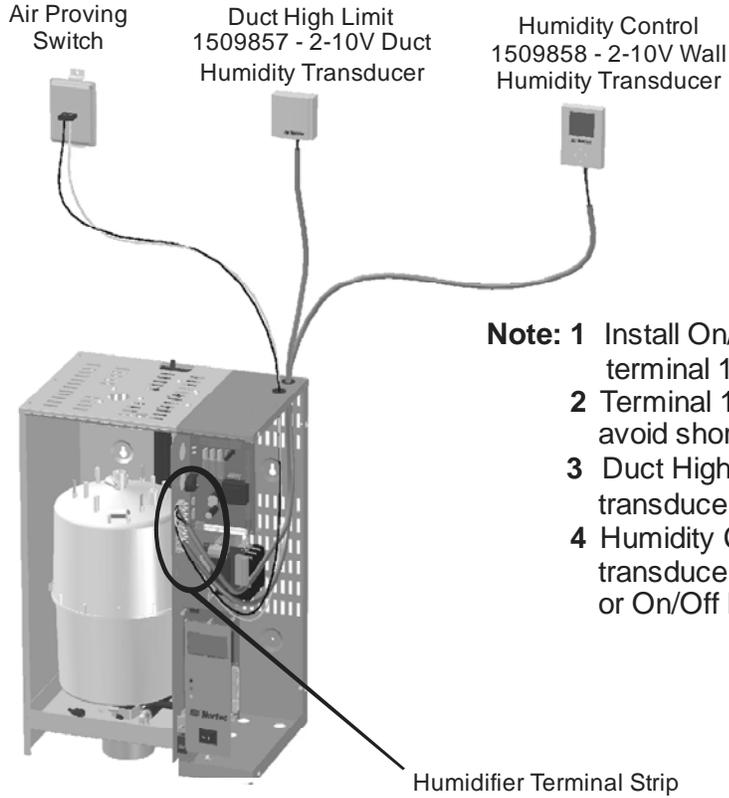
+

1509858 - Wall Sensor

Wire wall sensor to digital display as shown below, wire digital display to humidifier as shown for 1510142 - Digital Wall Humidistat.

Figure 23: Digital Wall Humidistat – Remote Wall Sensor

Transducer Control Wiring (NHTC Only)



- Note:**
- 1 Install On/Off controls or jumper between terminal 1 and 2 of humidifier .
 - 2 Terminal 1 is 24 VAC Hot, turn unit off to avoid shorting while wiring.
 - 3 Duct High limit can be duct humidity transducer as shown or duct On/Off humidistat.
 - 4 Humidity Control can be wall humidity transducer as shown, duct humidity transducer, or On/Off humidistat.

Figure 24: Transducers

1509857 - 2-10V Duct Humidity Transducer

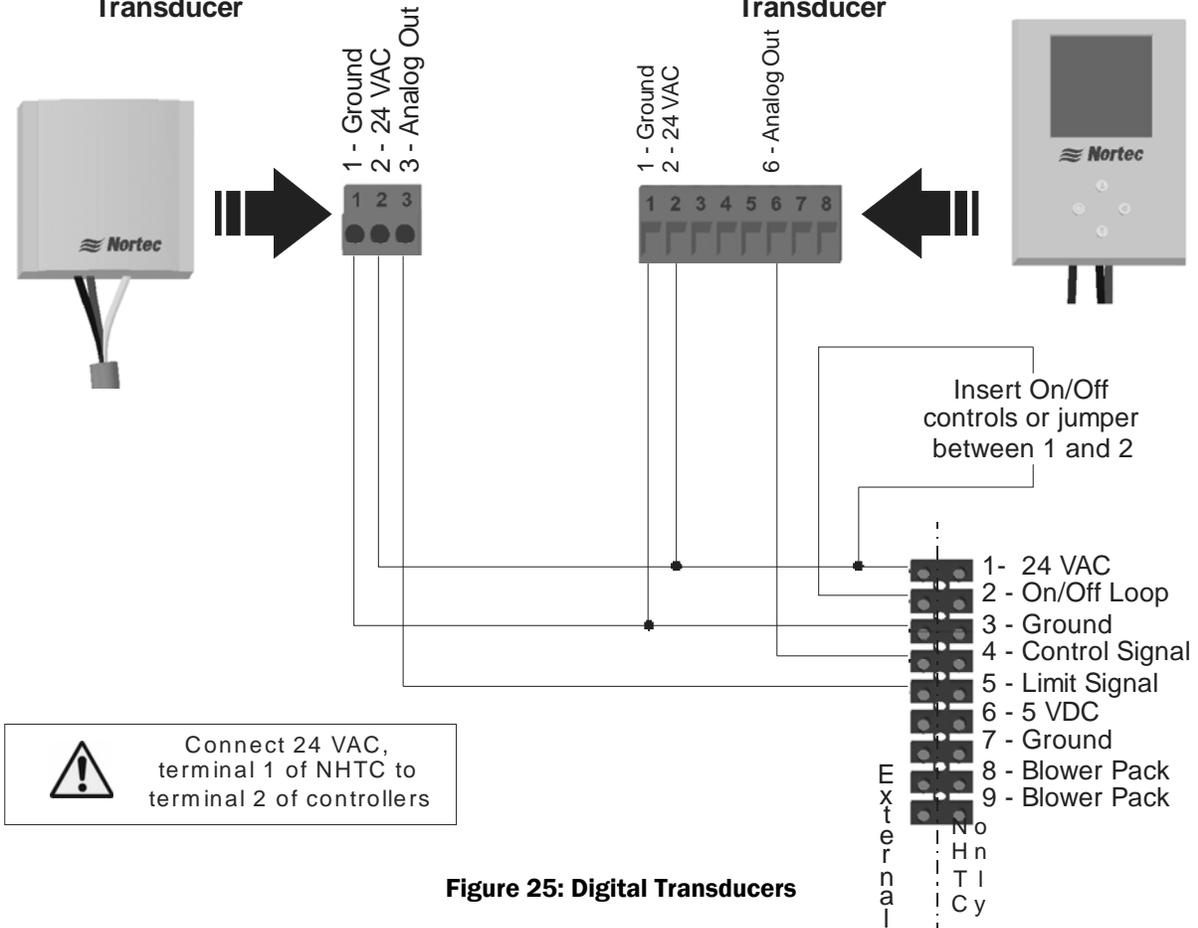


1 - Ground
2 - 24 VAC
3 - Analog Out

1509858 - 2-10V Wall Humidity Transducer



1 - Ground
2 - 24 VAC
6 - Analog Out



Warning: Connect 24 VAC, terminal 1 of NHTC to terminal 2 of controllers

Figure 25: Digital Transducers

Optional Outdoor Temperature Reset

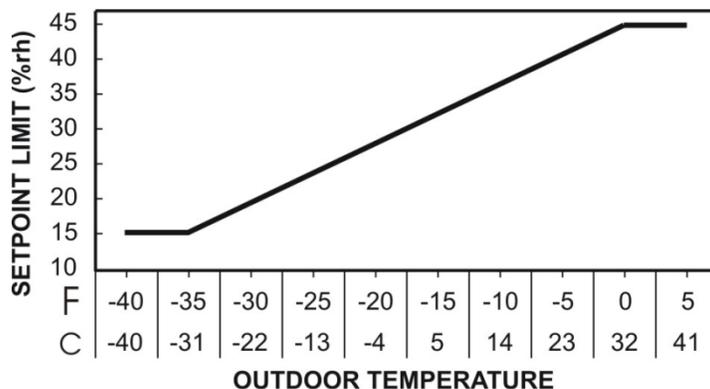


Figure 26: Outdoor Temperature Reset

- 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.

2520263 - Outdoor Temperature Sensor

Any NORTEC Digital Controller (Not Transducer)

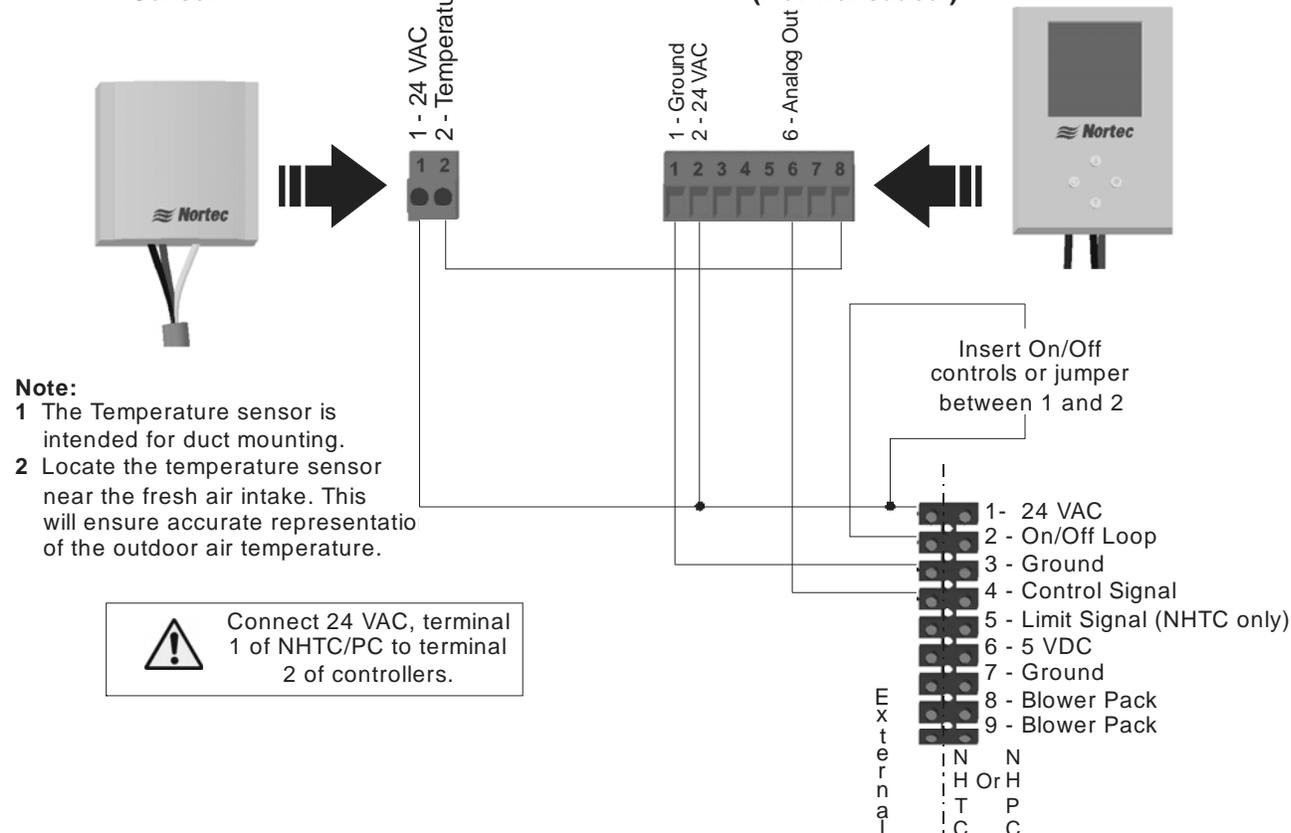


Figure 27: Outdoor Temperature Sensor

Remote Fault Option Wiring

The NHTC (not NHPC) 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 28: 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.

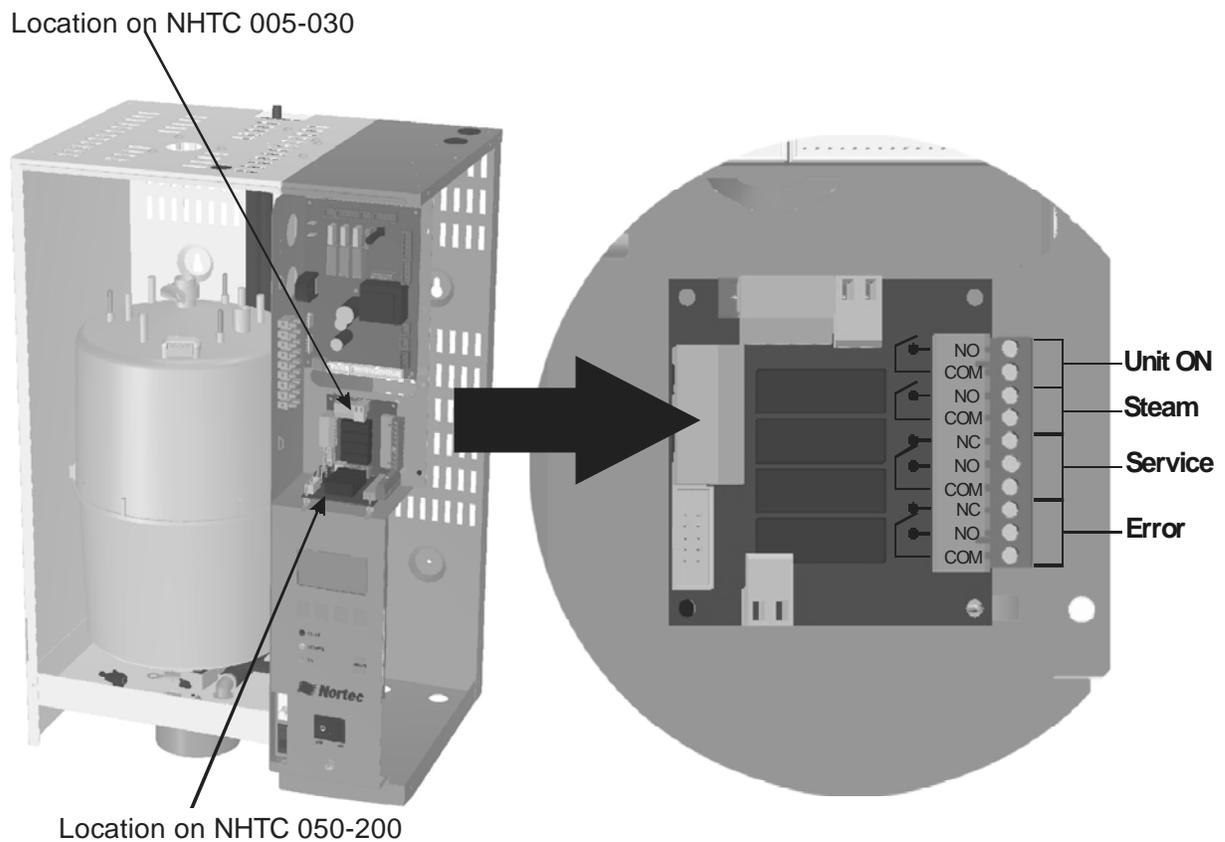


Figure 28: Remote Fault Wiring

Multi Mode Wiring (NHTC Only)

- Connect up to 16 units (equivalent of 1600 lb/hr) using 18-24 AWG multi-strand, twisted pair, shielded cable.
- Connect humidistats/transducers and On/Off safety loop to master unit only.
- When connecting double units connect only to driver board A.
- See Multi Mode on page 48 and Multi Unit Op. Range on page 54 for software configuration.

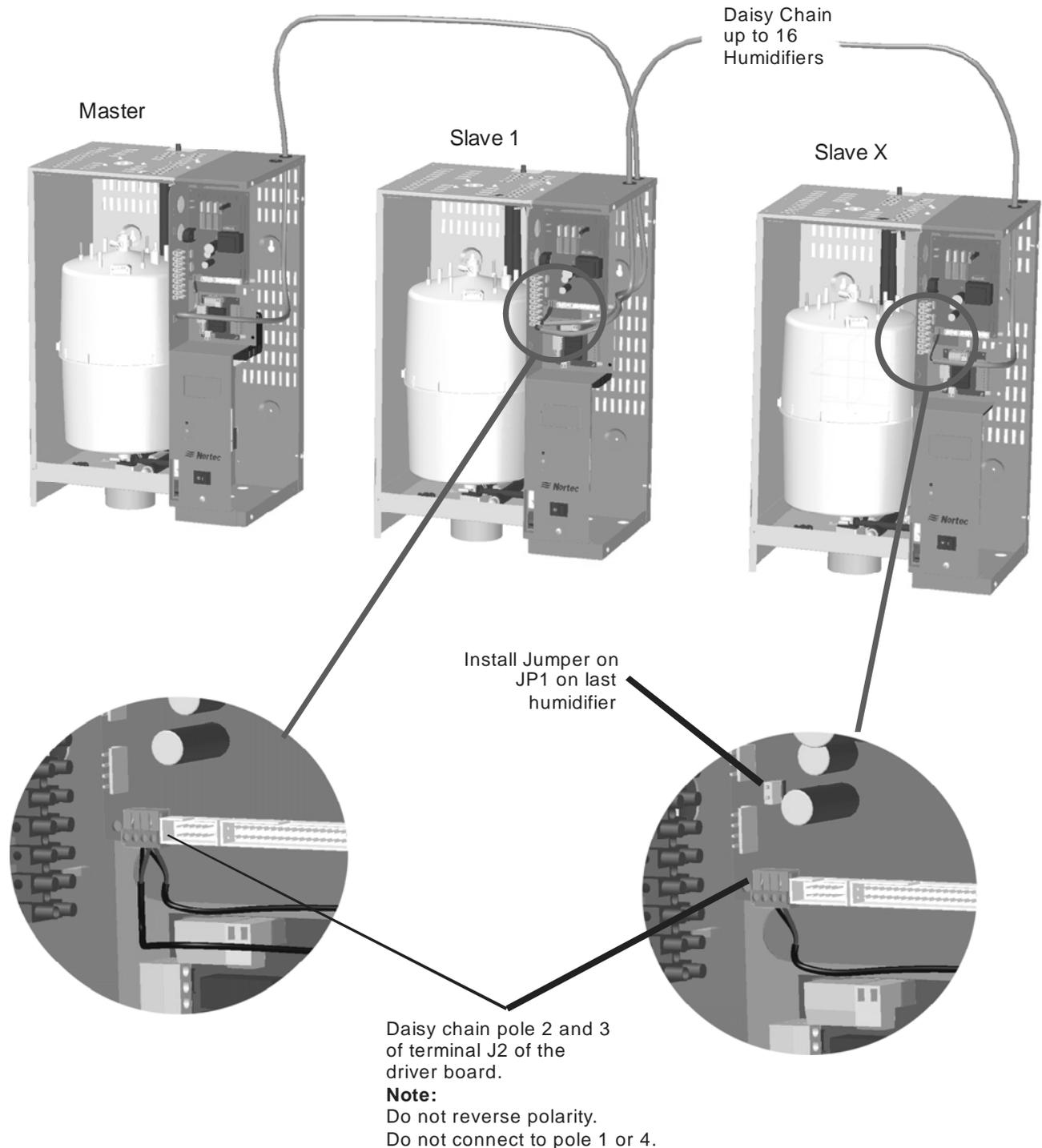


Figure 29: Multi Mode Wiring

Options and Accessories



Note:

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

Built On or Remote Blower Pack

Built on and remote blower packs are available for the NHTC/PC for applications where steam for humidification must be introduced directly into the space being humidified. For instructions on installing the remote blower pack refer to the installation instructions supplied with it. The steam line and condensate return instructions provided in this manual are also applicable to remote mounted blower packs.

