

IMPORTANT! Read and save these instructions. This manual to be left with the equipment.



EL
SERIES



INSTALLATION MANUAL

Electrode Steam Humidifier
Nortec **EL Series**

Thank you for choosing Nortec

Installation date (DD/MM/YYYY):

Commissioning date (DD/MM/YYYY):

Site:

Model:

Serial number:

Manufacturer

Nortec Humidity Ltd.
2740 Fenton Road, Ottawa, ON, Canada K1T 3T7
Tel. 1.866.NORTEC1, Fax 613.822.7964
nortec@humidity.com, www.humidity.com

Proprietary Notice

This document and the information disclosed herein are proprietary data of Nortec Humidity Ltd. Neither this document, nor the information contained herein shall be reproduced, used, or disclosed to others without the written authorization of Nortec Humidity Ltd., except to the extent required for installation, operation or maintenance of the customer's equipment.

Liability Notice

Nortec Humidity Ltd. does not accept any liability due to incorrect installation, maintenance or operation of the equipment, or due to the use of parts/components/equipment that are not authorized by Nortec Humidity Ltd.

Copyright Notice

Copyright 2016, Nortec Humidity Ltd, All rights reserved.

Technical modification rights reserved.

Contents

1	Introduction	1
1.1	Before You Start!	1
1.2	General	1
2	For Your Safety	3
3	Receiving and Storage	5
3.1	Inspection	5
3.2	Storage and Transportation	5
4	Product Overview	7
4.1	General Description	7
4.2	Models Overview	8
4.3	Model Designation	8
4.4	Options	9
4.5	Accessories	10
5	Installation	11
5.1	General	11
5.2	Installation Overview	12
5.2.1	Typical Installation for Duct Humidification	12
5.2.2	Typical Installation for Direct Room Humidification	14
5.3	Site Requirements	15
5.4	Mounting the Humidifier	16
5.4.1	Location and Clearances	16
5.4.2	Standard Mounting	18
5.4.3	Mounting Using Optional Mounting Bar	20
5.4.4	Mounting to OSHPD Seismic Requirements	22
5.4.5	Mounting Checklist	24
5.5	Steam Line Connections	24
5.5.1	Steam Distribution Using the Air Handling Unit	24
5.5.2	Steam Distribution Using the Blower Pack	24
5.5.2.1	Placement of Humidifier	24
5.5.2.2	Remote-Mounted Blower Pack	25
5.5.3	Best Practices for Installing Steam and Condensate Lines	26
5.5.3.1	Common Steam and Condensate Line Installation Mistakes	34
5.5.4	Steam Connections Checklist	35
5.6	Water Connections	36
5.6.1	Water Connections Overview	36
5.6.2	Water Connection Requirements	38
5.6.3	Water Connections Checklist	38
5.7	Humidity Control Systems	39
5.7.1	Control Device Locations	39
5.7.2	Permissible Control Signal Inputs	39

5.8	Electrical Connections	40
5.8.1	General	40
5.8.2	Wiring Diagrams	41
5.8.2.1	Nortec EL Steam Humidifier, Steam Cylinder A	41
5.8.2.2	Nortec EL Steam Humidifier, Steam Cylinder B (Large Units Only)	43
5.8.3	External Connections	44
5.8.3.1	3-Phase Power Supply Connection	44
5.8.3.2	Single-Phase Power Supply Connection	45
5.8.3.3	External Safety Chain	46
5.8.3.4	Modulating Demand or Humidity Signal	47
5.8.3.5	Ohmic Humidity Controller (Passive)	48
5.8.3.6	24V On/Off Humidistat	49
5.8.3.7	External On/Off Input	49
5.8.3.8	Dual Steam Cylinders Control Wiring	50
5.8.3.9	Remote Relay PCB Connections	51
5.8.3.10	Accessory Relay PCB Connections	52
5.8.3.11	Modbus Connection	53
5.8.4	Connecting Multiple Units Using Linkup	54
5.8.5	Maximum External Fuse	55
5.8.6	Electrical Connections Checklist	57
6	Product Specifications	59
6.1	Weights	59
6.2	Dimensions	60
A	Appendix	i
A.1	Installation Checklist	i
B	Appendix	iii
B.1	Commissioning Checklist	iii
B.1.1	Pre-Start-Up Checklist	iii
B.1.2	Performance Checklist	vi

1 Introduction

1.1 Before You Start!

Thank you for purchasing the Nortec EL steam humidifier.

The Nortec EL steam humidifier incorporates the latest technical advances and meets all recognized safety standards. Never-the-less, improper use of the Nortec EL steam humidifier may result in danger to the user or third parties, and/or damage to property.

To ensure safe, proper and economical operation of the Nortec EL steam humidifier, observe and comply with all information and safety instructions contained in this manual, as well as all relevant documentation of components of the installed humidification system.

If you have additional questions, contact your local Nortec representative. They will be glad to assist you.

1.2 General

Limitations

The subject of this manual is the Nortec EL steam humidifier. The various options and accessories may only be described in-so-far as is necessary for proper installation and operation of the equipment. Additional information on available options and accessories can be obtained in the instructions that are supplied with them.

This manual is restricted to the installation of the Nortec EL steam humidifier, and is intended for well trained personnel who are suitably qualified for their respective tasks.

Symbols Used in This Manual



CAUTION!

The word "CAUTION" in conjunction with the general caution symbol is used to provide safety instructions that, if neglected, may cause damage and/or malfunction of the unit or damage to property.



WARNING!

The word "WARNING" in conjunction with the general warning symbol is used to provide safety instructions that, if neglected, may cause injury to personnel. Other specific warning symbols may also be used in place of the general symbol.



DANGER!

The word "DANGER" in conjunction with the general danger symbol is used to provide safety instructions that, if neglected, may cause severe injury to personnel or even death. Other specific danger symbols may also be used in place of the general symbol.

Other Related Publications

This installation manual is supplemented by other publications such as the operation and maintenance manual, spare parts list, etc., which are included in the delivery of the equipment. Where necessary, appropriate cross-references to these publications have been added in this manual.

Storage of Manual

Keep this manual in a place where it is safe and readily accessible. If the equipment is moved to another location, make sure that the manual is passed on to the new user.

If the manual is lost or misplaced, contact your local Nortec representative for a replacement copy.

2 For Your Safety

General

Every person who is tasked with the installation of the Nortec EL steam humidifier must read and understand this manual before performing any work. Knowing and understanding the contents of the installation manual and the operation and maintenance manual is a basic requirement for protecting personnel against any kind of danger, preventing faulty operation, and operating the unit safely and correctly.

All labels, signs and marking applied to the Nortec EL steam humidifier must be observed and kept in a readable state.

Personnel Qualifications

All procedures described in this manual must only be performed by personnel who are adequately qualified, well trained and are authorized by the customer.

For safety and warranty reasons, any activity beyond the scope of this manual must only be performed by qualified personnel authorized by Nortec.

All personnel working with the Nortec EL steam humidifier must be familiar with, and comply with the appropriate regulations on workplace safety and prevention of accidents.

Intended Use

The Nortec EL steam humidifier is intended exclusively for air humidification using a Nortec-approved steam distributor or blower pack within specified operating conditions (refer to the Operation and Maintenance Manual for details). Any other type of application, without the express written consent of Nortec, is considered to be not conforming to its intended purpose, and may lead to dangerous operation and will void the warranty.

In order to operate the equipment in the intended manner all information contained in this manual, in particular the safety instructions, must be observed closely.

Dangers that may arise from the Nortec EL steam humidifier:



DANGER!
Risk of electric shock!

The Nortec EL steam humidifier is mains powered. Live parts may be exposed when the door panels are removed. Touching live parts may cause severe injury or even death.

Prevention: The Nortec EL steam humidifier must be connected to the mains only after all installation work has been completed, checked for correct workmanship, and the door panels are installed and fastened securely.



WARNING!
Risk of severe burns from exposure to hot steam vapors!

The Nortec EL steam humidifier uses hot steam vapors for humidification. Bare skin exposed to hot steam vapors can result in severe burns.

Prevention: Avoid contact with hot steam. Or, wear appropriate personal protective equipment when working near steam vapors.

Preventing Unsafe Operation

All personnel working with the Nortec EL steam humidifier must immediately report to the customer any alterations to the unit that may affect safety, and **secure the humidifier against accidental power-up**.

Modifications to the Unit Prohibited

Modifications are not permitted on the Nortec EL steam humidifier without the express written consent of Nortec.

3 Receiving and Storage

3.1 Inspection

After receiving the shipment, inspect the goods as follows:

- Inspect the shipping boxes for damage.
Report any shipping box damages to the shipping company without delay.
- Check the goods against the packing slip to ensure that all items have been delivered.
Report any shortages to your Nortec representative within 48 hours of receipt of the goods. Nortec does not assume responsibilities for any shortages beyond this period.
- Unpack the parts/components and check for any damage.
If parts/components are damaged, notify the shipping company immediately.
- Verify the model type on the rating label to ensure that it is suitable for your installation. Refer to [Figure 3 on page 9](#).

3.2 Storage and Transportation

Storage

Store the Nortec EL steam humidifier in its original packaging inside a protected area that meets the following requirements until it is installed, or if it needs to be stored for an extended period of time:

- Room temperature: 41 to 104 °F (5 to 40 °C)
- Room humidity: 10 to 75% RH

Transportation

For optimum protection always transport the unit and components in their original packaging, and use appropriate lifting/transporting devices.

Packaging

Keep the original packaging of the unit/components for later use.

If the packaging needs to be disposed off, observe local regulations on waste disposal. Recycle packaging where possible.

This page intentionally left blank

4 Product Overview

4.1 General Description

The Nortec EL steam humidifier is an advanced electrode steam humidifier with state-of-the-art features. It has an integrated controller which not only controls the humidifier, but also allows the humidifier to be connected to a building automation system, or an off-line computer, so it can be controlled and monitored remotely.

The Nortec EL steam humidifier comes in three different housing sizes depending on the steam capacity. Refer to [Figure 1](#). These units can range from 5 lb/h (2.2 kg/h) to 200 lb/h (91 kg/h) – refer to ["Models Overview" on page 8](#). Models with steam capacity up to 100 lb/h (45 kg/h) can also be ordered with a built-on blower pack. The large models, with steam capacity from 150 lb/h (68 kg/h) to 200 lb/h (91 kg/h), are equipped with dual steam cylinders – each with its own dedicated driver board.

The dedicated driver boards in the large models allow the steam cylinders to be configured to operate in series, in parallel or independent mode. Two separate sets of control signals are needed for independent mode of operation. In series mode, the output capacity of steam cylinder "A" is configured to 0-50% of humidifier demand, and steam cylinder "B" to 50-100% of humidifier demand. In parallel mode, the output capacity of each steam cylinder is configured to 0-100% of humidifier demand.

In addition, up to six integrated controllers (for a maximum of 12 steam cylinders) can be set up in a "main-extension" configuration using Nortec's Linkup system to satisfy large humidification needs.

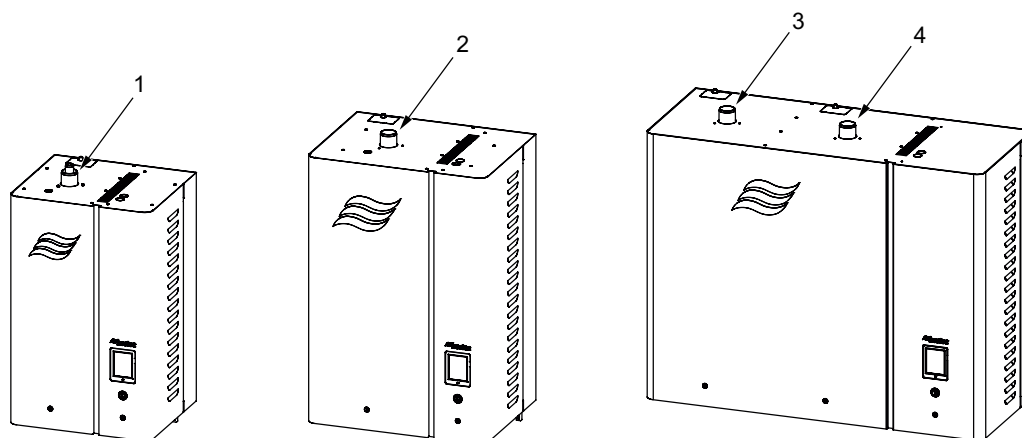


Figure 1: Nortec EL Steam Humidifier Model Sizes

- 1 Small model, steam cylinder "A" only
- 2 Medium model, steam cylinder "A" only
- 3 Large model, steam cylinder "B"
- 4 Large model, steam cylinder "A"

4.2 Models Overview

The Nortec EL steam humidifier is available in different sizes (S, M and L) with different heating voltages and steam capacities as shown in [Table 1](#) below.