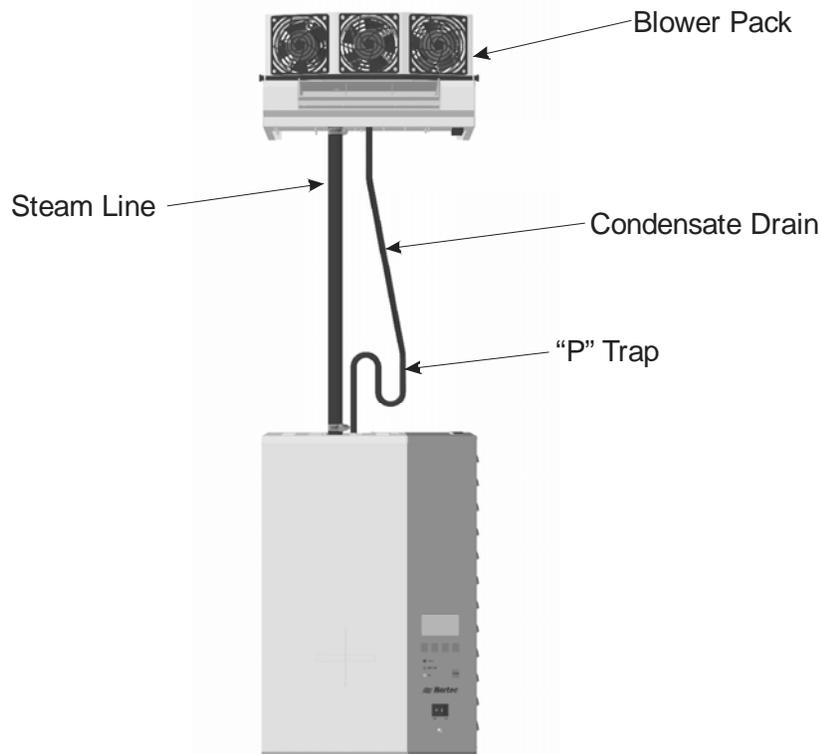


Figure 30: Remote Mounted Blower Pack

Installation of an NHTC/PC with a built on blower pack is identical to installation of an NHTC/PC without a blower pack. The steam line, condensate return and wiring connections to the blower pack have been done at the factory.

Fill Cup Extension

For installations where duct static pressure exceeds 6 inches a fill cup extension kit is required. The 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.

Drain Water Cooling

For installations where drain water must be cooler than 140°F (60°C) a kit is available which consists of a double fill valve. The second fill valve adds additional water to the fill cup while the humidifier is draining to cool the water more than the single fill valve.

Drain Water 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 drain water 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 NHTC/PC 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 NHTC/PC. 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 also Remote Fault Option Wiring on page 27 for more information about the remote fault indication kit.

Outdoor Model

The outdoor model of the NHTC performs in the same way as the indoor model except as noted in the manual addendum that is supplied with it. Refer to additional installation instructions for the outdoor model in the addendum.

Start Up

- 32 Installation Check**
- 33 NHTC/PC User Interface**
 - 33 Manual Drain Switch
 - 33 Door Interlock Switch
- 34 Start Up Procedure**
- 35 Status Screens**
- 36 NORTEC Digital Controls**
- 38 Multi Mode**
- 38 NORTEC LINKS 2**
- 38 NORTEC ONLINE**
- 39 NHTC/PC Pre-Start Up Checklist**
- 40 NHTC/PC Start Up Checklist**

Installation Check

Before turning on power to the NHTC, inspect the installation to insure that it was carried out correctly. Refer to Figure 31: Installation Check, to the NHTC/PC Pre-Start Up Checklist on page 39, and to the chapter on Installation that starts on page 9.

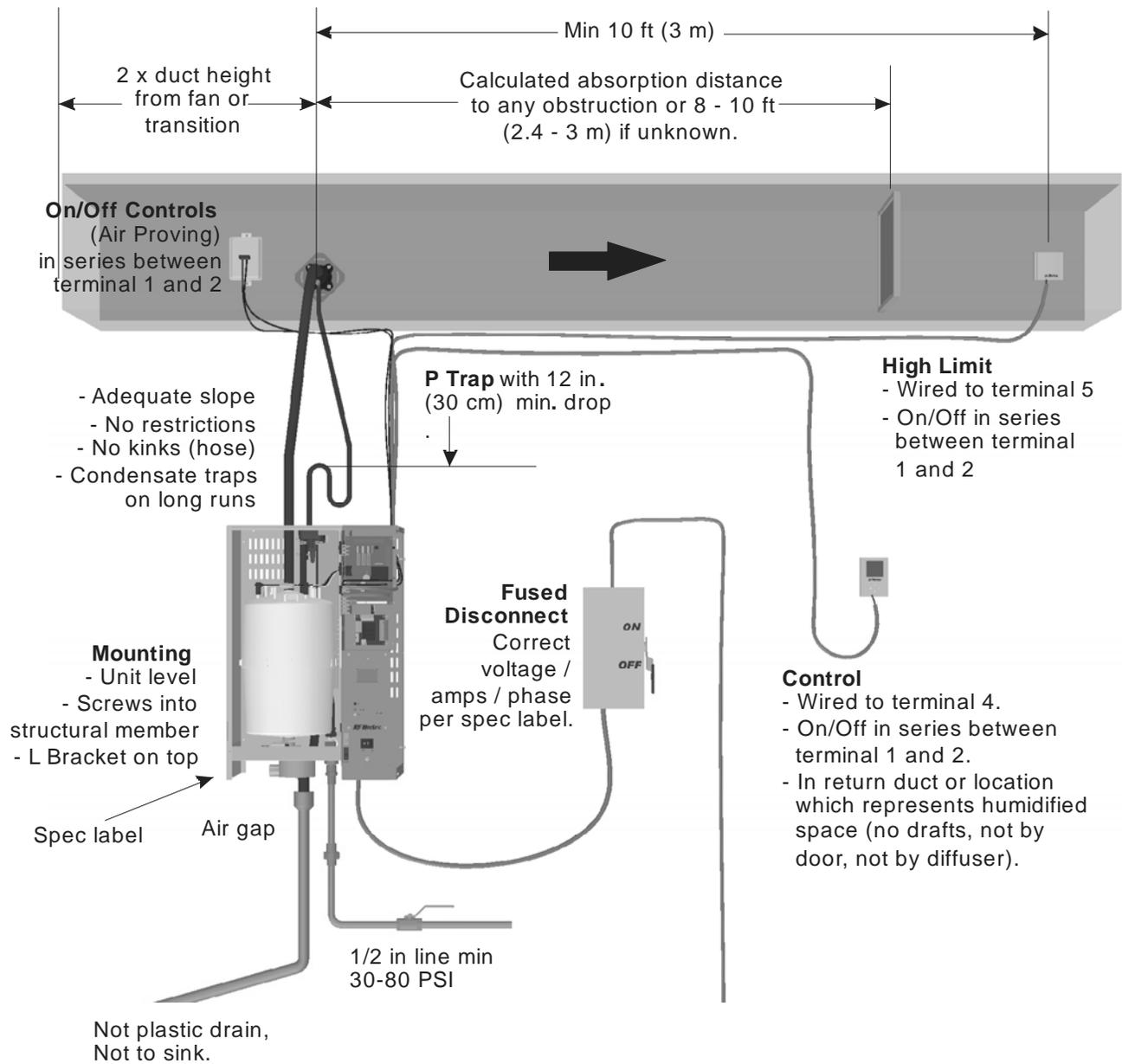


Figure 31: Installation Check

NHTC/PC User Interface

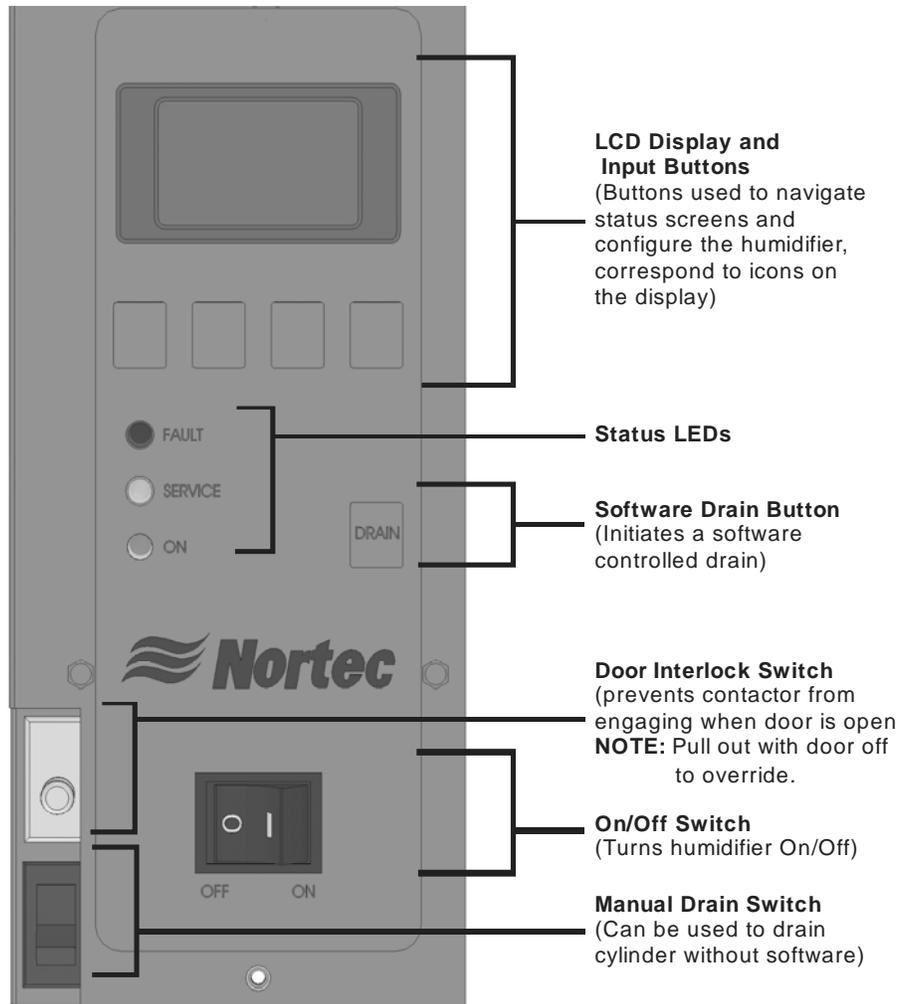


Figure 32: NHTC/PC User Interface

Manual Drain Switch

In addition to software controlled draining of the cylinder the NHTC/PC 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.

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.

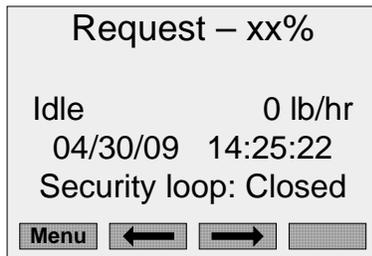
Start Up Procedure

- 1 Examine the humidifier and installation for damage and or improper installation.

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



- 2 Ensure that the door is in place and secured with its retaining screw.
- 3 Open the supply water shut off valve.
- 4 Turn on the mains power using the installed disconnect.
- 5 Turn the On/Off switch on the front of the humidifier to On.



The LCD display will illuminate and the humidifier will perform a self-diagnostic sequence during which the LED's and internal components will be momentarily activated.

If an error is detected during the self-diagnostic sequence a Fault will be displayed. See troubleshooting section for information on diagnosing and correcting faults.

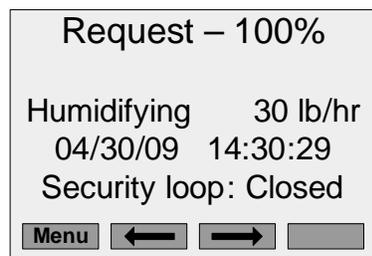
After the system test the humidifier is in normal operation mode.

Note: NHTC display shown. The information on the LCD depends on the configuration of the NHTC/PC and the actual operating conditions. It may vary from the display shown.

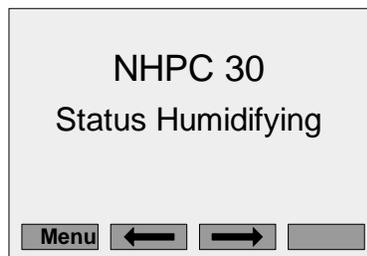
- 6 If On/Off or a control humidistats have been installed check and adjust the control setpoint on the control and high limit humidistat (see NORTEC Digital Controls on page 36). If transducer controls have been installed then adjust the humidity setpoint using the keypad and display (see Set P on page 53)
- 7 When either the external humidistat or internal controller generate a demand for humidity higher than 20% and the security loop is closed 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 69.

- 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.



NHTC Display



NHPC Display

The green humidifying LED on the front of the humidifier will light up and the display will indicated “Humidifying” and the amount of steam being produced (NHTC only) as soon as the electrodes are submerged and drawing current.

Note: If operated on low conductivity water it may take several hours for the NHTC/PC to reach full output capacity. This is normal. During this time the humidifier will periodically indicate high water level, not perform any drains and will concentrate the cylinder water.



Status Screens

In addition to the main status screen the NHTC/PC includes several status screens which provide additional information about the humidifier. The additional screens can be reached by pressing the buttons corresponding to the left and right arrow key on the LCD display.



Note:: NHTC status screens are shown below. The NHPC has similar status screens but with less detailed information. NHPC screens show only software version, output, demand, capacity limit, and control type. The NHPC does not have a trend graph.

Request – xx%

Idle 0 lb/hr
 04/30/09 14:25:22
 Security loop: Closed

Menu ← → □

Main Status Screen

This screen reports the current request for humidity, status, output, date and time, and security loop status. If status is not idle or humidifying the left arrow key becomes a “?”. If the button corresponding to the arrow key is pressed the display will give additional information on the status of the humidifier.

CONTROL

Output : 0 lb/hr
 Man Cap. : 100%
 Ch1 Dem : 55%
 Ch2 Dem : 100%

Menu ← → □

CONTROL

Output : 0 lb/hr
 Man Cap. : 100%
 RH Ch1 : 55%
 CNT Set-Pt : 50%
 RH Ch2 : 100%
 CNT Set-Pt : 70%

Menu ← → □

Control Information Screen

Output is the lb/hr steam output of the unit. Man Cap is the user configured capacity limitation. Depending on the control configuration the screen also reports the current inputs of channel 1 and 2. If the unit is configured for internal control it also provides the current humidity and setpoints.



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 control information screen do not match those connected to the humidifier.

HUMIDIFIER

Model : NHTC
 Capacity : 30 lb/hr
 REG Mode : Demand
 Software : XVXX

Menu ← → □

HUMIDIFIER

Model : NHTC
 Capacity : 30 lb/hr
 REG Mode : RH (PI)
 Software : XVXX

Menu ← → □

Humidifier Information Screen

Model is the humidifier model type. Capacity is the maximum output. REG Mode is the configured control method. Software is the installed software version.

CYLINDER

Cyl Number : 421
 Cyl Type : Disposable
 Capacity : 30 lb/hr
 Fac. Date : 10/10/06
 Run Time : 657h
 Status : Good

Menu ← → □

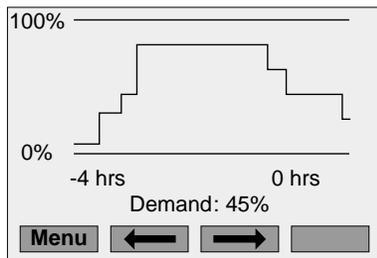
Cylinder Information

Cyl number is the model number of the cylinder. Cyl Type identifies it is a disposable cylinder. Capacity shows the cylinders maximum capacity. Fac. Date is the date the cylinder was manufactured. Run Time is the cylinders operational hours. Status indicates if the cylinder is good or spent. Replace if spent!

Functionality	
Idle Mode	: Idle Only
3DD Force	: Off
Ground FI	: Off
Rapid Modu	: Off
Short Cyc	: Off
Foam Mode	: Off
<input type="button" value="Menu"/> <input type="button" value="←"/> <input type="button" value="→"/> <input type="button" value="□"/>	

Functionality Information

Indicates the configuration of user configurable settings. For definitions see Controls Configuration.



Trend Graph

This graph provides a history of the humidifiers output for the past 4 hours. It displays a percentage of full output which corresponds to the demand signal. The current demand signal is displayed at the bottom of the screen.

NORTEC Digital Controls

NORTEC provides optional On/Off, Modulating Control, or Transducer digital controls. Figure 31 and 32 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.

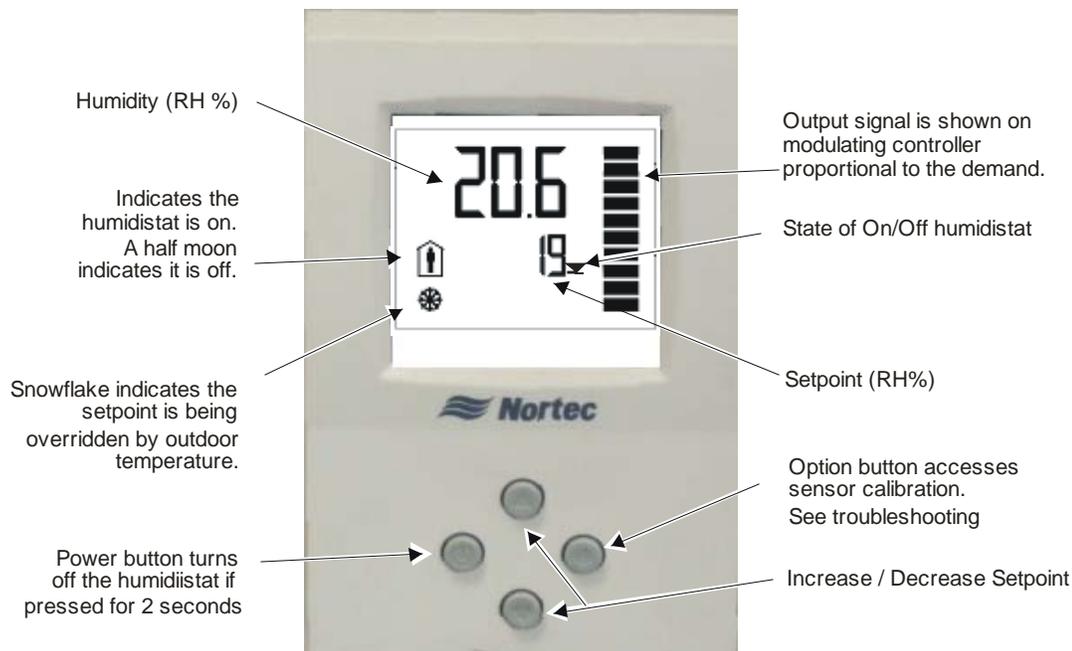


Figure 33: Modulating and On/Off Digital Control Operation

Modulating 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 On/Off 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 NHTC/PC's display and keypad.