Table 1: Nortec EL Steam Humidifier Models

Housing Size	Nortec EL Model	110-120V/1~	208V/1~	220-240V/1~	277V/1~	380-415V/1~	440-480V/1~	550-600V/1~	208V/3~	220-240V/3~	380V/3~	440-480V/3~	550-600V/3~
		lb/h (kg/h)	lb/h (kg/h)	lb/h (kg/h)	lb/h (kg/h)	lb/h (kg/h)	lb/h (kg/h)	lb/h (kg/h)	lb/h (kg/h)	lb/h (kg/h)	lb/h (kg/h)	lb/h (kg/h)	lb/h (kg/h)
S	005	5 (2.2)	–	–	–	–	–	–	–	–	–	–	–
	010	–	10 (4.5)	10 (4.5)	10 (4.5)	10 (4.5)	10 (4.5)	10 (4.5)	–	–	–	–	–
	020	–	20 (9)	20 (9)	20 (9)	20 (9)	20 (9)	20 (9)	20 (9)	20 (9)	20 (9)	20 (9)	20 (9)
	030	–	–	–	–	–	–	–	30 (13.6)	30 (13.6)	30 (13.6)	30 (13.6)	30 (13.6)
M	050	–	–	–	–	–	–	–	50 (22.7)	50 (22.7)	50 (22.7)	50 (22.7)	50 (22.7)
	075	–	–	–	–	–	–	–	75 (34)	75 (34)	75 (34)	75 (34)	75 (34)
	100	–	–	–	–	–	–	–	90 (41)	100 (45)	100 (45)	100 (45)	100 (45)
L	150*	–	–	–	–	–	–	–	150 (68)	150 (68)	150 (68)	150 (68)	150 (68)
	200*	–	–	–	–	–	–	–	180 (82)	200 (91)	200 (91)	200 (91)	200 (91)

* These models have two steam cylinders.

4.3 Model Designation

The specification label on the side (and the underside) of the Nortec EL steam humidifier shows its model number, serial number and ratings – refer to [Figure 3 on page 9](#). The breakdown of the model number is shown in [Figure 2](#). For other details of the specification label refer to the Operation and Maintenance Manual.

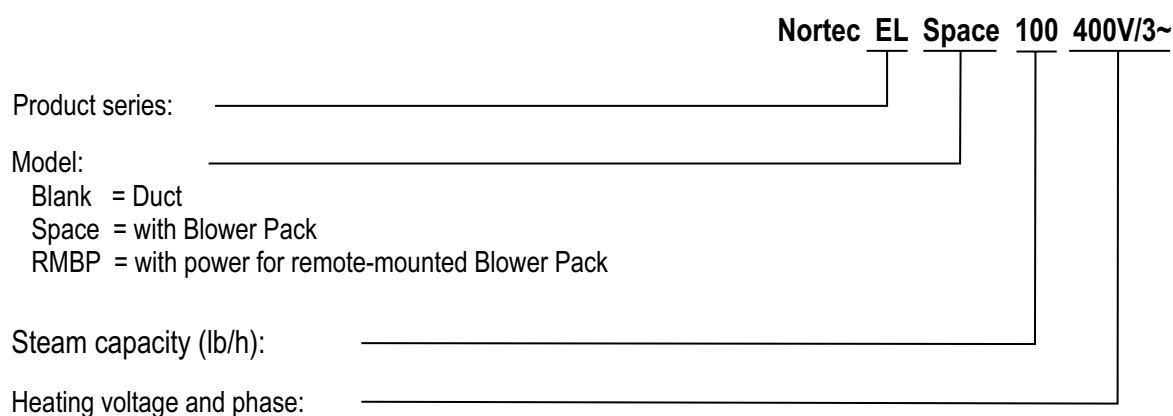


Figure 2: Model Breakdown

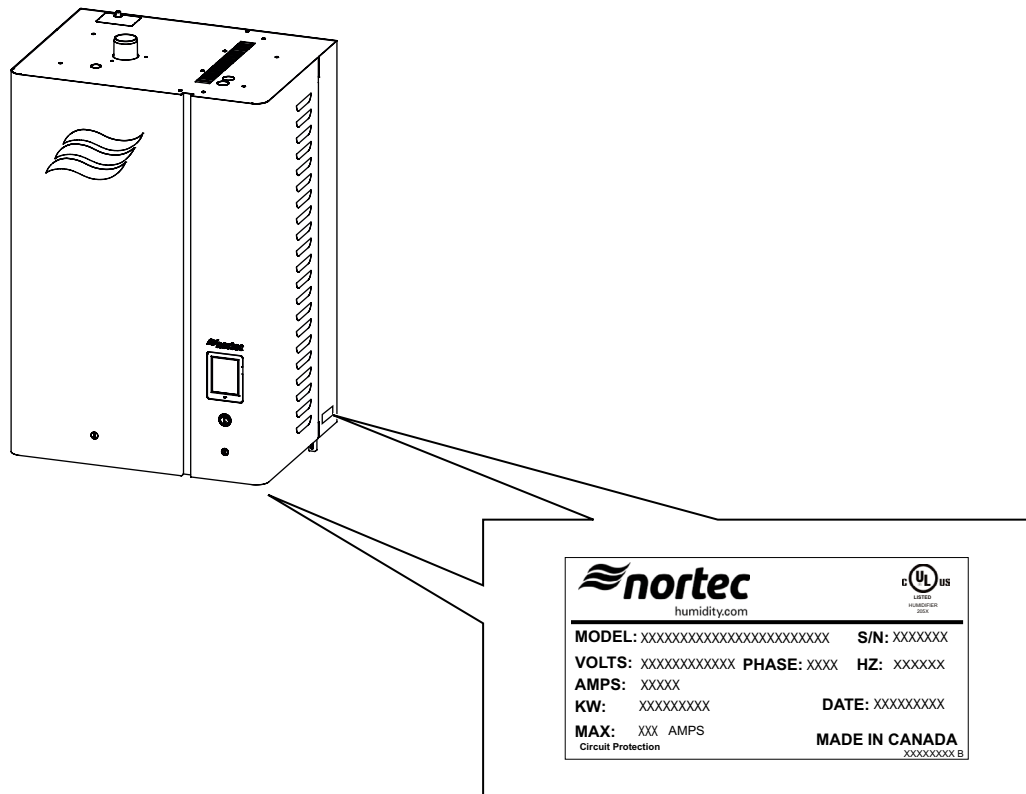


Figure 3: Nortec EL Steam Humidifier Specification Label

4.4 Options

Table 2 shows the list of options for the Nortec EL steam humidifier. Contact your Nortec representative for details.