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 71 of chapter on Troubleshooting.

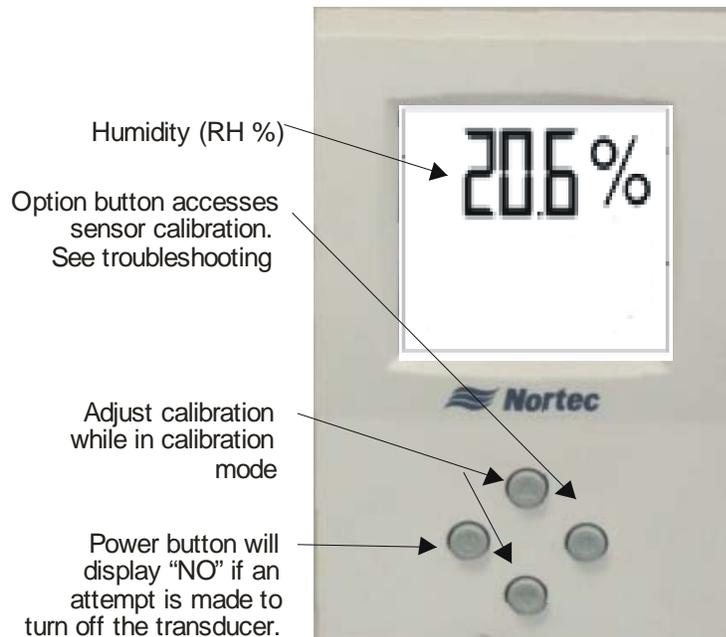


Figure 34: Transducer Control Operation

Multi Mode (NHTC Only)

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 **Multi Unit Op. Range** 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%)

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 Unit Op. Range on page 54 for software configuration, and Multi Mode Wiring on page 28 for wiring of humidifiers in a multi mode system.

NORTEC LINKS 2 (NHTC Only)

NORTEC LINKS 2 is an option that can be integrated with the NHTC. It allows a Building Management System to monitor and / or control the humidifier. For complete information about NORTEC LINKS 2 and its operation and configuration, go to www.humidity.com and look up the NORTEC LINKS 2 manual.

NORTEC ONLINE (NHTC Only)

NORTEC ONLINE is an option that can be integrated with the NHTC. It allows a user to log onto the Internet, go to www.norteconline.com and log in to allow them to monitor their unit from any computer with an internet connection. It can also be configured to send service reminders and fault warnings when they occur.

NHTC/PC 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 Acceptable Obstruction)

- 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 + 2in P Trap min 12 in drop

Water Line:

- 1/2 in to within 4ft of unit 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: _____

NHTC/PC 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:

- Door in Place and secured with screw yes no
- Water supply valve opened yes no
- Mains disconnect switched on yes no
- Turn On/Off switch on 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) yes no
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 W12 Sensor on warning indicating water level is at the top of the cylinder to be displayed during this time period.

Remarks:

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

Company: _____

Operation

42	LED Status Lights
42	Common Warnings
3	Humidifier Components
4	Description of Components
44	How the Humidifier Works
44	Steam Generation
44	Drains
44	Steam Distribution
45	Selecting an RH Setpoint
47	NHTC Humidifier Configuration
47	Navigating the NHTC Software
47	Main Menu (NHTC Password)
48	Service Level
48	User Defined Settings
52	Control Setting
53	Setting
54	Multi Unit Op. Range
55	Diagnostic Menu
57	NHPC Humidifier Configuration
57	Navigating the NHPC
57	Main Menu (NHPC Password)

LED Status Lights

The keypad and display panel includes 3 LED's which provide information about the humidifier's current status.

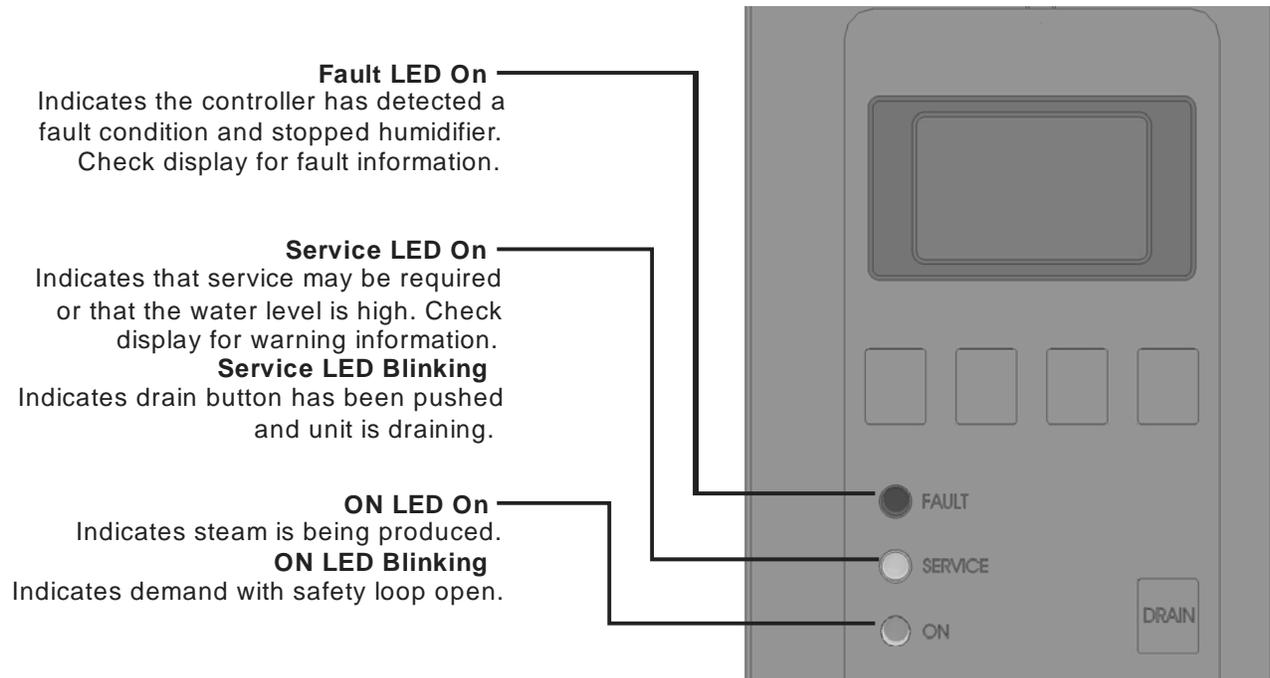


Figure 35: LED Status Lights

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 Sensor On warning indicates that full capacity cannot be reached because cylinder water is not concentrated. For an old cylinder the Sensor On warning may be an indication that the cylinder will soon have to be replaced.

W12: Sensor On

The above warning is normal during the start and end of a cylinder's 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.



W11: Safety Loop Open

The above warning is normal during operation. It indicates that an On/Off humidistat or 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

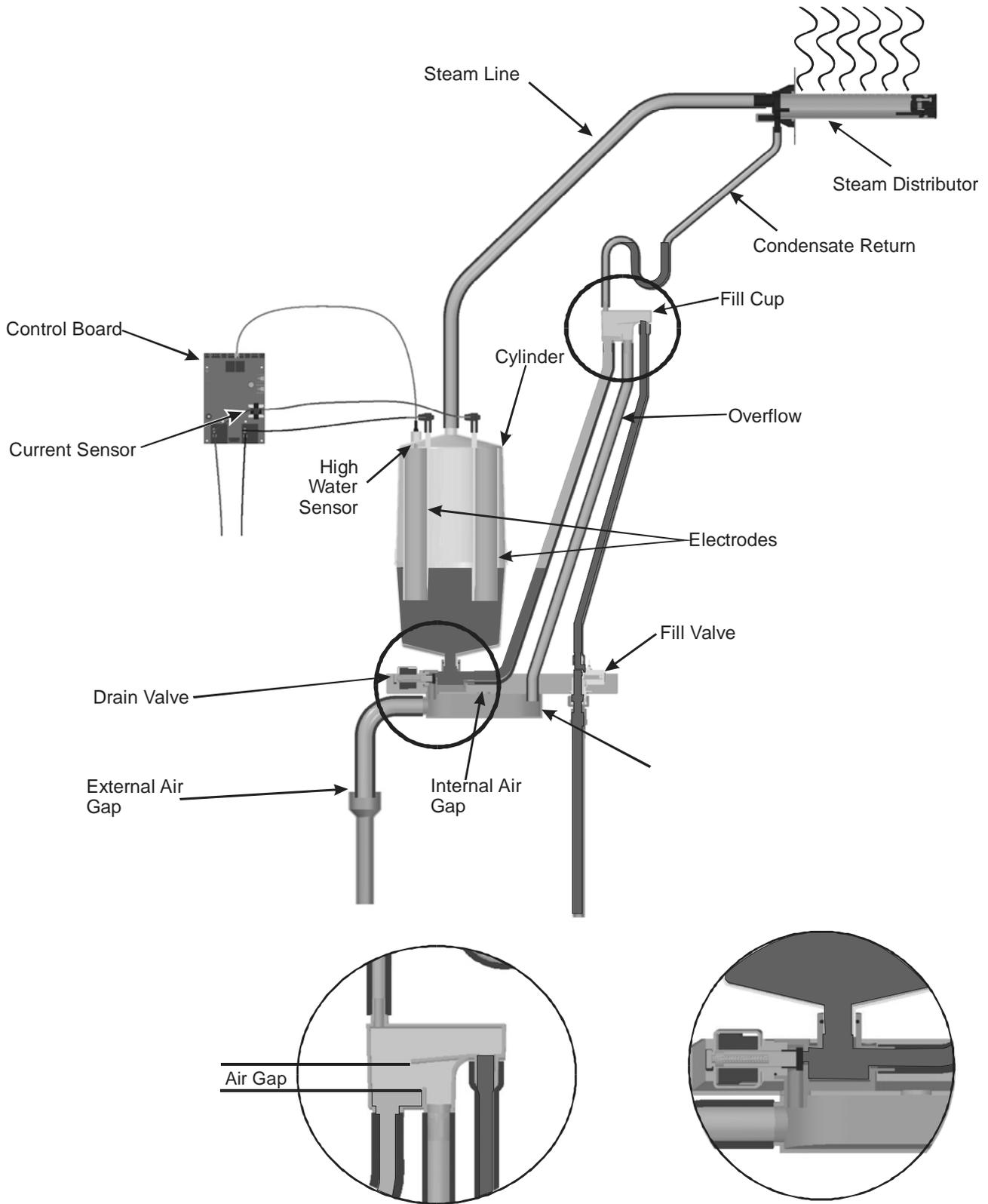


Figure 36: Humidifier Schematic

How the Humidifier Works

The NHTC/PC is an atmospheric steam generator that uses heat generated by electrical current flowing between submerged electrodes to generate heat and steam. The NHTC/PC 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 safety 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 electrode is covered by water the higher is 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 NHTC/PC repeats the fill and boil down cycle repeatedly to match output to demand.
- Over time minerals in the water will adhere to the cylinder's 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 NHTC/PC's 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 NHTC/PC'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 36: 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 37: SAM-e Manifold. For introducing steam directly into a room, humidifier mounted or remote mounted blower packs are used see Figure 38: Remote Blower Pack.

Steam Line

The steam line between the cylinder steam outlet and the distributor may be NORTEC steam hose, copper pipe, or stainless steel pipe or tube. The NHTC/PC is an atmospheric steam generator so it is very important no restrictions are present in the steam line and that the steam line is sized properly to carry the full output capacity of the humidifier. It is also important to minimize the length of steam lines. See Steam Lines and Condensate Returns on page 14 for information on selecting steam lines and maximum recommended lengths.

Whenever steam is distributed condensate is formed in the distribution system and steam distributor, manifold, or blower pack. Insulating steam lines is one important way to reduce the amount of condensate formed. Steam lines must be sloped so that condensate does not collect in the lines and create a restriction to steam flow.

Condensate Return

The condensate must be collected and removed from the 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 NHTC/PC 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. See also 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.

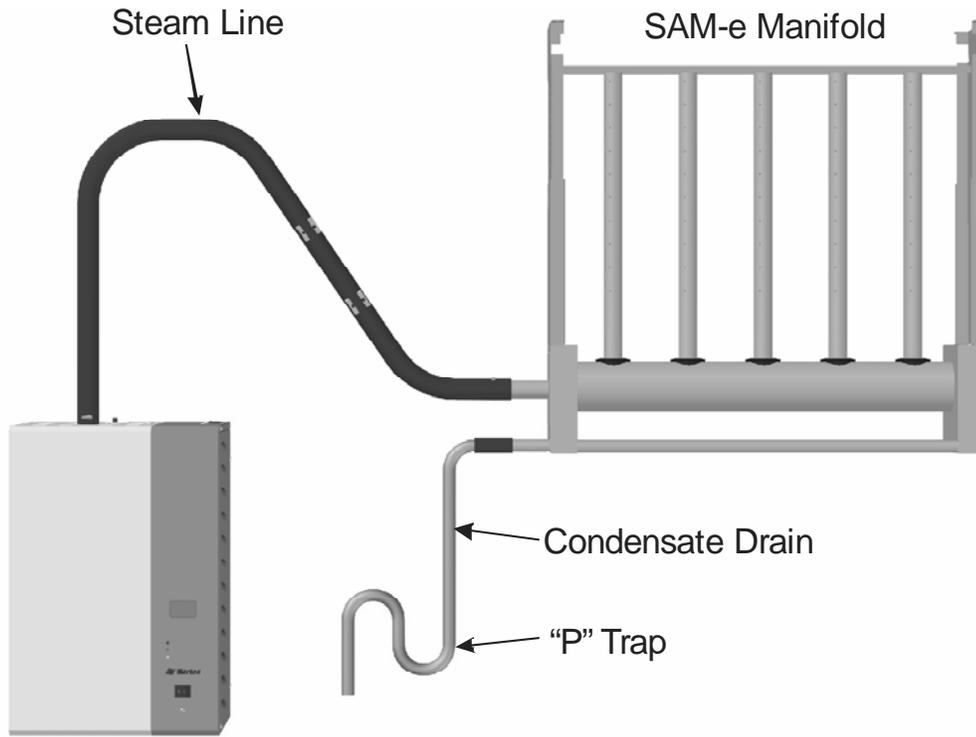


Figure 37: SAM-e Manifold

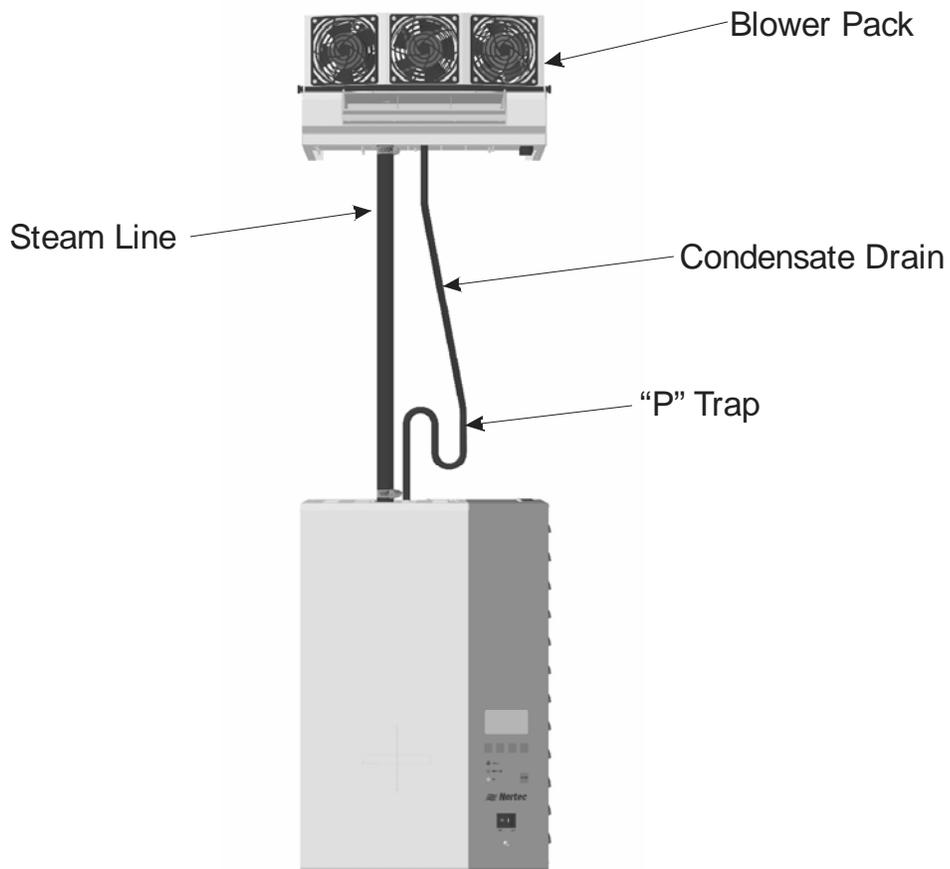


Figure 38: Remote Blower Pack

NHTC Humidifier Configuration

Navigating the NHTC Software

The four input buttons below the digital display are used to navigate in the NHTC’s software and to enter values. The function of the four buttons changes depending on what is being displayed on the screen. In all cases 4 icons representing the functions of the buttons are shown at the bottom of the screen.

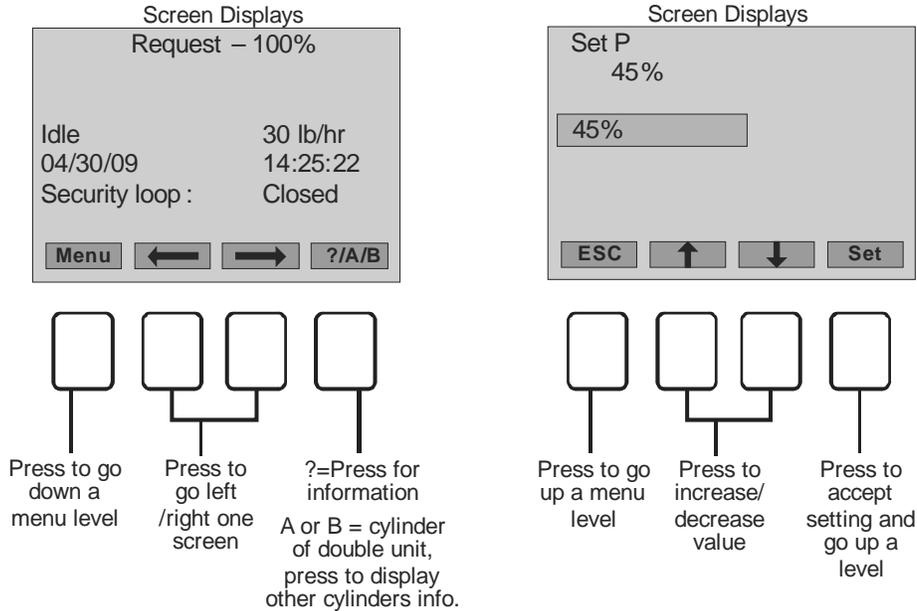
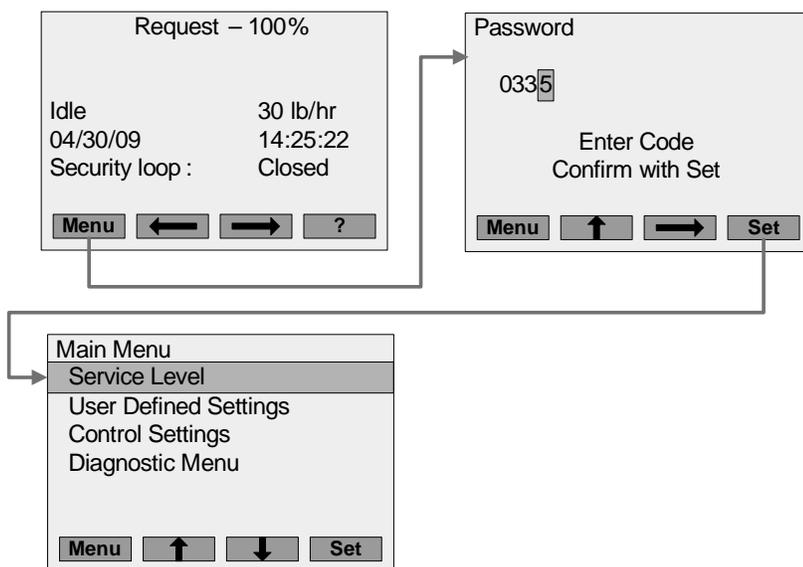


Figure 39: Navigating the NHTC/PC Software

Main Menu (NHTC Password)

The menu levels of the NHTCare password protected to prevent configuration changes by unauthorized persons. In order to access the menu level press the button corresponding to the Menu icon and when prompted enter the password 0335.



Enter Password

Press the **Menu** button from any status screen. Enter the user level code **0335** using the up arrow to change the value of each digit and the right arrow to move to the next digit. Press the **Set** button.

Main Menu

From here you can access all user configurable settings. Select any sub-menu by using the **up/down** arrow buttons and pressing **Set** when the desired one is highlighted.

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

Service Level

The selections in the **Service Level** allow you to reset service reminders and the fault history. Press **Set** while highlighting **Service Level** in the **Main Menu**.

Service Level
Reset Error History
Reset Service History
Reset Cylinder
Menu ↑ ↓ Set

Reset Cylinder without replacing it Is dangerous !!!
Still Reset Cyl ?
Menu Yes No Set

Reset Cylinder

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.

Service Level
Reset Error History
Reset Service History
Reset Cylinder
Menu ↑ ↓ Set

Reset Error History are you sure ?
Menu Yes No Set

Reset Error History

Deletes the list of errors stored in the error history. The **Error History** is located in the **Diagnostics Menu**. Resetting the error history is not normally required, but can be done after repairs to remove faults that are no longer needed.

Service Level
Reset Error History
Reset Service History
Reset Cylinder
Menu ↑ ↓ Set

Reset Service History are you sure ?
Menu Yes No Set

Reset Service History

Deletes the historical list of service reminders. The **Service History** can be found in the **Diagnostics Menu**.

User Defined Settings

The selections in **User Defined Settings** allow you to configure most user configurable features available with the NHTC. Press **Set** while highlighting **User Defined Settings** in the **Main Menu**.

User Defined Settings
Multi Mode : Master
Drain Cool : On
Dfactor : 1.0
Foam Mode : Off
Rapid Modu : Off
ShortCyc : Off
Menu ↓ Set

Multi Mode
Master
Standalone
Master
Slave
Menu ↑ ↓ Set

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. See **Multi Unit Op. Range** later in this section. (Default = Standalone)

(User Defined Settings Continued)

User Defined Settings	
Multi Mode	: Standalone
Double Mode	: Parallel
Drain Cool	: On
Dfactor	: 1.0
Foam Mode	: Off
Rapid Modu	: Off
Menu	↓ Set

Double Mode	
Parallel	
Sequenced	
Independent	
Menu	↑ ↓ Set

Double Mode (NHTC 150-200 only)

Parallel = cylinders operate in parallel from one set of control signals. Sequenced = cylinders operate in sequence from one set of control signals. Independent = two sets of controls signals and each cylinder follows one of the sets.

User Defined Settings	
Multi Mode	: Standalone
Drain Cool	: On
Dfactor	: 1.0
Foam Mode	: Off
Rapid Modu	: Off
ShortCyc	: Off
Menu	↑ ↓ Set

Drain Cool	
On	
Off	
On	
Menu	↑ ↓ Set

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)

User Defined Settings	
Multi Mode	: Standalone
Drain Cool	: On
Dfactor	: 1.0
Foam Mode	: Off
Rapid Modu	: Off
ShortCyc	: Off
Menu	↑ ↓ Set

DFactor	
1.0	
1.0	
Menu	↑ ↓ Set

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 o be adjusted. (Default = 1.0)

User Defined Settings	
Multi Mode	: Standalone
Drain Cool	: On
Dfactor	: 1.0
Foam Mode	: Off
Rapid Modu	: Off
ShortCyc	: Off
Menu	↑ ↓ Set

Foam Mode	
Off	
Off	
Basic	
Advanced	
Menu	↑ ↓ Set

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)

User Defined Settings	
Multi Mode	: Standalone
Drain Cool	: On
Dfactor	: 1.0
Foam Mode	: Off
Rapid Modu	: Off
ShortCyc	: Off
Menu	↑ ↓ Set

Rapid Modu	
Off	
Off	
Menu	↑ ↓ Set

Rapid Modu

Reserved for future development. Do not adjust. (Default = Off)

User Defined Settings	
Multi Mode	: Standalone
Drain Cool	: On
Dfactor	: 1.0
Foam Mode	: Off
Rapid Modu	: Off
ShortCyc	: Off
Menu	↑ ↓ Set

ShortCyc	
Off	
Off	
On	
Menu	↑ ↓ Set

ShortCyc

When On the software will detect short On/Off cycles that could prevent proper draining to control cylinder conductivity. It will reduce output of the unit if short cycling is detected. (Default = Off).

(User Defined Settings Continued)

User Defined Settings	
Drain Cool	: On
Dfactor	: 1.0
Foam Mode	: Off
Rapid Modu	: Off
ShortCyc	: Off
Ground FI	: Off
Menu	↑ ↓ Set

Ground FI	
Off	
Off	
On	
Menu	↑ ↓ Set

Ground FI

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

User Defined Settings	
Dfactor	: 1.0
Foam Mode	: Off
Rapid Modu	: Off
ShortCyc	: Off
Ground FI	: Off
Fill Stop	: Off
Menu	↑ ↓ Set

Fill Stop	
Off	
Off	
On	
Menu	↑ ↓ Set

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).

User Defined Settings	
Foam Mode	: Off
Rapid Modu	: Off
ShortCyc	: Off
Ground FI	: Off
Fill Stop	: Off
Adapting	: Off
Menu	↑ ↓ Set

Adapting

Reserved for future development. Do not adjust. (Default = Off)

User Defined Settings	
Rapid Modu	: Off
ShortCyc	: Off
Ground FI	: Off
Fill Stop	: Off
Adapting	: Off
Idle Mode	: Idle Only
Menu	↑ ↓ Set

Idle Mode	
Idle Only	
Idle Only	
3 Day Drain	
Keep Warm	
Menu	↑ ↓ Set

Idle Mode

Configures operation when no demand is present. **Idle Only** = no action. **3 Day Drain** = drain cylinder after 72 hours. **Keep Warm** = keep cylinder warm by periodically engaging contactor. (Default = 3 Day Drain).

User Defined Settings	
ShortCyc	: Off
Ground FI	: Off
Fill Stop	: Off
Adapting	: Off
Idle Mode	: Idle Only
3DD Force	: Off
Menu	↑ ↓ Set

3DD Force	
Off	
Off	
On	
Menu	↑ ↓ Set

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)

User Defined Settings	
Ground FI	: Off
Fill Stop	: Off
Adapting	: Off
Idle Mode	: Idle Only
3DD Force	: Off
Drain Mode	: Fixed ED
Menu	↑ ↓ Set

Drain Mode	
Fixed ED	
Fixed ED	
Float ED	
Menu	↑ ↓ Set

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).

(User Defined Settings Continued)

User Defined Settings	
Fill Stop	: Off
Adapting	: Off
Idle Mode	: Idle Only
3DD Force	: Off
Drain Mode	: Fixed ED
Overcurr	: 0.00
Menu	↑ ↓ Set

Overcurr	
0.00	
0.00	
Menu	↑ ↓ Set

Overcurr

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

User Defined Settings	
Adapting	: Off
Idle Mode	: Idle Only
3DD Force	: Off
Drain Mode	: Fixed ED
Overcurr	: 0.00
Date	: 04/28/09
Menu	↑ ↓ Set

Date	
04/28/09	
04/28/09	
Menu	↑ → Set

Date

Sets the date. Highlight month/day/year and use the **up arrow** button to change the value and the **right arrow** button to move to the next field. Press **Set** when correct to save changes.

User Defined Settings	
Idle Mode	: Idle Only
3DD Force	: Off
Drain Mode	: Fixed ED
Overcurr	: 0.00
Date	: 04/28/09
Time	: 13:49
Menu	↑ ↓ Set

Time	
13:49	
13:49	
Menu	↑ → Set

Time

Sets the time of day. Highlight hour / minutes. Use the **up arrow** button to change the value and the **right arrow** button to move to the next field. Press **Set** when correct to save changes.

User Defined Settings	
3DD Force	: Off
Drain Mode	: Fixed ED
Overcurr	: 0.00
Date	: 04/28/09
Time	: 13:49
Unit	: Lb/hr
Menu	↑ ↓ Set

Unit	
Lb/hr	
Kg/hr	
Lb/hr	
Menu	↑ ↓ Set

Unit

Set the units in which the humidifier will display output. Highlight the desired units using the **up/down arrow** buttons and press **Set** to save setting.

User Defined Settings	
Drain Mode	: Fixed ED
Overcurr	: 0.00
Date	: 04/28/09
Time	: 13:49
Unit	: Lb/hr
Language	: English
Menu	↑ ↓ Set

Language	
English	
English	
French	
Menu	↑ ↓ Set

Language

Sets the language in which the humidifier will display information. Highlight the desired language using the **up/down arrow** buttons and press **Set** when correct to save changes.

Control Setting

Control Settings allow you to set the type of external controls the humidifier is connected to. In most cases the NHTC humidifier is factory configured to operate with the external controls that were specified for the site. Press **Set** while highlighting **Control Settings** in the **Main Menu**.

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



Control Setting	
Source	: Analog
REG Mode	: Demand
MOD Mode	: Single CH
CNT Type	: 0-10 V
Setting	
Menu	↑ → Set

Source	
Analog	
Analog	
Digital	
Menu	↑ ↓ Set

Source

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

Control Setting	
Source	: Analog
REG Mode	: Demand
MOD Mode	: Single CH
CNT Type	: 0-10 V
Setting	
Menu	↑ → Set

REG Mode	
Demand	
Demand	
On/Off	
RH (P)	
RH (PI)	
Menu	↑ ↓ Set

REG 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 Setting	
Source	: Analog
REG Mode	: Demand
MOD Mode	: Single CH
CNT Type	: 0-10 V
Setting	
Menu	↑ → Set

MOD Mode	
Single CH	
Single CH	
Dual CH	
Menu	↑ ↓ Set

MOD Mode

Configures the humidifier to either operate with a single channel (control only) or dual channel (control and high limit). If an On/Off high limit humidistat is used set **MOD Mode** to Single CH.

Control Setting	
Source	: Analog
REG Mode	: Demand
MOD Mode	: Single CH
CNT Type	: 0-10V
Setting	
Menu	↑ → Set

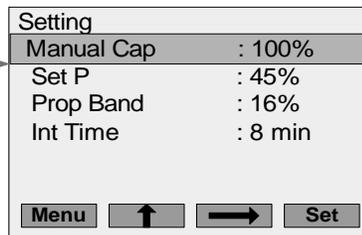
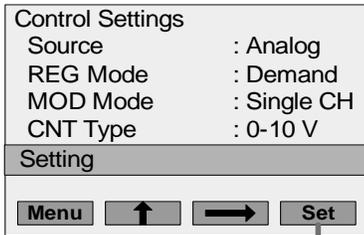
CNT Type	
0-10 V	
0-5 V	
1-5 V	
0-10 V	
2-10 V	
0-16 V	
32-16 V	
0-20 mA	
4-20 mA	
Menu	↑ ↓ Set

CNT Type

Configures the Volt or amp range of the control signal connected to the humidifier.

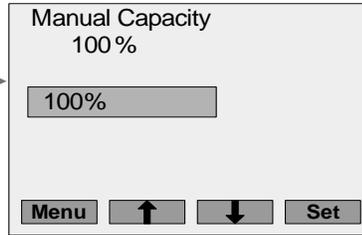
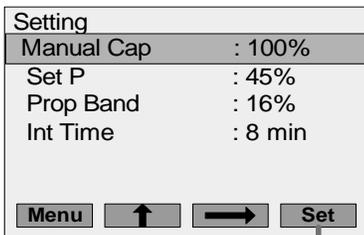
Setting

The **Setting** submenu is used to set a manual capacity limit. It is also used to adjust setpoint, the proportional band, and the integral time if **REG Mode** is set to **RH (P)** or **RH (PI)** and wired to humidity sensors. Access the **Setting** submenu by pressing the menu key while **Setting** is highlighted in the **Control Settings** menu.



Setting

Accesses a submenu whose primary purpose is applying a manual capacity override and (for units with transducer controls) configuring a setpoint.

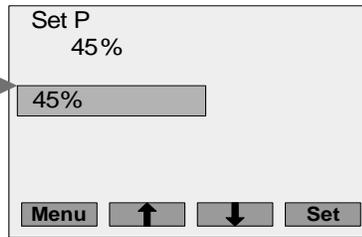
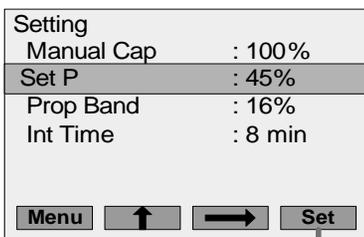


Manual Cap

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

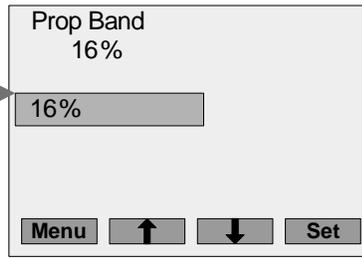
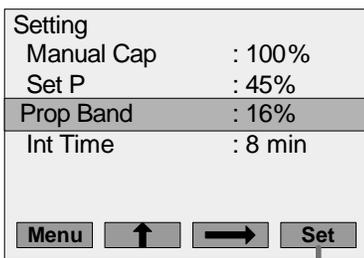


Note: Set P, Prop Band, and Int Time will only be displayed in the menu if **REG Mode** is set to **RH (P)** or **RH (PI)**.



Set P

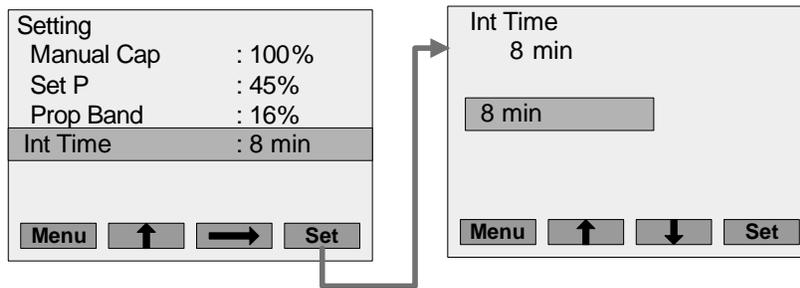
Sets the humidity setpoint value. The humidifier will attempt to maintain this humidity level in the space where the control transducer is installed.



Prop Band

Prop Band should not have to be changed under normal conditions. The **Prop Band** setting adjusts the band within which the humidifier will modulate between 0 and 100% output. At set point +Prop Band/2 the output will be 0. At set point - Prop Band/2 the output will be 100%.

(Setting Menu Continued)



Int Time

Int 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 **Int Time** adjusts the frequency at which the correction is performed.

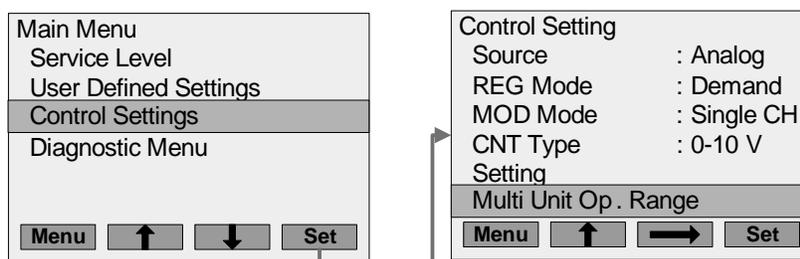
Multi Unit Op. Range

The NHTC can be configured to network up to sixteen (16) humidifiers (or equivalent of 1600 lb/hr) using a master slave configuration. To operate the NHTC in multi mode;

- The humidifiers must be connected in parallel (daisy chained) using the linkup terminal (J2) on the NHTC driver board (See Multi Mode Wiring on page 28).
- One humidifier must be designated the master and all others as slave units (see Multi Mode on page 48 for software configuration). The master unit must be the unit to which external controls / transducers and safety loop are connected.
- Each humidifier in the system including the master must have the range of demand signal in which it will operate configured (see Multi Unit Op. Range below). Example, for four humidifiers with equal capacity set the master to operate between 0% and 25%, set the first slave for 26% to 50%, set the second slave for 51% to 75%, and set the third slave for 76% to 100%.