Table 2: Nortec EL Options

Option	Application
Mounting bar	Provides two mounting bars which fit into each other for wall mounting. One bar is fastened to the humidifier, the other bar is fastened to the wall. The unit can be hung onto the wall by engaging the two mounting bars. Note: The unit can also be wall mounted (without this option) using the keyhole cutouts on the back of the humidifier housing.
Mounting rack	Stand-alone rack for mounting the Nortec EL steam humidifier.
Remote fault indication PCB (printed circuit board)	Printed circuit board with relay contacts for connecting remote status displays for "Unit On", "Steam", "Error" and "Service".
Accessory relay PCB (printed circuit board)	Printed circuit board with relay contacts for connecting other accessories such as fans and supply water flushing valves.
Internal primary fusing	Optional internal fuse for heating voltage power supply. Only available as a factory-installed option. Note: This is not a substitute for a dedicated external disconnect switch.
Fill cup extension	Kit for extending the fill cup so the humidifier can accommodate backpressure of up to 10 in H ₂ O (2.49 kPa).
Extreme drain water cooling	Kit for cooling drain water to less than 120°F (49°C) before it is discharged into the drain.
Foam detection kit	Kit for extending the ability of the humidifier to handle a wider range of water supply quality.
BACnet MSTP BTL	PCB to provide BTL certified BACnet MSTP. This option also enables full Master functionality when using BACnet MSTP.
BACnet IP BTL	PCB to provide BTL certified BACnet IP.
LonWorks board	Supplementary board to connect the Nortec EL to a building management system using LonWorks.

Option	Application
Remote blower pack power kit	When a remote blower pack is being installed with the humidifier, this option provides a transformer, fusing, and a terminal block inside the humidifier to provide power to the remote blower pack. Without this option, a separate 110-120V supply must be provided for the remote blower pack.

4.5 Accessories

[Table 3](#) shows the list of accessories for the Nortec EL steam humidifier. Contact your Nortec representative for details. To install and operate the accessories, refer to the instructions supplied with the accessories.

Table 3: Nortec EL Accessories

Accessory	Application
Steam distributor	Steam distribution system for use in an air duct.
SAM-e steam distribution manifold	Steam distribution system for use in an air duct where reduced absorption distance is required.
Blower pack, built-on or remote	For direct room humidification or use in conditioned spaces without a built-in air distribution system. The EL Space model has a blower pack mounted directly, the EL RMBP model has power for a remote-mounted blower pack (blower pack ordered as an accessory).
Digital or analog control humidistat with either On/Off or modulating operation	Input device used to meter the output of the humidifier based on the sensed relative humidity. The humidistat can be installed in the conditioned space that is being humidified, or within the duct.
Digital RH transducer	Input device used to communicate the relative humidity in a conditioned space or a duct to the humidifier.
Digital or analog high limit humidistat with either On/Off or modulating operation	Input device used to limit the output of the humidifier by either shutting it down or throttling it down when the humidity in the duct approaches the high limit.
Air proving switch	Input device to ensure that humidification only occurs when air is moving through the duct.
Outdoor temperature sensor	Input device used to communicate the outdoor temperature to the humidistat so that it can lower the setpoint value during cold weather to prevent condensation on exterior windows/ surfaces.

5 Installation

5.1 General

Strictly observe and perform all installation tasks including the mounting of the unit and connection of the water, steam and power supplies as described in this manual.

Observe and comply with all local and national codes dealing with water, steam and electrical installations.

Nortec does not accept any liability for installation of humidification equipment by unqualified personnel, or the use of equipment/parts that are not authorized by Nortec.

Personnel Qualifications

All installation work must be performed only by licensed personnel authorized by the customer. It is the customer's responsibility to verify qualifications of the personnel.

Safety

Observe the following safety precautions:



DANGER!
Risk of electric shock!

The Nortec humidifier is mains powered. Live parts may be exposed when the door panels are open. Touching live parts may cause severe injury or even death.

Prevention: The Nortec humidifier must be connected to the mains only after all installation work has been completed, checked for correct workmanship, and the door panels are closed and fastened securely.



CAUTION!
Risk of damage to internal components from electrostatic discharge (ESD)!

The electronic components inside the humidifier are sensitive to electrostatic discharge (ESD).

Prevention: Take appropriate measures to protect the electronic components inside the unit against damage caused by electrostatic discharge (ESD). Refer to ANSI/ESD-S20.20.

Legend:

- 1 High limit On/Off humidistat (external safety chain)
- 2 Humidity sensor or modulating humidistat (used for control of space in return duct, or high limit in supply duct)
- 3 On/Off humidistat (used for humidity control)
- 4 Steam line (see Note 1 below)
- 5 Electrical disconnect, high voltage supply
- 6 Drain line (see Note 2 below)
- 7 Air gap with optional trap (see Note 3 below)
- 8 Water supply (see Note 4 below)
- 9 Condensate line (see Note 5 below)
- 10 Steam distributor (see Note 6 below)
- 11 Air proving switch (external safety chain)
- 12 Supply air duct
- 13 Return air duct

Note 1: The steam line should be as short as possible – the maximum length varies depending on unit capacity and material used (refer to [Table 6 on page 28](#)). The steam line should have adequate upslope (minimum 10°) /downslope (minimum 2°), without restrictions and with a condensate trap at the lowest point. Steam traps are required every 15 ft (5 m) for long runs. The steam line must rise a minimum of 12 in (30 cm) straight up before running to the steam distributor. The minimum bend radius for steam hose is 12 in (30 cm), or 5× the internal diameter for rigid pipes. Refer to [Table 6 on page 28](#) for steam line recommendations.

Note 2: The drain line should have a minimum internal diameter of 7/8 in (22 mm), with a constant minimum downslope of 1 in/48 in (1.2°) to the funnel, and must not touch the sides or bottom of funnel.

Note 3: The air gap and trap should be located to the left of the humidifier, as shown. A 2-1/2 in to 7/8 in (63.5 mm to 22 mm) reducer is ideal (Nortec option P/N 2522172). The hose must not touch the bottom of the funnel.

Note 4: Water supply should be potable drinking water, with conductivity of 150-1200 micro-siemens/cm (0-12 gpg). The water supply line should have a minimum diameter of 1/2 in (13 mm) with a shutoff valve. An optional 5 µm filter is also recommended. Water temperature should be 34-104°F (1-40°C). Pressure should be surge-free and regulated to 30-80 psig (207-550 kPa).

Note 5: Condensate drain line from the steam distributor should have a constant minimum downslope of 1 in/48 in (1.2°), with no restrictions and a minimum trap height of 8 in (200 mm). The trap should be located a minimum of 12 in (30 cm) below the steam distributor.

Note 6: The distance from the steam distributor to any obstruction or transition in the duct should be equal to the calculated absorption distance B_n or a minimum of 8-10 ft (2.4-3 m) if B_n is not known. For details refer to the installation manual for the relevant steam distribution system. The absorption distance can be obtained using [Nortec HELP](#). The steam distributor capacity must equal or exceed the maximum capacity of the humidifier.