The **Multi Unit Op. Range** submenu is used to configure the humidifier's operating range when **Multi Mode** in the **User Defined Settings** menu is set to either **Master** or **Slave**. The menu is not displayed if the humidifier is set to **Standalone** operation. Access the **Multi Unit Op. Range** submenu by pressing the menu button while **Multi Mode Op. Range** is highlighted in the **Control Settings** menu.

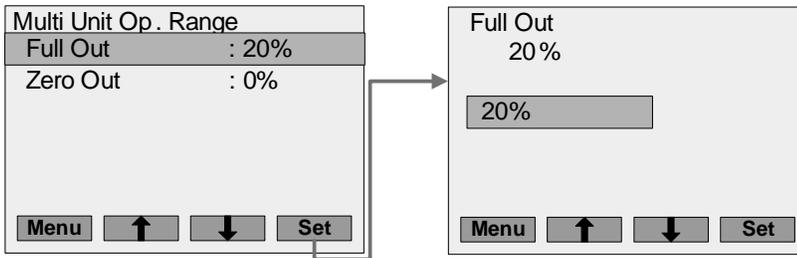
NOTE: The **Multi Unit Op. Range** submenu is only displayed if the humidifier has been configured as either a **Master** or **Slave**. It is not displayed in **Standalone** mode.



Multi Unit Op. Range

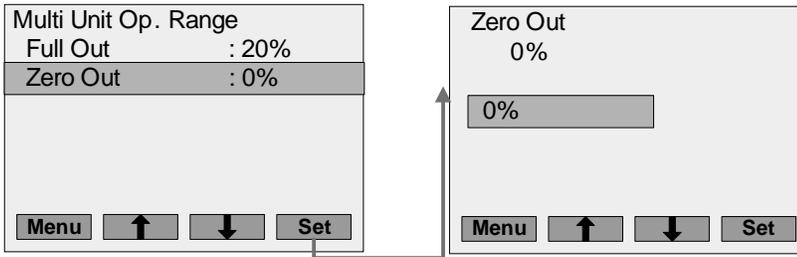
Once the humidifier has been designated as either a master or slave a **Multi Unit Op. Range** selection will be available in the **Control Settings** menu.

(Multi Unit Op Range Continued)



Full Out

Set the system demand at which the humidifier should output its full capacity.

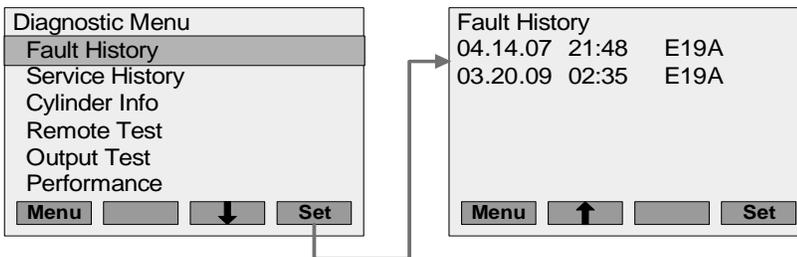


Zero Out

Set the system demand at which the humidifier should shut off.

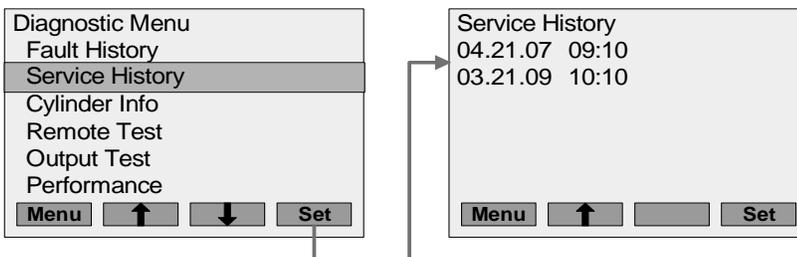
Diagnostic Menu

The **Diagnostic Menu** provides a historical list of errors and service recorded by the humidifier's software as well as providing the ability to manually activate humidifier components for troubleshooting purposes. Press **Set** while highlighting **Diagnostic Menu** in the **Main Menu**.



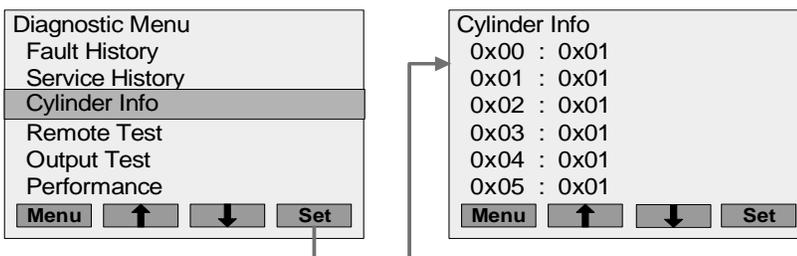
Fault History

Displays a list of faults which the controller has recorded. It shows the date and time at which the faults occurred. Refer to Table 7: Troubleshooting Warnings and Faults for meaning of codes and suggested actions to correct faults.



Service History

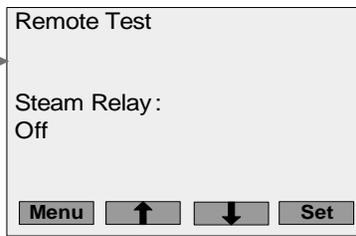
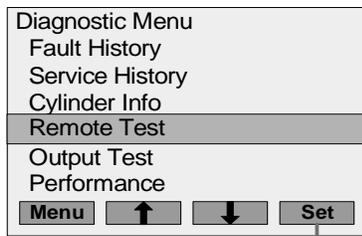
Displays a list of cylinder service that has been performed on the humidifier. It displays the date and time of service.



Cylinder Info

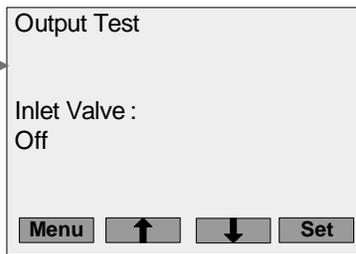
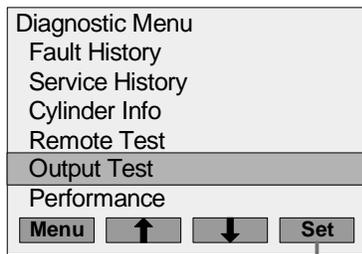
Displays information regarding the cylinder which can be used by factory technicians to help diagnose operational issues.

(Diagnostic Menu Continued)



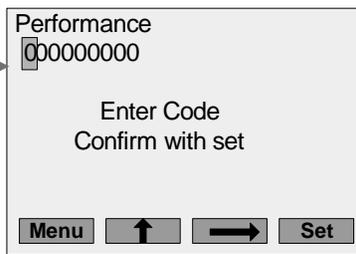
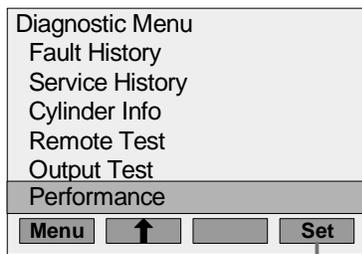
Remote Test

Provides a means for testing of remote fault relays to confirm they are operating correctly. Relays can be activated one at a time. Scroll between relays with **up/down** arrow buttons and press **Set** once to turn on relay, press again to turn it off.



Output Test

Provides a means for activating all humidifier components (inlet valve, drain valve, contactor etc.) for diagnostic purposes. Components can be activated one at a time. Scroll to component to be tested using **up/down** buttons, press **Set** once to activate, press again to turn off.



Performance

Factory code for configuring the humidifier. Do not enter any values.

NHPC Humidifier Configuration

Navigating the NHPC

The four input buttons below the digital display are used to navigate in the NHPC’s software and to enter values. The function of the four buttons changes depending on what is being displayed on the screen. In all cases 4 icons representing the functions of the buttons are shown at the bottom of the screen.

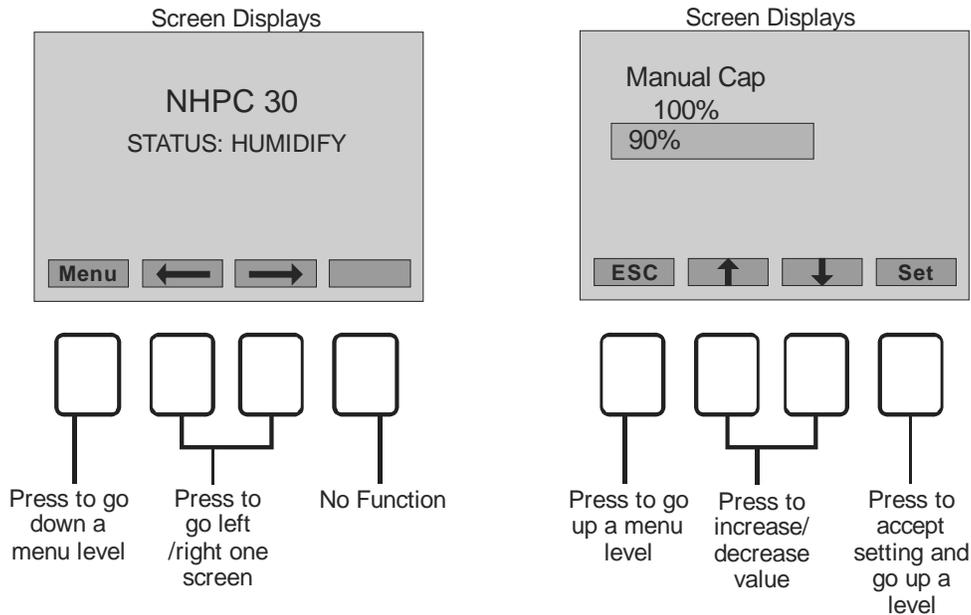
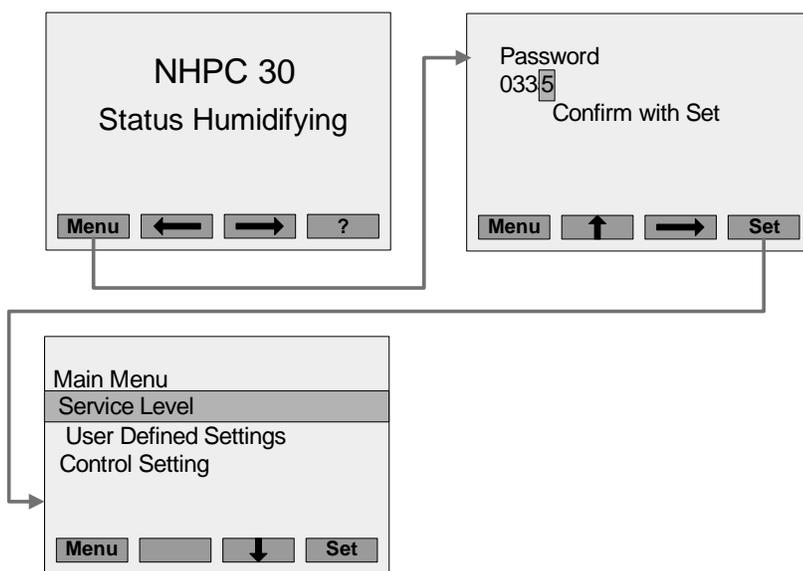


Figure 40: Navigating the NHPC Software

Main Menu (NHPC Password)

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



Enter Password

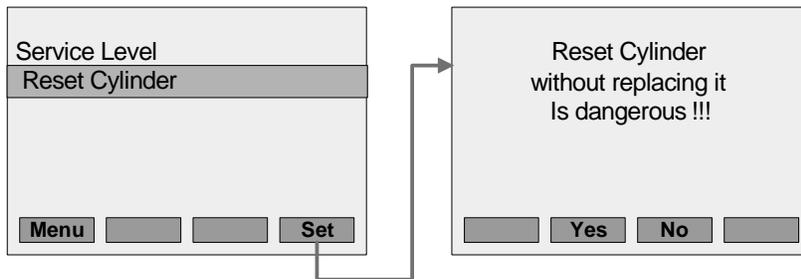
Press the **Menu** button from any status screen. Enter the user level code **0335** using the up arrow to change the value of each digit and the right arrow to move to the next digit. Press the **Set** button.

Main Menu

From here you can access all NHPC submenus. Select any submenu by using the **up/down** arrow buttons and pressing **Set** when the desired one is highlighted.

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

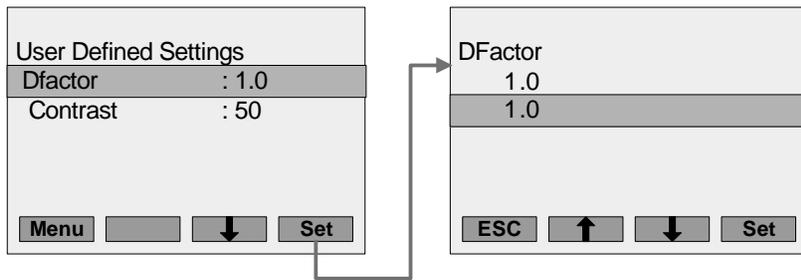
Service Level Submenu



Reset Cylinder

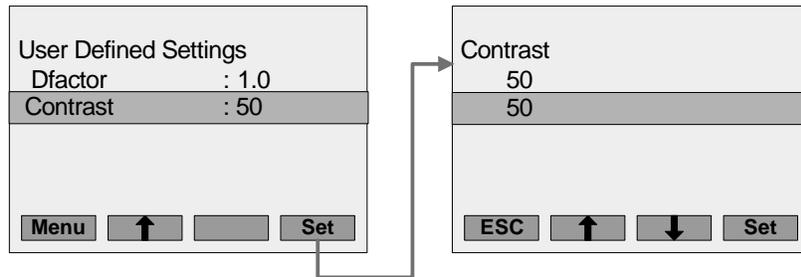
The humidifier uses information about cylinder replacement to optimize the performance of the humidifier. Only after replacing a cylinder select **Reset Cylinder**, and then press the **Yes** button.

User Defined Settings Submenu



Dfactor

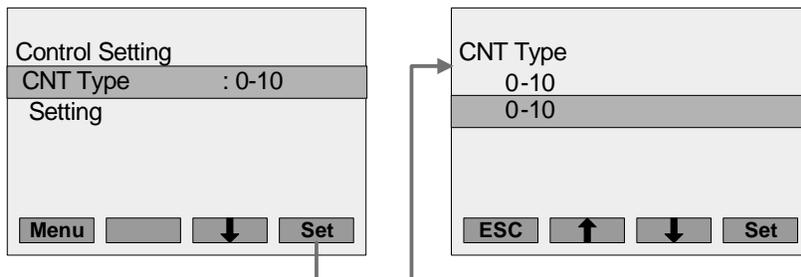
Increases or decreases the drain time used to control cylinder water conductivity. It should not normally need to be adjusted. A NORTEC representative will provide instructions if it should need to be adjusted. (Default = 1.0)



Contrast

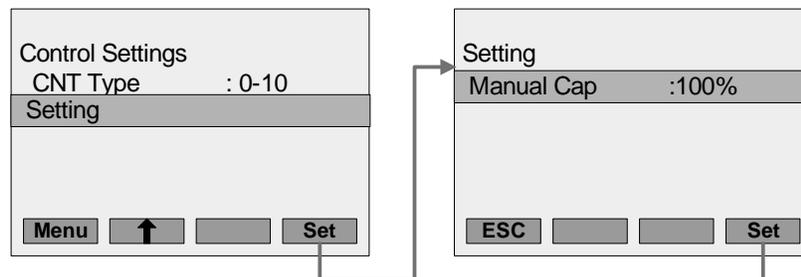
Increases or decreases the contrast of the LCD display to allow better visibility in different lighting conditions.

Control Setting Submenu



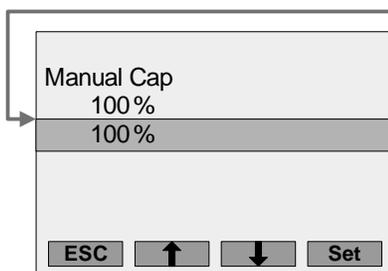
CNT Type

Configures the NHPC to one of its available control types (0-5V, 0-10V, 2-10V, 0-16V, 3.2-16V, 0-20 mA, 4-20 mA) (Default = 0-10V)



Setting

Access the manual capacity setting by selecting setting in Control Settings and then selecting Manual Cap.



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 **Set** to save the setting

Maintenance and Servicing

60 Required Maintenance

60 Cylinder Spent Warning / Fault

61 Replacement Cylinder

61 Removing the Cylinder

63 Drain Valve Cleaning

64 Installing the New Cylinder

65 Extended Shutdown

65 Starting After Extended Shutdown

66 NHTC/PC Maintenance Checklist

Required Maintenance

The NHTC/PC humidifier has been designed to require very little maintenance. Regular maintenance consists of checking the humidifier to insure it is in good condition, replacing the cylinder when the software advises that the cylinder is spent and 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. Failure to replace the cylinder at the end of cylinder life will cause the unit to lock out. NORTEC is not responsible for any damages resulting from, or attributed to, the failure to replace a spent cylinder (see Manufacturer's Warranty).

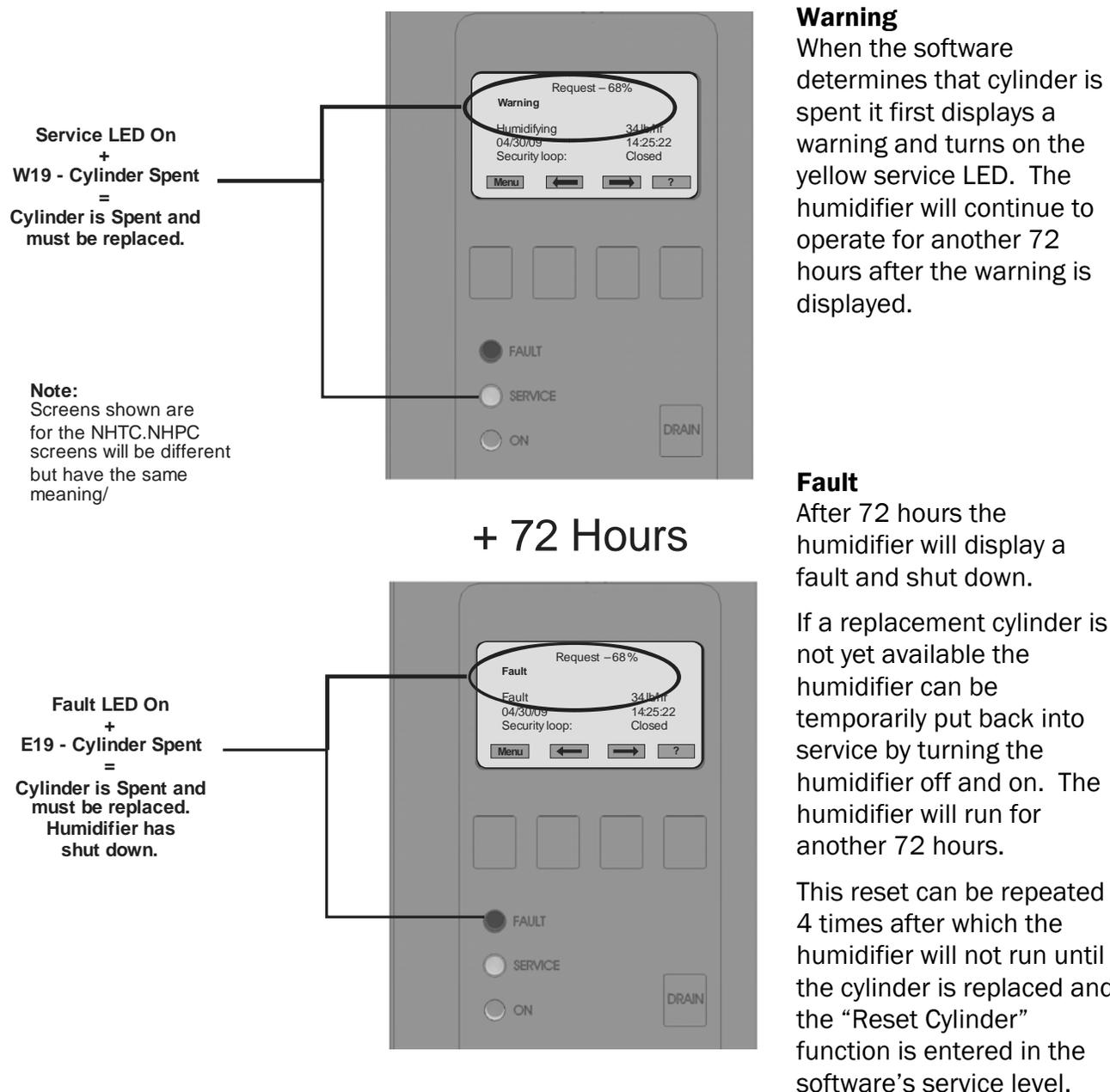


Figure 41: Cylinder Spent Warning / Fault

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 humidifier's voltage. Serial number and voltage are located on the specification label on the left side of the humidifier.

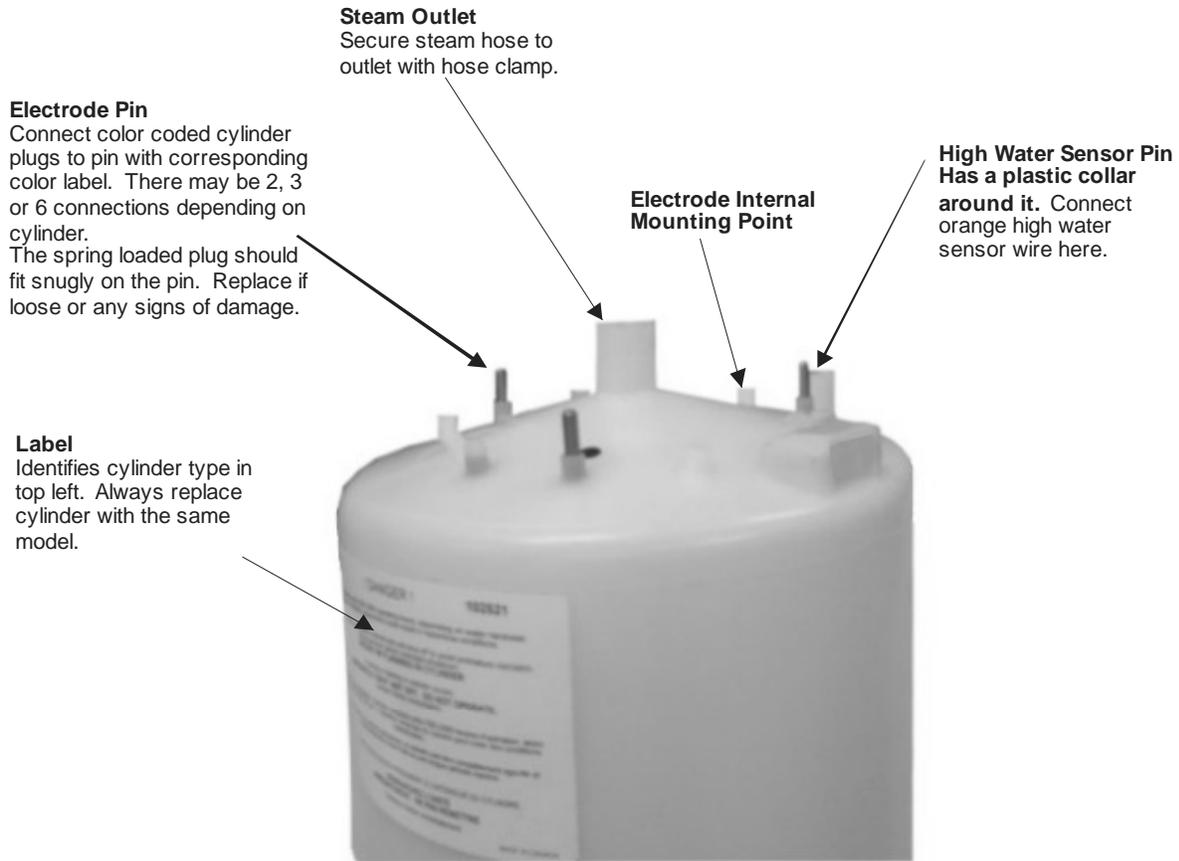


Figure 42: NHTC/PC Cylinder



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 and release the Drain button on the keypad. The display will show that the manual drain is activated and the yellow service LED will blink. Let the humidifier drain until no more water is flowing out to drain (usually not more than 10 minutes). Press the drain button again to turn off the drain valve.
- 2 Close supply water shut off valve.
- 3 Turn the humidifier On/Off switch to off.
- 4 Turn off power to the humidifier with the external disconnect.
- 5 Loosen the 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.

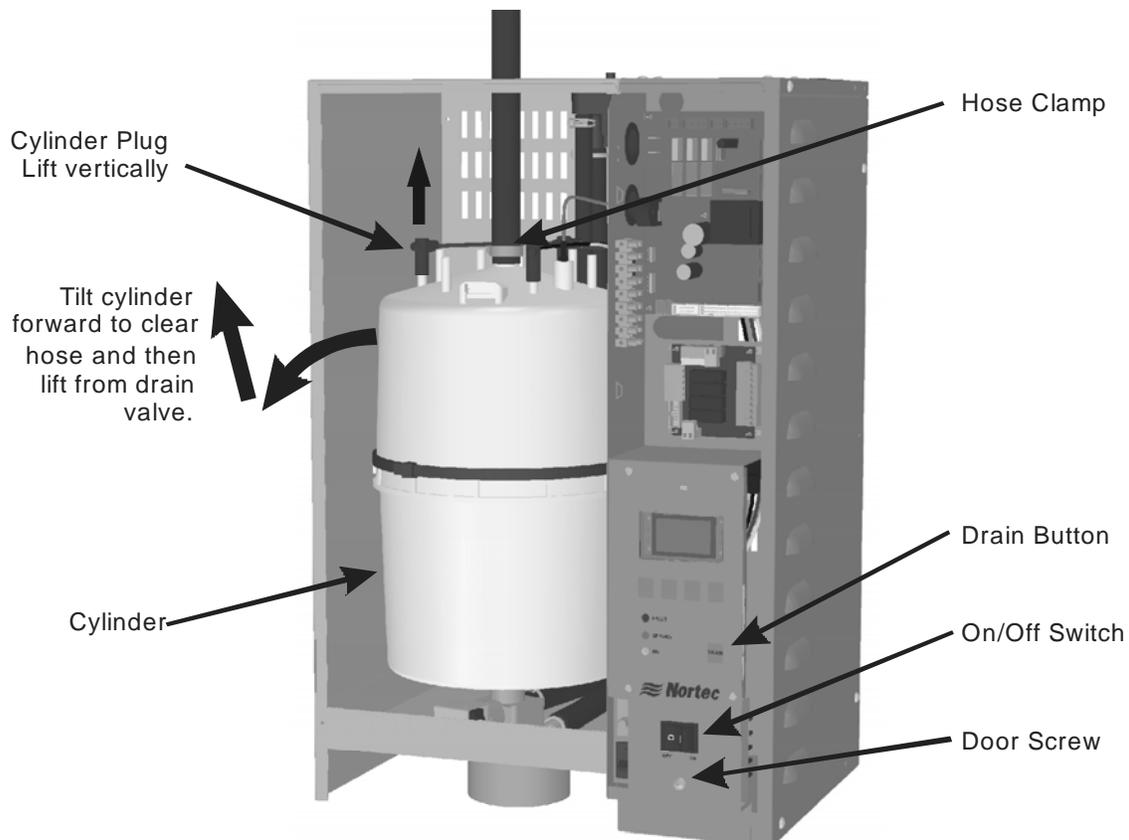


Figure 43: Cylinder Removal

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 45: 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.

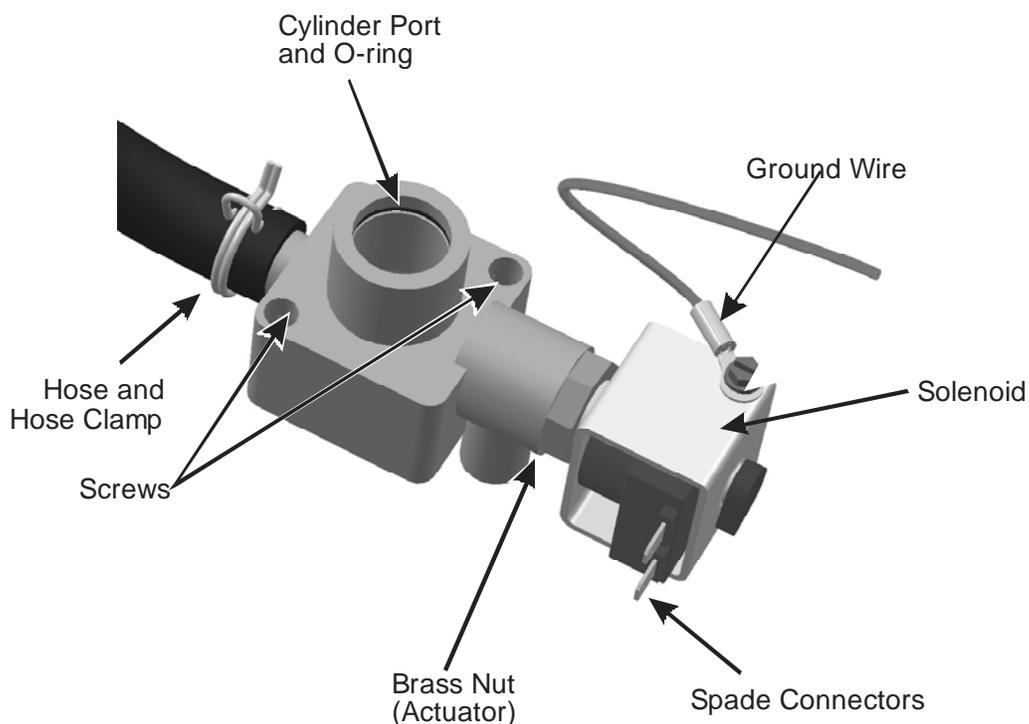


Figure 44: Drain Valve

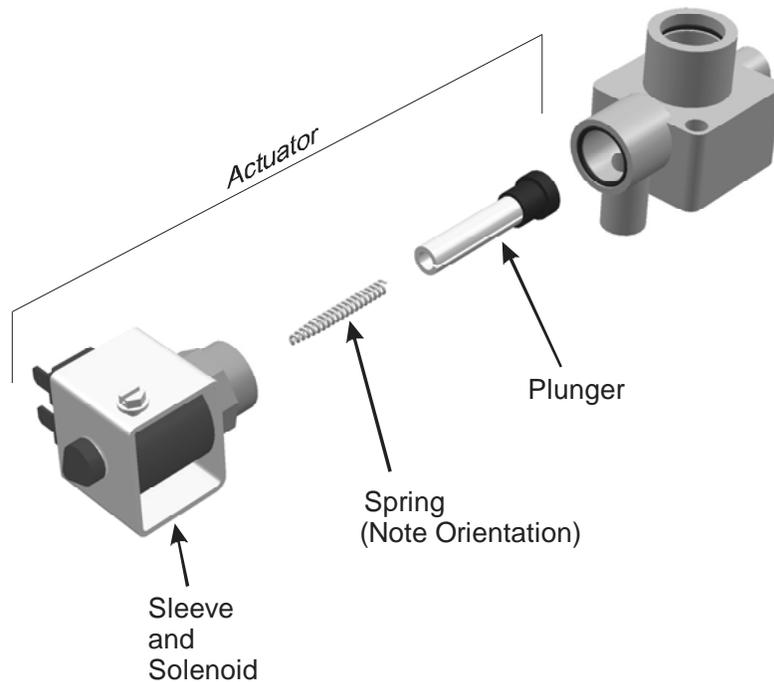


Figure 45: Drain Valve Actuator Assembly

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. Tighten hose clamp being careful not to over tighten and crush the plastic cylinder steam outlet.
- 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 snugly 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 going to the “Service Level” menu and selecting “Reset Cylinder”.

NOTE: If the “Cylinder Reset” is not entered 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 Press and release the Drain button on the keypad.
- 2 Wait until the humidifier is completely drained (usually takes less than 10 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 NHTC/PC 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.

NHTC/PC Maintenance Checklist

Model #: _____

Serial #: _____

Tag: _____

Cylinder #: _____

Cylinder / System Check

- W19 Cylinder Spent E19 Cylinder Spent
(If software displays W19 or E19 then cylinder must be replaced)
- Yellow LED On with W12- Sensor On Warning.
(If Yellow LED is On with W12 and cylinder is not new then cylinder will 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. 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, (Password 0335, Service Level)

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

Company: _____

Troubleshooting

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79 NHTC/PC Wiring Diagram (Cylinder A)

80 NHTC/PC 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.

CAUTION: Be aware, when troubleshooting, that the humidifier is powered by high voltage and 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.



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 for specific for your humidifier is installed on the inside of the humidifier door. A generic copy of the NHTC/PC 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.

General Troubleshooting

The following section provides general guidelines for troubleshooting the NHTC/PC humidifier and auxiliary components. For detailed troubleshooting information refer to the manuals that were provided with the auxiliary equipment and to Table 8: Troubleshooting NHTC/PC Warnings and Faults later in this chapter.

Humidifier

Table 6: 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 fuse on driver board.
	2 Incorrect or no Voltage	2a Check voltage against spec label and correct. 2b Check disconnect and insure humidifier is getting power.
	3 Step Down Transformer not outputting 24VAC	3 Replace the transformer
	4 Door interlock switch open	4a Replace the door 4b Pull door interlock switch out to override. Caution! The electrical and plumbing compartment contain high voltage components and wiring.
Humidifier will not humidify or not reaching RH setpoint	1 Safety loop open	1a Check if W11: Safety loop open 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 25% 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 25% 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 Cap” in the “Setting” submenu of the “Control Setting” menu if necessary.
	6 Low conductivity water	6 Check if W12: Cylinder Max Level is displayed on the humidifier’s display. If operated on low conductivity water it may take several hours for the NHTC/PC 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 8 troubleshooting warnings and faults.

Steam Distributors

Symptom	Cause	Corrective Action(s)
Distributor spitting out water	1 Distributor not level	1 Use support at end o 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 insure 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 Check reading against known reliable instrument. If out of calibration it can be field calibrated $\pm 10\%$. Press ▼▲ buttons together until calH appears on the display. Press ► to display the current calibration trim. Adjust using ▼▲ buttons. Press ● button when done.
	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 Insure drafts cannot affect reading by ensuing vapour barrier is in place and working.

NHTC/PC Warnings and Faults

The self-diagnostic system built into the NHTC/PC is continually monitoring the operation of the humidifier.

Warnings

- When problem symptoms are detected, the NHTC/PC 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 yellow “Service” LED is also illuminated.

Faults

- If the humidifier is not able to self correct a problem symptom it will if necessary respond by shutting itself 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 8, Troubleshooting Warnings and Faults.
- Power cycle the humidifier with the On/Off switch waiting 3 seconds between turning it off and on.

Table 7: Troubleshooting Warnings and Faults

No.	Display Message	LED	System Detected	Cause	Corrective Action(s)
E5	Cylinder B Controller Missing	Red	Controller cannot detect the driver board for cylinder B	1 Bad wiring connection.	1 Check ribbon cable to driver board B.
				2 Controller not configured correctly	2 If humidifier is not a double unit contact factory for configuration help
				3 Driver board damaged	3 Replace driver board
E6	Extended Missing	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 J2 of Master and Slave and that polarity is not reversed

No.	Display Message	LED	System Detected	Cause	Corrective Action(s)
E6 Cont				4 Incorrect wire type used	4 Use 18-24 AWG multi-strand, twisted pair, shielded cable
E7	CPU CRC Fault	Red	Controller hardware failure	1 Software has detected a hardware problem with main control board	1 Restart humidifier, if error occurs within 1 minute replace main control board. If error does not occur then primary power fluctuation may be the cause.
				2 Control board is wet	2 Let board dry and correct condition which caused board to become wet. Try restart when dry.
W11	Safety Loop Open	Grn Blink	Safety loop open (terminal 1 and 2)	1 On/Off device connected to safety 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.
W12	Cylinder Max Level		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 Add ¼ teaspoon of salt to fill cup to assist cylinder in concentrating.
				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. See W18 – Foam.
E12	Cylinder max Level no current	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 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.