5.2.2 Typical Installation for Direct Room Humidification

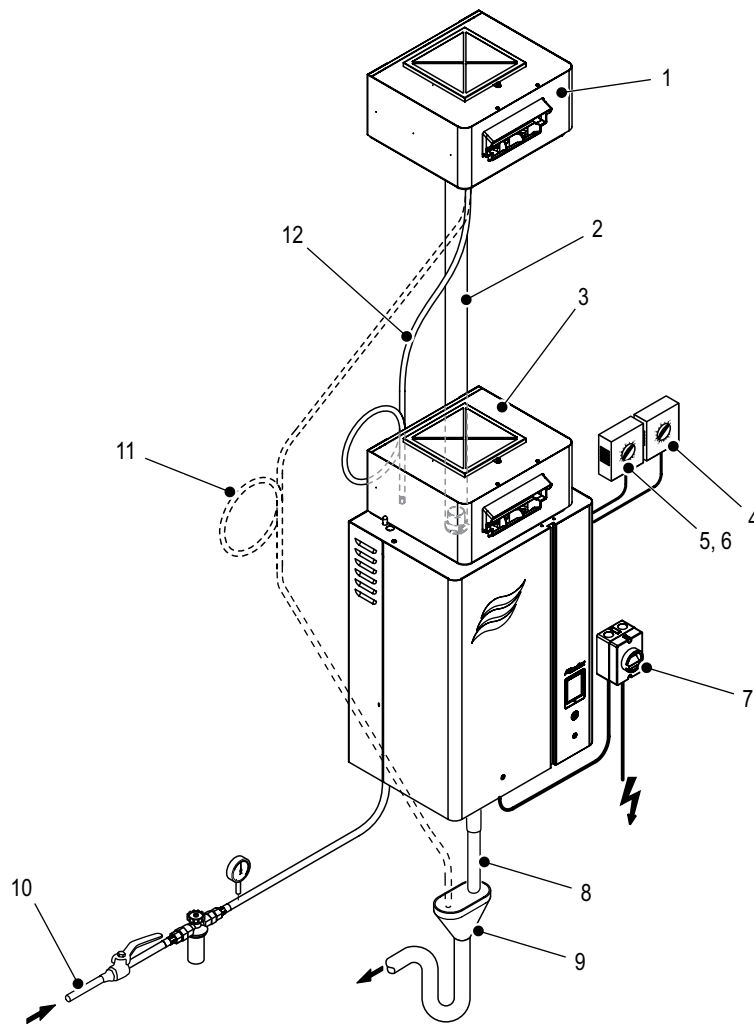


Figure 5: Typical Installation for Direct Room Humidification

- 1 Blower pack, remote-mounted
- 2 Steam line (see Note 1 below)
- 3 Blower pack, built-on
- 4 High level On/Off humidistat (external safety chain)
- 5 Humidity sensor or humidistat (used for control of space humidity or high limit)
- 6 On/Off humidity control
- 7 Electrical disconnect, high voltage supply
- 8 Drain line (see Note 2 below)
- 9 Air gap with optional trap (see Note 3 below)
- 10 Water supply (see Note 4 below)
- 11 Condensate drain line (routed to floor drain, see Note 5 below)
- 12 Condensate drain connection through fill cup to steam cylinder (for remote blower pack)

Note 1: The steam line should be as short as possible – the maximum length varies depending on unit capacity and material used (refer to [Table 6 on page 28](#)). The steam line should have adequate upslope (minimum 10°) /downslope (minimum 2°), without restrictions and with a condensate trap at the lowest point. Steam traps are required every 15 ft (5 m) for long runs. The steam line must rise a minimum of 12 in (30 cm) straight up before running to the steam distributor. The minimum bend radius for steam hose is 12 in (30 cm), or 5× the internal diameter for rigid pipes. Refer to [Table 6 on page 28](#) for steam line recommendations.

Note 2: The drain line should have a minimum internal diameter of 7/8 in (22 mm), with a constant minimum downslope of 1 in/48 in (1.2°) to the funnel, and must not touch the side or bottom of the funnel.

Note 3: The air gap and trap should be located to the left of the humidifier, as shown. A 2-1/2 in to 7/8 in (63.5 mm to 22 mm) reducer is ideal (Nortec option P/N 2522172). The hose must not touch the bottom of the funnel.

Note 4: Water supply should be potable drinking water, with conductivity of 150-1200 micro-siemens/cm (0-12 gpg). The water supply line should have a minimum diameter of 1/2 in (13 mm) with a shutoff valve. An optional 5 µm filter is also recommended. Water temperature should be 34-104°F (1-40°C). Pressure should be surge-free and regulated to 30-80 psig (207-550 kPa).

Note 5: For remote-mounted blower pack, the condensate line can be routed to either an external drain or to the fill cup of the humidifier. The condensate drain line from the blower pack should have a constant minimum downslope of 1 in/48 in (1.2°), with no restrictions and a minimum trap height of 8 in (200 mm). The trap should be located a minimum of 12 in (30 cm) below the condensate port on the blower pack.

5.3 Site Requirements

In preparation for installation of the Nortec EL steam humidifier, make sure that the following site requirements are satisfied. Report any discrepancies to the site engineer.

Steam and Condensate Lines:

- ☐ When choosing the location of the humidifier, install it as close as possible to the steam distributor to minimize heat loss through the steam line.
- ☐ When possible, install the humidifier below the steam distributor. Make sure that the selected location permits proper routing of steam and condensate lines as described in ["Best Practices for Installing Steam and Condensate Lines" on page 26](#).

Mounting

- ☐ Allow adequate clearances around the humidifier for ease of maintenance. Although the Nortec EL steam humidifier requires no side clearance, Nortec recommends minimum clearances of 6 in (150 mm) on the side. A 24 in (610 mm) clearance between the humidifier and the ground is required. Observe all local and national installation codes. Nortec is not responsible for any installation code violations.
- ☐ Do not mount the humidifier on hot surfaces, or surfaces that can freeze, or near vibrating components, or on the floor. In addition, the mounting surface must be able to withstand temperatures of 140-158°F (60-70°C) that can be generated during operation of the humidifier.
- ☐ The humidifier should be mounted on a wall or other suitable surface that offers a sufficiently high load-bearing capacity. Refer to [Table 15 on page 59](#) for operating weights.
- ☐ The Nortec EL steam humidifier should be installed in a drip-proof location within buildings, where the ambient temperature is 41-104°F (5-40°C) and the relative humidity is 5-95% (non-condensing).