No.	Display Message	LED	System Detected	Cause	Corrective Action(s)
W13	Fill Timeout		Fill valve activated for long time but high water level not reached.	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.
E13	Red	Water level in cylinder should rise faster than 1" per minute.	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.	
W15				1 Drain blocked water over concentrated	1 Clean the drain line
				2 Drain solenoid not energized, water over concentrated	2 Check and correct wiring to drain valve.
				3 Filling too fast, fill valve damaged	3 Replace the fill valve
				4 Filling too fast, wrong fill valve	4 Check for correct fill valve in parts list, replace if incorrect
E15	Red	Current has exceeded 115% of max	5 Wrong cylinder	5a If cylinder replaced check if it is the same model as the one removed. 5b Check water conductivity and check with Nortec representative for alternate cylinder.	
			6 Condensate from Other source feeding to humidifier	6 Remove any condensate lines that are not from the humidifier's steam distribution system.	
			7 Contactor seized / sticking	7 Check if contactor disengages when turned off, replace if defective.	

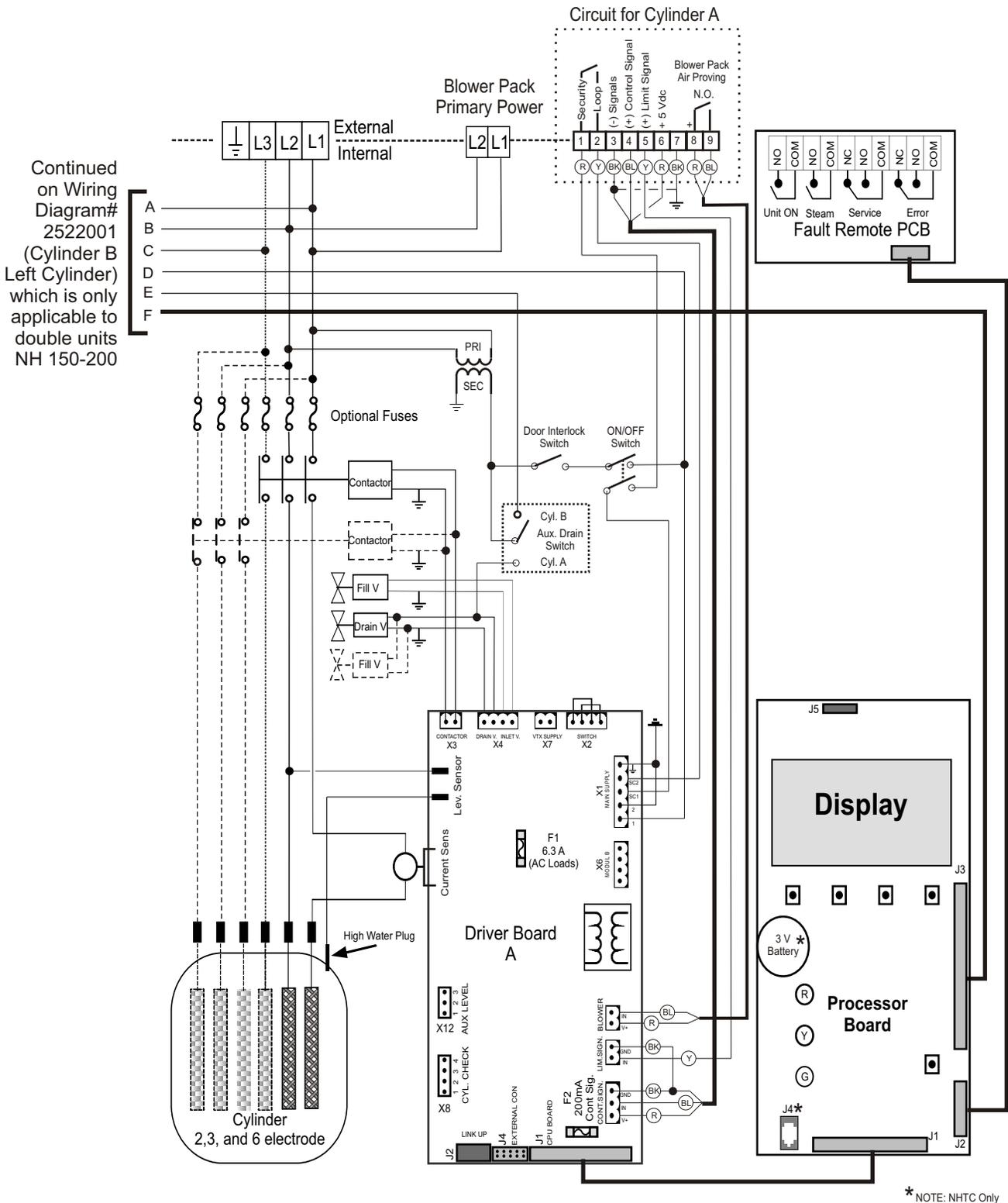
No.	Display Message	LED	System Detected	Cause	Corrective Action(s)
W16	Excess Current		Current has exceeded 130% of max	5 Water supply too conductive	5a Contact NORTEC representative for recommendation on alternate cylinder 5b Change the water supply
E16		Red		6 Wrong cylinder installed	6 Install correct cylinder model
				7 Cylinder Spent but not detected by software	7 Replace the cylinder (see maintenance chapter)
E17	Req off current	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.
W18	Foam		Foam inside the cylinder.	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.
				2 Organic material in water	2 Install filter to remove organic material
E18		Red		3 Drain blocked water over concentrated	3 Clean the drain line
				4 Humidifier short cycling	4 Observe operation to insure humidifier can normally run long enough to perform a drain. If not see W44 / W45 – Short cycling.
W19	Cylinder Spent	Yel	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)
E19		Yel Red			
W20	Conductivity too low		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

No.	Display Message	LED	System Detected	Cause	Corrective Action(s)
W20 Cont.				4 Newly installed cylinder not reaching demand for extended time due to Low water conductivity	4a Add 1/2 teaspoon of salt to fill cup. 4b Adjust drain factor to 0.7 in User Defined Settings (see operation chapter)
W23	Control sensor broken	Red	No signal from RH control sensor	1 Sensor not powered	1 Use multimeter to check that sensor is powered.
E23				2 Sensor not wired correctly	2 Check wiring is secure and wired correctly per instructions in installation chapter.
W24	Limit Sensor Broken	Red	No signal from RH Limit sensor	3 Defective sensor	3 Check if sensor is outputting corresponding to RH. If not replace the sensor.
E24				4 RH less than 5%	4 RH less than 5% are interpreted as a broken sensor. Contact NORTEC Representative for recommendation.
				5 Humidifier control configuration incorrect	5 Check that the humidifier control configuration matches the installed sensor output.
W25	3-day idle drain activated		3 days with no demand for humidity	1 Normal operation, cylinder is drained if there is no demand for 3 days	1 None required. If feature is not desired change configuration in "User Defined Settings" level of software.
W26	3 day forced drain activated		3 days since last forced drain	1 Normal operation if configured, humidifier is drained every three days	1 None required, humidifier has been configured to drain every 3 days to control scale build up.
W27	Safety loop instability		Safety loop opening/closing rapidly	1 High limit humidistat too close to steam distributor	1 Locate the high limit humidistat a minimum of 10 feet (3 m) from the distributor.
				2 Loose wiring	2 Check wiring and insure there are no loose connections.
				3 High limit humidistat setpoint too low	3 Adjust the high limit setpoint to 85% or more.
				4 Defective high limit humidistat	4 Replace defective device.
				5 Air proving cycling or chattering	5 Check for smooth operation of air proving switch.

No.	Display Message	LED	System Detected	Cause	Corrective Action(s)
W28	Demand signal instability		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
W29	Limit signal instability		Limit signal swinging from low to high rapidly	1 High limit humidistat too close to steam distributor	1 Locate the high limit humidistat a minimum of 10 feet (3 m) from the distributor.
				2 High limit humidistat setpoint too low	2 Adjust the high limit setpoint to 85% or more.
				3 Improper Proportional and Integral settings in control	3 Adjust proportional and integral settings to reduce swings in demand signal.
				4 Defective control	4 Replace defective control
W30	Modbus remote disable		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.
W43	Keep warm active		No demand in last 2 hours	1 Humidifier configured to keep cylinder water warm	1 Normal operation for humidifier configured to keep cylinder warm. See Operation Chapter, User Defined Settings to change configuration.
W44	Demand signal short cycling		Demand signal cycling on and off	1 The humidifier has detected short cycling and reduced capacity to stabilize operation.	1 Shortcyc set to On. If feature is not desired change configuration in "User Defined Settings" level of software.
				2 humidifier oversized	2 Change the manual capacity limit to 50% in the Control Setting level of software.
W45	Safety loop short cycling		Safety loop is cycling On/Off too frequently	3 High limit too close to distributor or control in air subjected to humidity swings	3 Locate high limit at least 10 ft (3 m) from distributor. Move control to space representative of space being humidified.
				4 Damaged controls	4 Replace any damaged controls.

No.	Display Message	LED	System Detected	Cause	Corrective Action(s)
W46	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.
W47	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.
W49	Wrong Cylinder installed		Cylinder is not recognized	1 Warning reserved for future development	1 Contact factory for instructions on configuring software.
E50	Modbus Timeout	Red	No Modbus signal	1 Loose connection	1 Check connections and polarity of wires.
				2 Incorrect Modbus address	2 Check that Modbus address of humidifier matches that of master.
				3 Humidifier configured for Modbus 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.
				5 Noise preventing humidifier from detecting signal.	5 Eliminate source of noise causing interference.

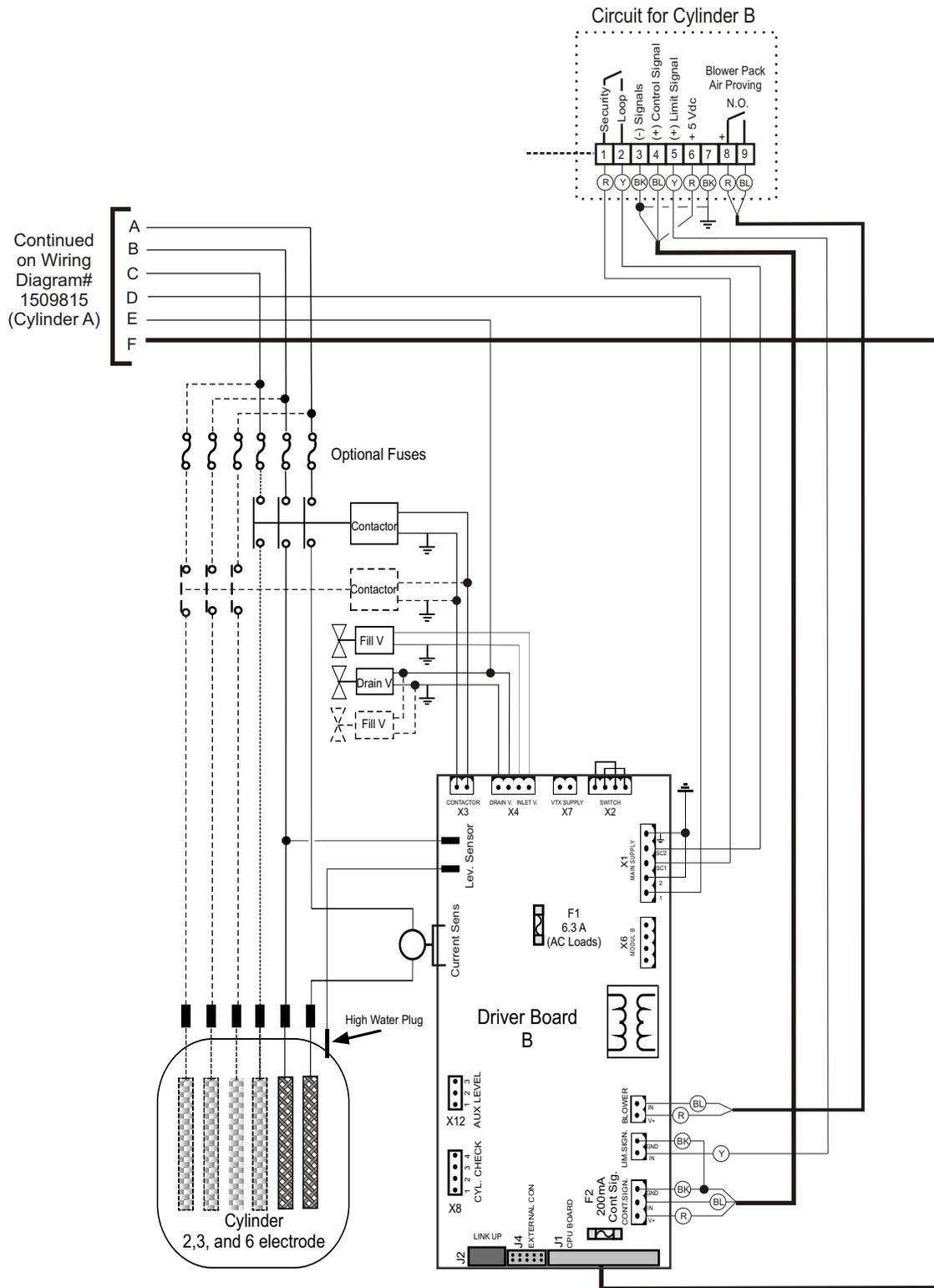
NHTC/PC Wiring Diagram (Cylinder A)



NHTC/NHPC HUMIDIFIER (Cylinder A)
 WIRING DIAGRAM
 DIAGRAM NUMBER 1509815 REV. E
 DATE Sept 17, 2009

Figure 44: NHTC/PC Wiring Diagram (Cylinder A)

NHTC/PC Wiring Diagram (Cylinder B)



Continued on Wiring Diagram# 1509815 (Cylinder A)



NHTC/NHPC HUMIDIFIER (Cylinder B)
WIRING DIAGRAM
DIAGRAM NUMBER 2522001 REV. D
DATE Sept 17, 2009

Figure 45: NHTC/PC Wiring Diagram (Cylinder B)

Spare Parts

- 82 Distributor Spare Parts**
- 83 NHTC/PC 005-030 Plumbing Parts**
- 85 NHTC/PC 050-200 Plumbing Parts**
- 87 NHTC/PC 005-030 Electrical Parts**
- 89 NHTC./PC 050-200 Electrical Parts**
- 92 Warranty**

Distributor Spare Parts



Figure 46: Distributor Exploded View and Spare Parts

NHTC/PC 005-030 Plumbing Parts

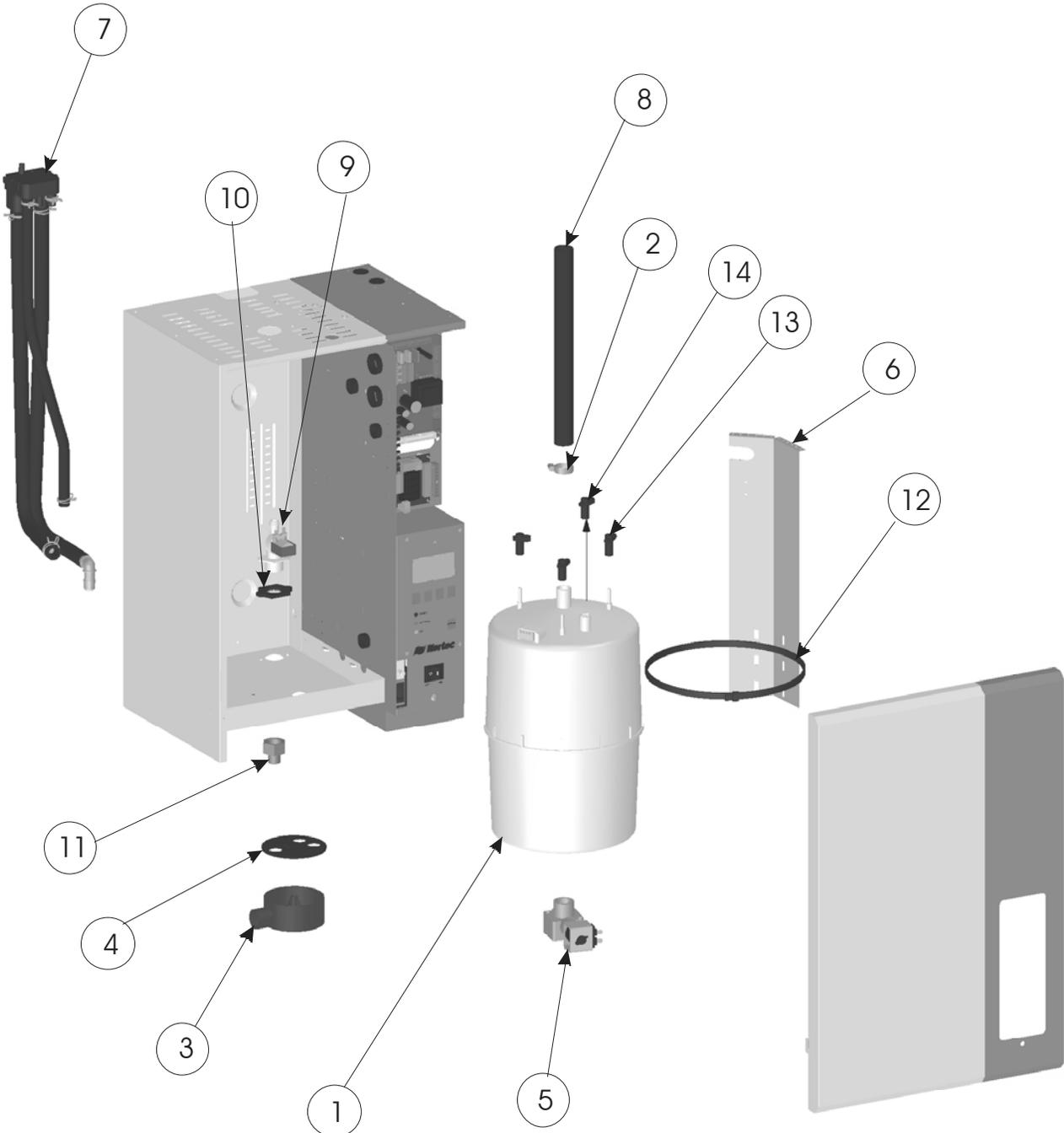


Figure 47: NHTC/PC 005-030 Plumbing Parts

NHTC/PC 050-200 Plumbing Parts

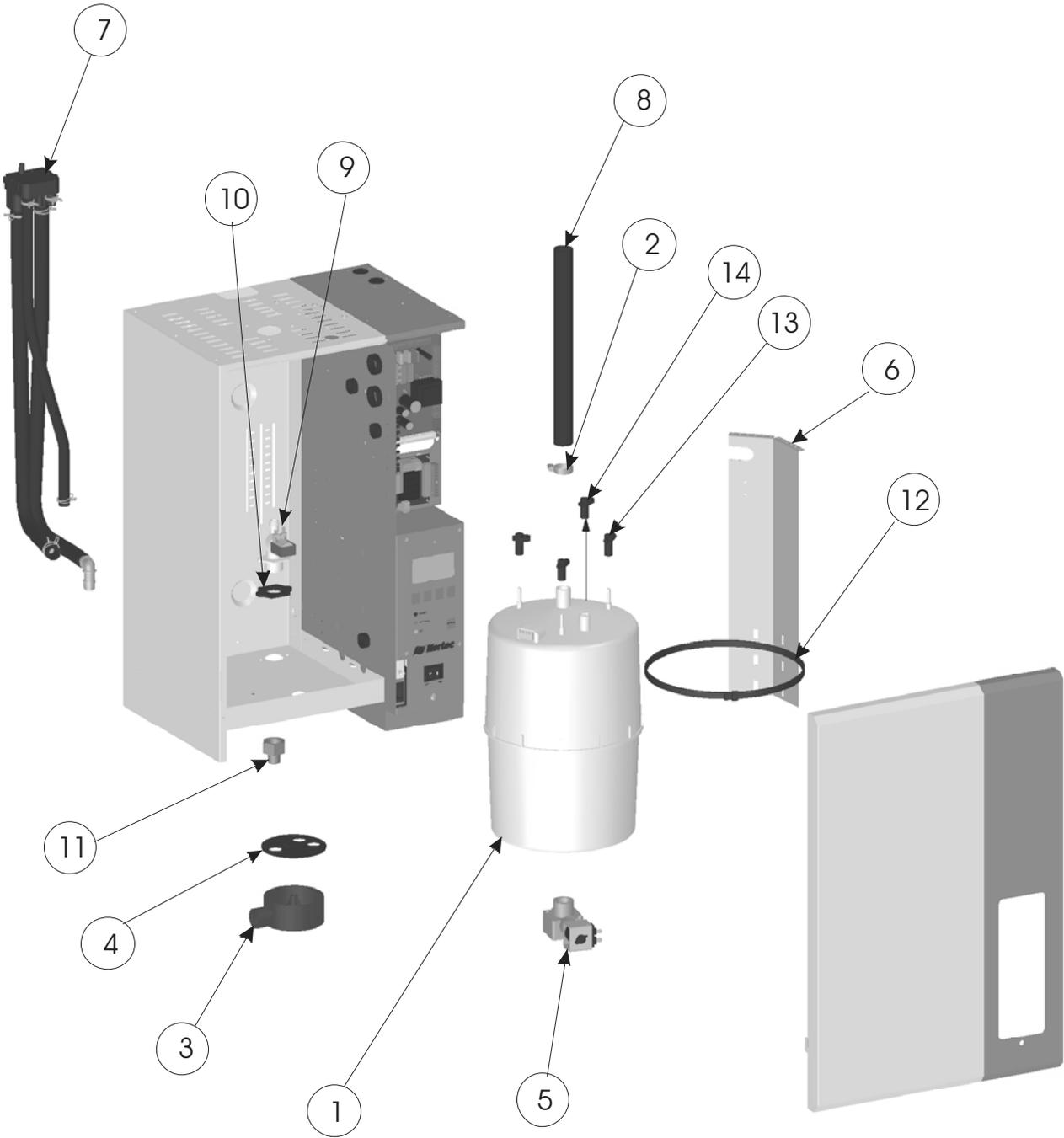


Figure 48: NHTC/PC 050-200 Plumbing Parts

Table 10: NHTC/PC 050-200 Plumbing Parts List

ITEM NO.	DESCRIPTION	MODEL NORTEC PART NO.	THREE PHASE																									
			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	440-480/3	550-600/3						
1	CYLINDER 621	1509744	1	1				1	1				1	1				2	2			2	2					
	CYLINDER 603	1509739			1					1						1				2							2	
	CYLINDER 607	1509741				1	1					1	1								2	2						2
	CYLINDER 605	1509740															1											2
	CYLINDER 609	1509742																										
	CYLINDER 617	1509743																										
	CYLINDER 631	1509745																										
	CYLINDER 636	1509746																										
2	CLAMP FOR LARGE STEAM LINE	1325009	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
3	DRAIN CHANNEL	1116857	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
4	DRAIN CHANNEL GASKET	1631026	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
5	VALVE DRAIN 93BEIGE + 24V COIL	1456000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
6	CYLINDER BRACKET	1509593	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
7	FILL CUP ASSEMBLY LARGE	2522407	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
8	LARGE STEAM LINE 1.500 IN. ID IN.	1328820	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	24	24	24	24	24	24	24	24	24	24
9	VALVE, SINGLE FILL, 2.0 L/min	1353032	1	1	1	1	1	1	1	1	1	1							2	2	2	2	2					
	VALVE, SINGLE FILL, 3.3L/min	1353037													1	1	1	1	1						2	2	2	2
10	GASKET FOR FILL THRU CAB	1455000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
11	FITTING BRASS 3/4 BSP / WASHER - 1/2" NPT	1506288	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
12	CABLE TIE REUSABLE 5-600 CYL SZ	1513005	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
13	CYL PLUG WITH BLACK MARKER	1510046	2	2	2	1	1	2	2	2	1	1				2	2	1	4	4	4	2	2			4	4	2
	CYL PLUG WITH YELLOW MARKER	1510049	2	2	2	1	1	2	2	2	1	1				2	2	1	4	4	4	2	2			4	4	2
	CYL PLUG WITH RED MARKER	1510047	2	2	2	1	1	2	2	2	1	1				2	2	1	4	4	4	2	2			4	4	2
	SUPER PLUG /W WIRE WITH BLACK MARKER	1324264													2	2									4	4		
	SUPER PLUG /W WIRE WITH YELLOW MARKER	1324265													2	2									4	4		
	SUPER PLUG W/ WIRE WITH RED MARKER	1324266													2	2									4	4		
14	CYL PLUG WITH WHITE MARKER	1510048	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
OPTIONAL COMPONENTS																												
FOAM DETECTION OPTION																												
	FLOAT ASSEMBLY, FOAM DETECTION	2523334	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
FILL CUP EXTENSION KIT																												
	FILLCUP EXTENSION KIT NHTC/NHPC	2522160	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
DRAIN WATER COOLING																												
9	VALVE, DUAL FILL, 3.3 L/min, 2.0 L/min		1	1	1	1	1	1	1	1	1								2	2	2	2	2					
	VALVE, DUAL FILL, 3.3 L/min, 3.3L/min														1	1	1	1	1						2	2	2	2

NHTC/PC 005-030 Electrical Parts

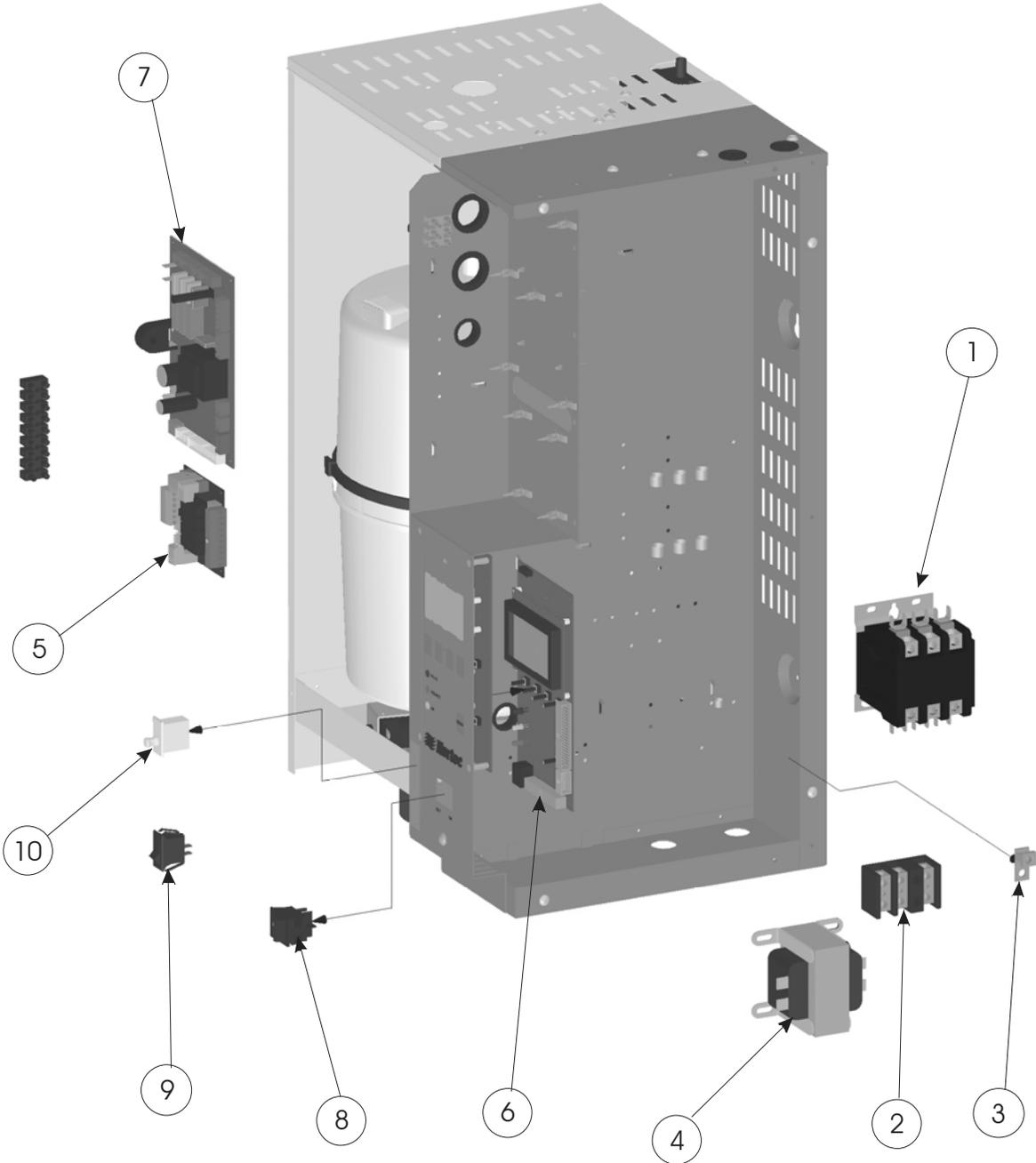


Figure 49: NHTC/PC 005-030 Electrical Parts

NHTC./PC 050-200 Electrical Parts

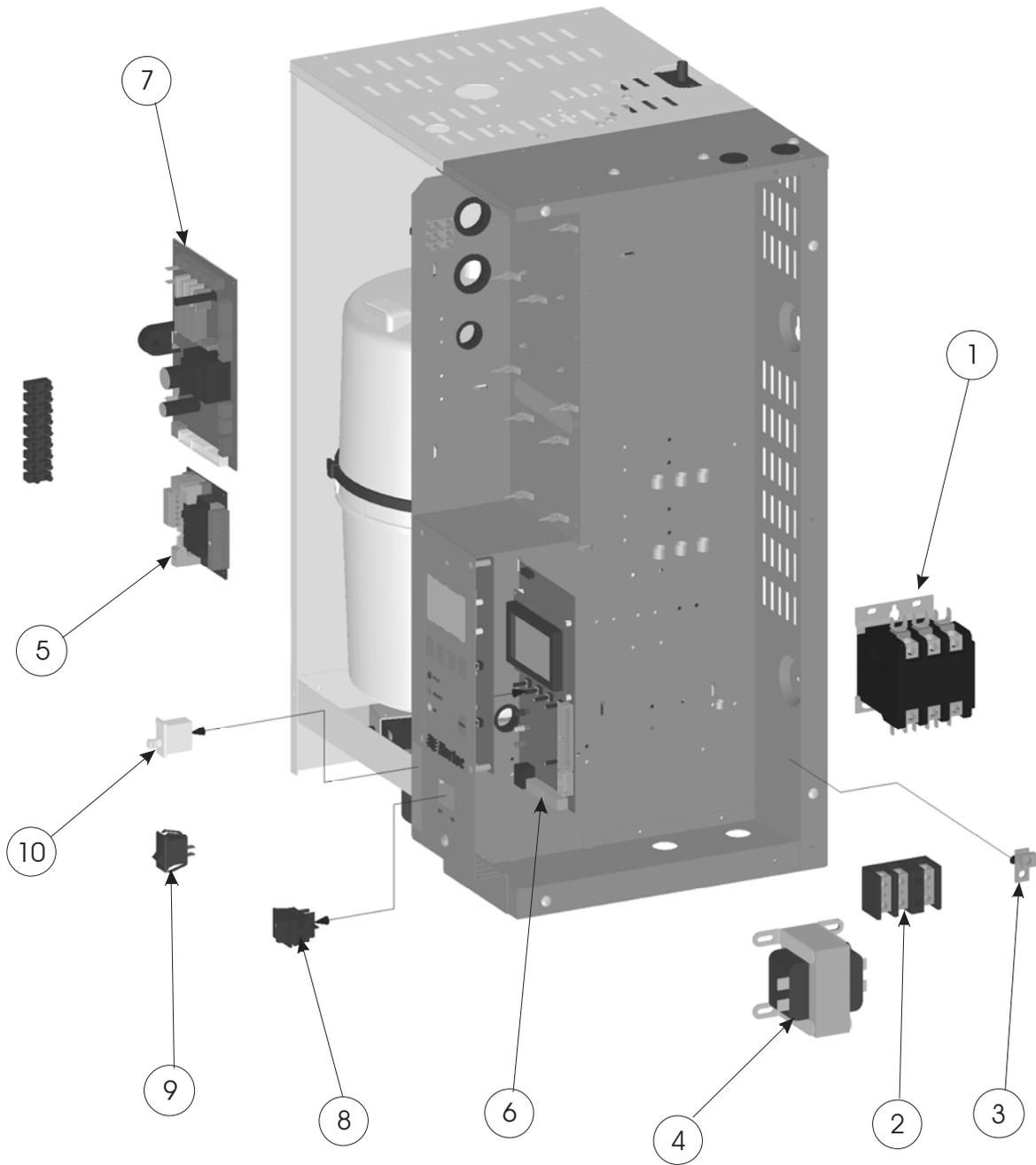


Figure 50: NHTC./PC 050-200 Electrical Parts

Table 12: NHTC/PC 050-200 Electrical Parts

ITEM NO.	DESCRIPTION	MODEL Volts/Rh NORTEC PART NO.	THREE PHASE																													
			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	440-480/3	550-600/3	208/3	220-240/3	380/3	440-480/3	550-600/3					
1	CONTACTOR 30 AMP 3PH	1323013	2	2	2	1	1				2	1							2						4	2					4	
	CONTACTOR 40 AMP 3PH	1323014								2	2		1						2	1	4	4			2				4		2	
	CONTACTOR 62 AMP 3PH	1323015													2	2		1										4	4			
2	TERMINAL BLOCK 3 POLE 95 AMP	1323027	1	1	1	1	1		1	1	1	1						1	1	1					1	1					1	
	TERMINAL BLOCK 3 POLE 150 AMP	1323028							1									1	1					1	1				1	1		
	TERM. BLOCK 3 POLE 310 AMP	1323030																						1				1	1			
3	GROUND CLAMP	1323020	1	1	1	1	1	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	TRANSFORMER 208 24V 75VA	1323208	1					1							1																	
	TRANSFORMER 240/24 VAC 75 VA	1323230		1					1						1																	
	TRANSFORMER 380/24V 75VA	1323380			1					1						1																
	TRANSFORMER 480/24 VAC 75 VA	1323460				1					1						1															
	TRANSFORMER 600/24 VAC 75 VA	1323575					1					1						1														
	TX 24VAC 150VA, PRIMARY 208	2522318																						1					1			
	TX 24VAC 150VA, PRIMARY 240	2522319																							1					1		
TX 24VAC 150VA, PRIMARY 480	2522320																									1				1		
TX 24VAC 150VA, PRIMARY 600	2522321																										1				1	
TX 24VAC 150VA, PRIMARY 380	2522322																									1				1		
5	PCB FAULT REMOTE	2521279	1	1	1	1	1	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	PCB PROCESSOR NHPC (NOT SHOWN)	2521274	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	PCB PROCESSOR NHTC	2521277	1	1	1	1	1	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	PCB DRIVER NHPC, NHTC INCL. ELECTRICITY CONVERTER	2521278	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	
8	SWITCH, ROCKER, DPST	2522489	1	1	1	1	1	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	SWITCH SPST 208-240V	1473010	1	1	1	1	1	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	SWITCH INTERLOCK IDM 423	1323091	1	1	1	1	1	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	CABLE RIBBON 40 PIN NHTC/NHPC	2522061	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	
	CABLE RIBBON 10 PIN NHTC FAULT	2522062	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	
	CABLE EPROM LARGE	2522037	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	CABLE EPROM DOUBLE	2522060																					1	1	1	1	1	1	1	1	1	
OPTIONAL COMPONENTS	JJN60(JLLN60) (OPTIONAL)	1423176													6	6											12	12				
	JJN50(JLLN50) (OPTIONAL)	1509692							6															12								
	PRIMARY FUSE JJN40 JLLN40 (OPTIONAL)	1423173								6															12							
	PRIMARY FUSE JJS40 (JLLS40) (OPTIONAL)	1423160															6									6	6		12			
	PRIMARY FUSE JJS50 (JLLS50) (OPTIONAL)	1509693																								6					6	
	PRIMARY FUSE JJS60 (JLLS60) (OPTIONAL)	1509694																													6	

Warranty

Walter Meier Inc. and/or Walter Meier 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 makes no warranty and assumes no liability whatsoever for equipment that has failed due to ambient conditions when installed in locations having climates below 14 °F (-10 °C) during January or above 104 °F (40 °C) during July.

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

U.S.A.
Walter Meier (Climate USA) Inc.
826 Proctor Avenue
Ogdensburg, NY 13669

CANADA
Walter Meier (Climate Canada) Ltd.
2740 Fenton Road
Ottawa, Ontario K1T 3T7

TEL: 1.866.NORTEC1
FAX: 613.822.7964

EMAIL: northamerica.climate@waltermeier.com
WEBSITE: www.humidity.com

www.norteconline.com



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