Water Supply

- ☐ The water supply to the humidifier must be cold potable drinking water, and not reverse osmosis (RO) or deionized (DI) water. The water quality requirements are listed in [Table 4](#) below.

Table 4: Water Quality Requirements

Conductivity (µS/cm)	Hardness (gpg)	Silica (ppm)	Alkalinity (pH)
150-1200*	0-12	0-4	7-7.5
	0-3	4-14	

* Default humidifier configuration supports approximately 330-670 µS/cm.

- ☐ The water supply should have a minimum flow rate of 0.9 gpm (3.3 L/min), and should be pressure regulated to 30-80 psig (207-550 kPa), with spike pressure limited to 120 psig (827 kPa).
- ☐ The water supply should be filtered to 5 µm (optional, but recommended).

- ☐ Water temperature should be 34-104°F (1-40°C).
- ☐ The diameter of the water supply piping should be minimum 1/2 in (13 mm), and must have a 1/2 in NPT female end.
- ☐ The water supply line should be made of copper, stainless steel or plastic certified for drinking water systems.
- ☐ A shutoff valve and a union fitting must be supplied in the water supply line for ease of maintenance.
- ☐ The water supply should be free of additives such as corrosion inhibitors, disinfectants, etc., which may affect the performance of the humidifier. If using softened or partially softened water, contact your Nortec representative for assistance.

Drainage

- ☐ The humidifier should be connected to a dedicated building drain (recommended) with a minimum drainage rate of 2.3 gal/min (8.7 L/min) per steam cylinder. For safety reasons, drain water from the humidifier should not empty into a sink used by personnel. The drain line must allow free and easy draining. A restricted drain can cause water in the humidifier to over-concentrate and result in poor operation, or cause water to back up at the air gap funnel.
- ☐ The building drain pipe should be made of either copper or stainless steel (minimum DIN 1.4301) so it can handle drain water temperatures up to 212 °F (100 °C).
- ☐ The space in which the humidifier is to be installed should have a floor drain. However, if a floor drain is not available, a leakage monitoring device must be installed (by others) to permit interruption of the water supply in case of a leakage.

Power Supply

- ☐ The power supply to the humidifier should be adequate to match the full voltage and current draw shown on the specification label of the humidifier.
- ☐ The power supply must have an external dedicated fused disconnect switch. The fusing must not exceed the maximum circuit protection indicated on the specification label. Refer to [Figure 3 on page 9](#).

5.4 Mounting the Humidifier

Refer to ["Site Requirements" on page 15](#) for the location and mounting requirements for the Nortec EL steam humidifier.

5.4.1 Location and Clearances

The location of the humidifier depends largely on the steam distribution system. For the required minimum clearances for a Nortec EL steam humidifier with a built-on blower pack refer to ["Placement of Humidifier" on page 24](#); or refer to the blower pack manual for a remote-mounted blower pack.

For all other steam distribution systems refer to [Figure 6](#). The clearance dimensions shown are for reference only, and are suggested clearances for ease of maintenance. Consult local and national installation codes. Nortec does not accept responsibility for violations of the installation codes.

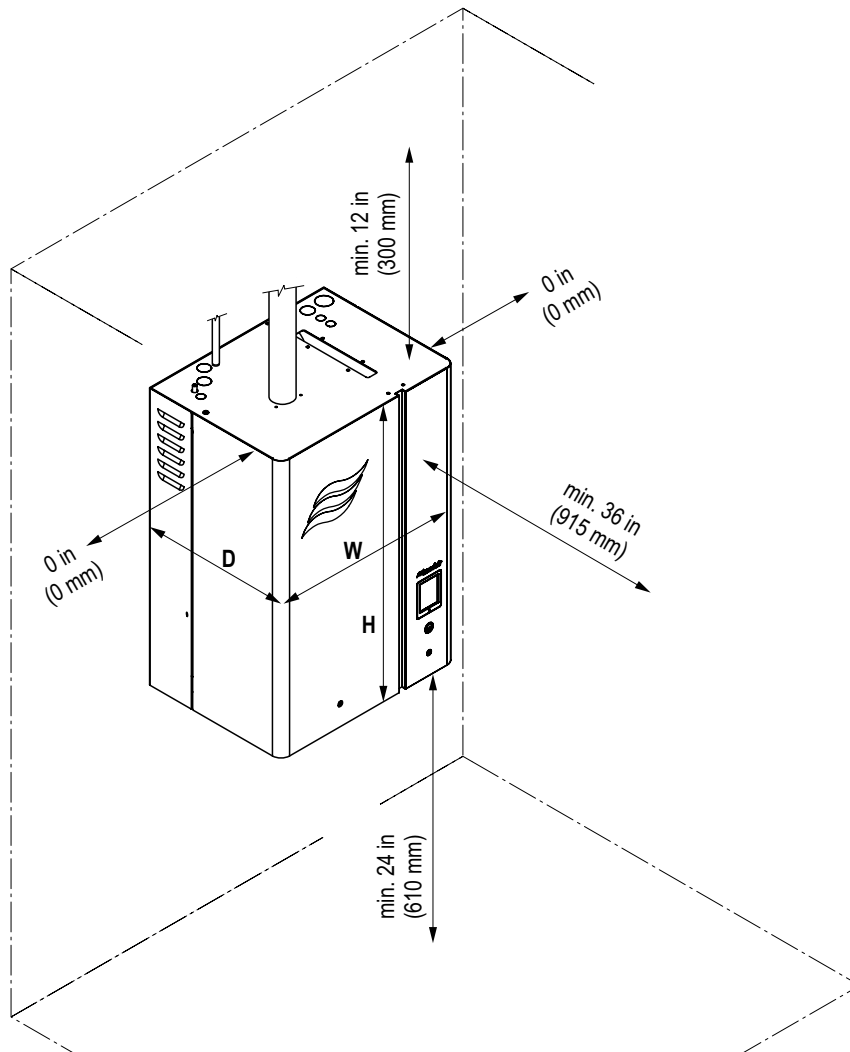


Figure 6: Nortec EL Humidifier Suggested Clearances

5.4.2 Standard Mounting

Locate the Nortec EL humidifier according to *"Location and Clearances"* on page 16, and install it on the mounting surface as follows:

- 1. Locate 2×4 wooden studs or equivalent support in the mounting surface, and mark the attachment points “A” and “B” at the desired position with the help of a level. For small or medium housing refer to *Figure 7*. For large housing refer to *Figure 8* on page 19.

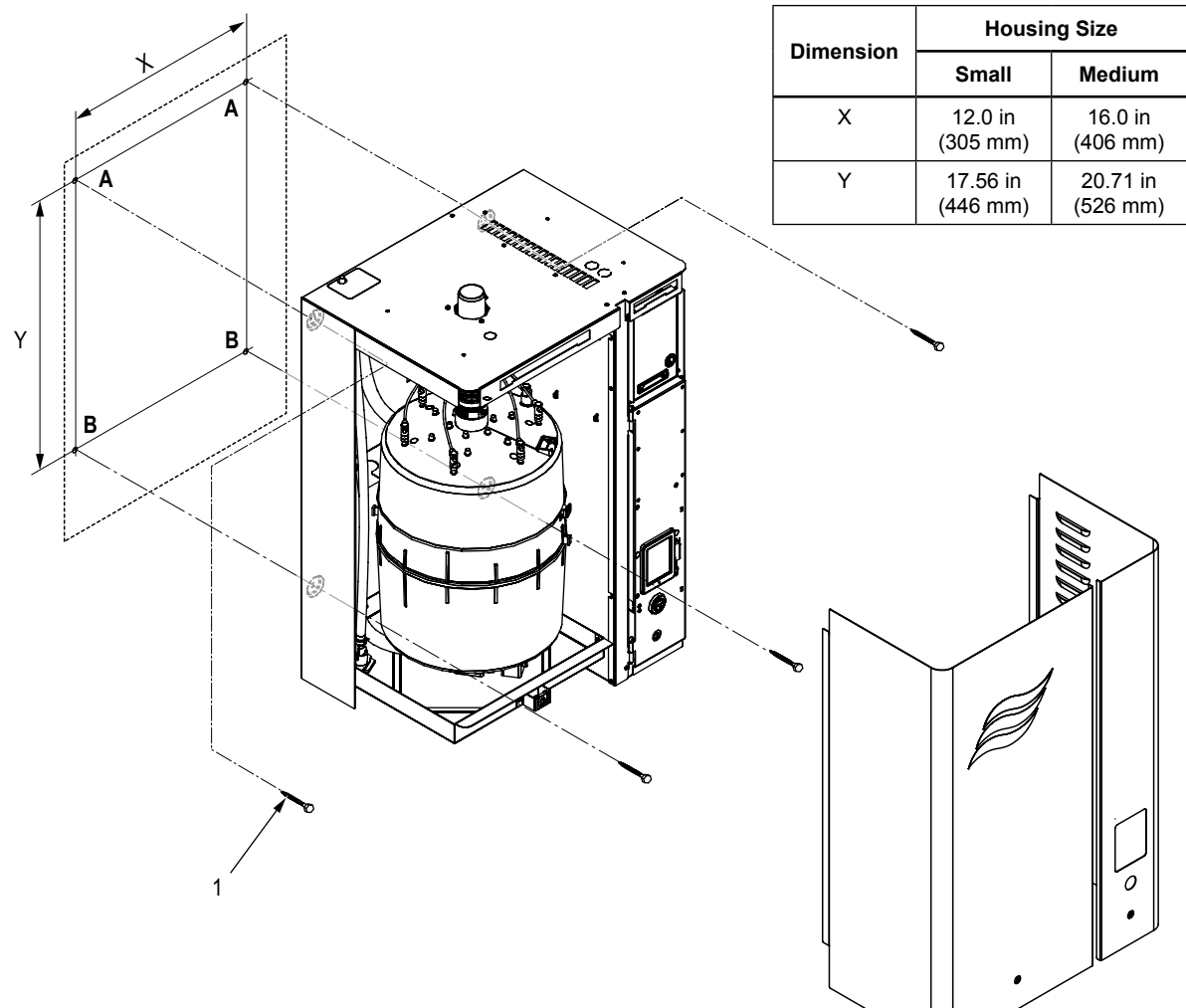


Figure 7: Standard Mounting, Small or Medium Housing

1 Lag bolt, 1/4×2 in (×4)

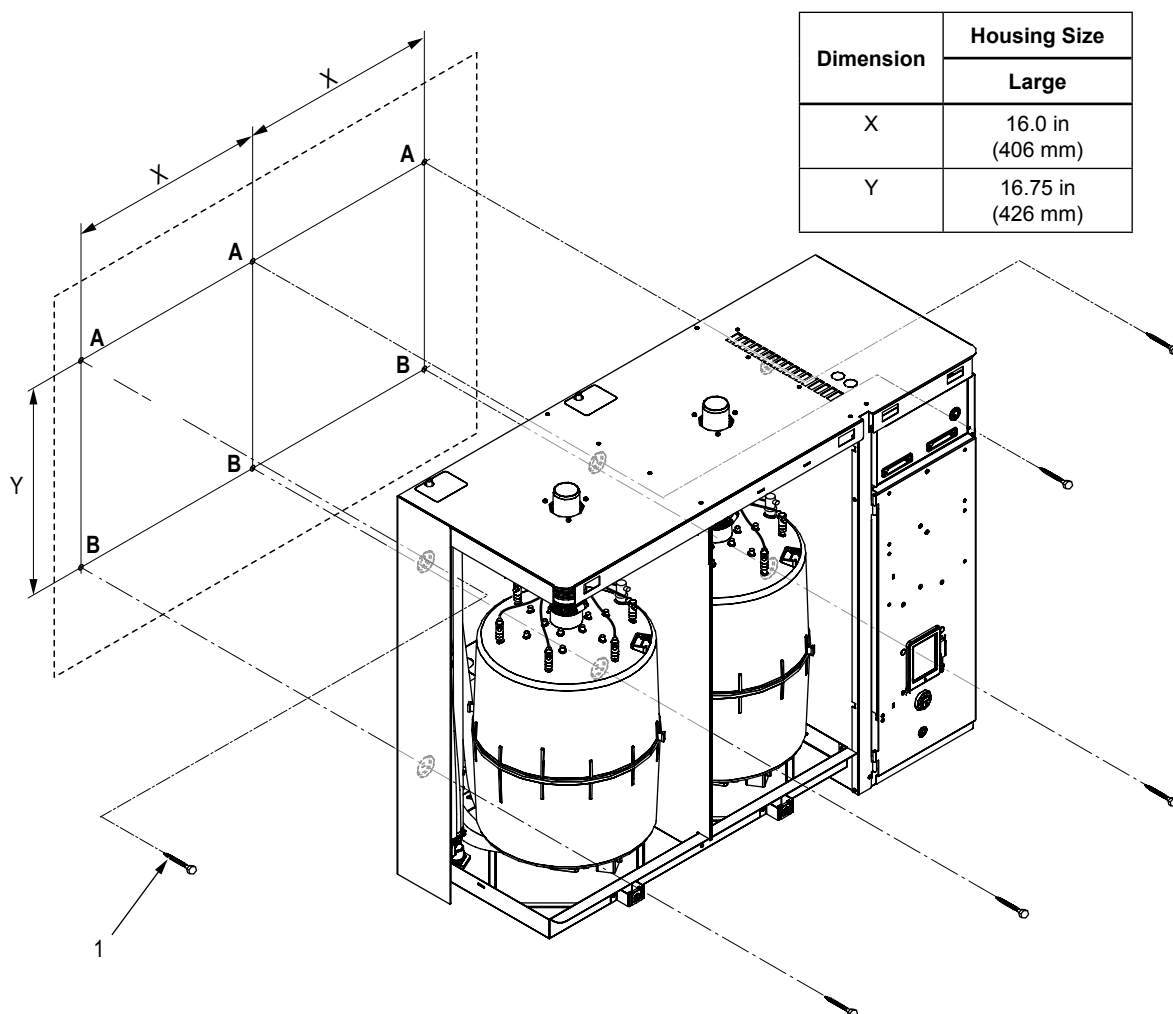


Figure 8: Standard Mounting, Large Housing

- 1 Lag bolt, 1/4×2 in (×6)
2. Install 1/4×2 in lag bolts (supplied by others) at attachment points "A". Use longer screws if going through drywall or other structural material into the mounting surface. Allow the heads of the screws to extend 0.25 in (5 mm) from the mounting surface so that the humidifier can be installed on the bolts.
3. Remove the door panels from the humidifier.



WARNING!
Heavy object – risk of injury!

The small humidifier weighs 45 lb (20 kg), and the large humidifier weighs 120 lb (54 kg).

Prevention: Use an appropriate lifting device, or request assistance to raise the humidifier into position.

4. Carefully raise and install the humidifier onto the installed lag bolts.
5. Align the humidifier with the help of a level, then tighten the lag bolts.
6. Install additional lag bolts (supplied by others) into the mounting surface at attachment points "B", and fasten securely.
7. Reinstall the door panels, and fasten them securely.

5.4.3 Mounting Using Optional Mounting Bar

Locate the Nortec EL humidifier according to "[Location and Clearances](#)" on [page 16](#), and install it on the mounting surface as follows using the optional mounting bar. Mounting bars are a factory-installed option. If ordered, the corresponding bars and bumpers will be riveted/installed to the housing at the factory.

1. Locate 2×4 wooden studs or equivalent support in the mounting surface, and mark the attachment points "A" at the desired position with the help of a level. For small or medium housing refer to [Figure 9](#). For large housing refer to [Figure 10 on page 21](#).

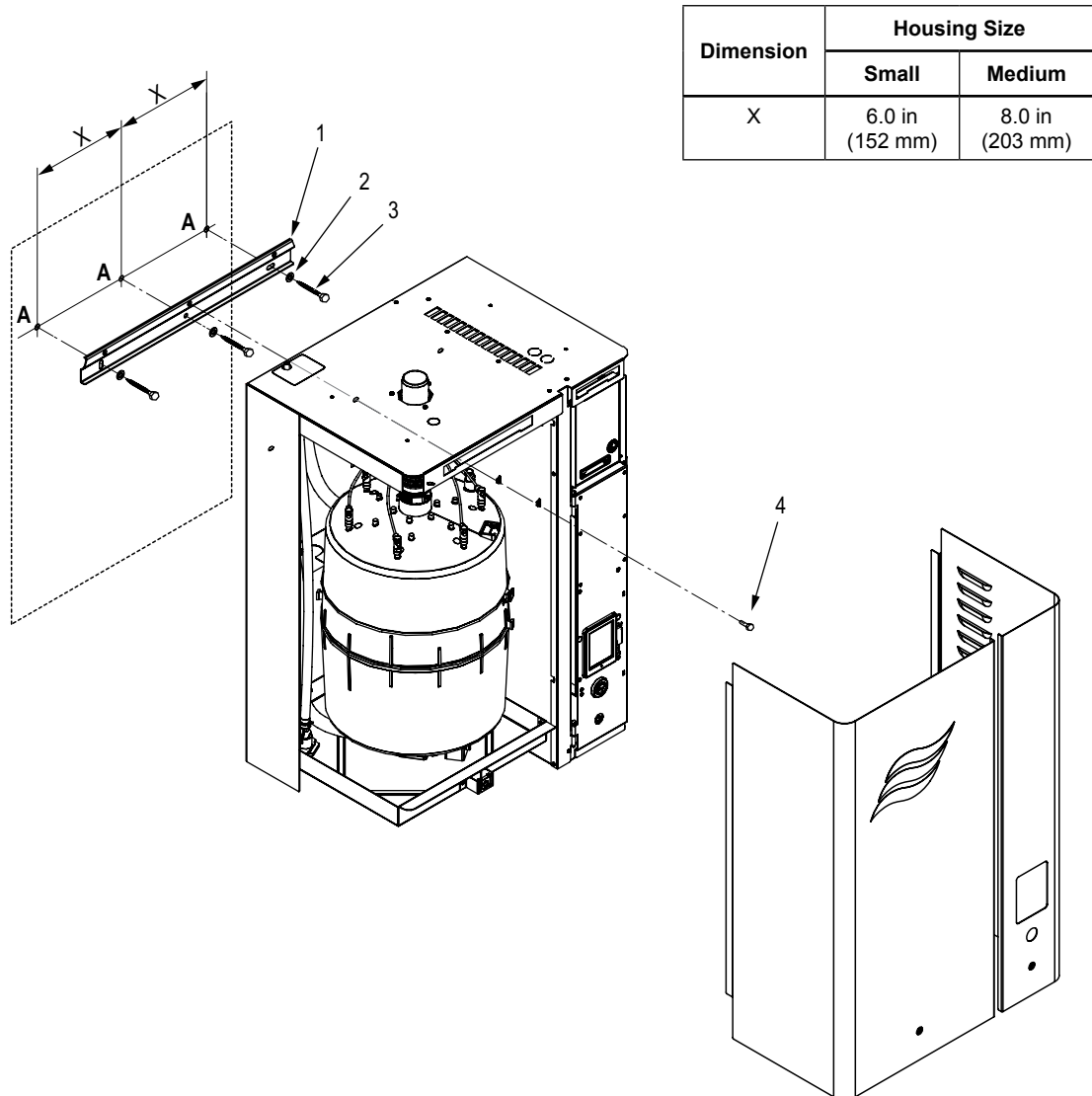


Figure 9: Optional Mounting, Small or Medium Housing

- 1 Mounting bar
- 2 Flat washer (×3)
- 3 Lag bolt, 1/4×2 in (×3)
- 4 Screw, M6×10 (×1), supplied

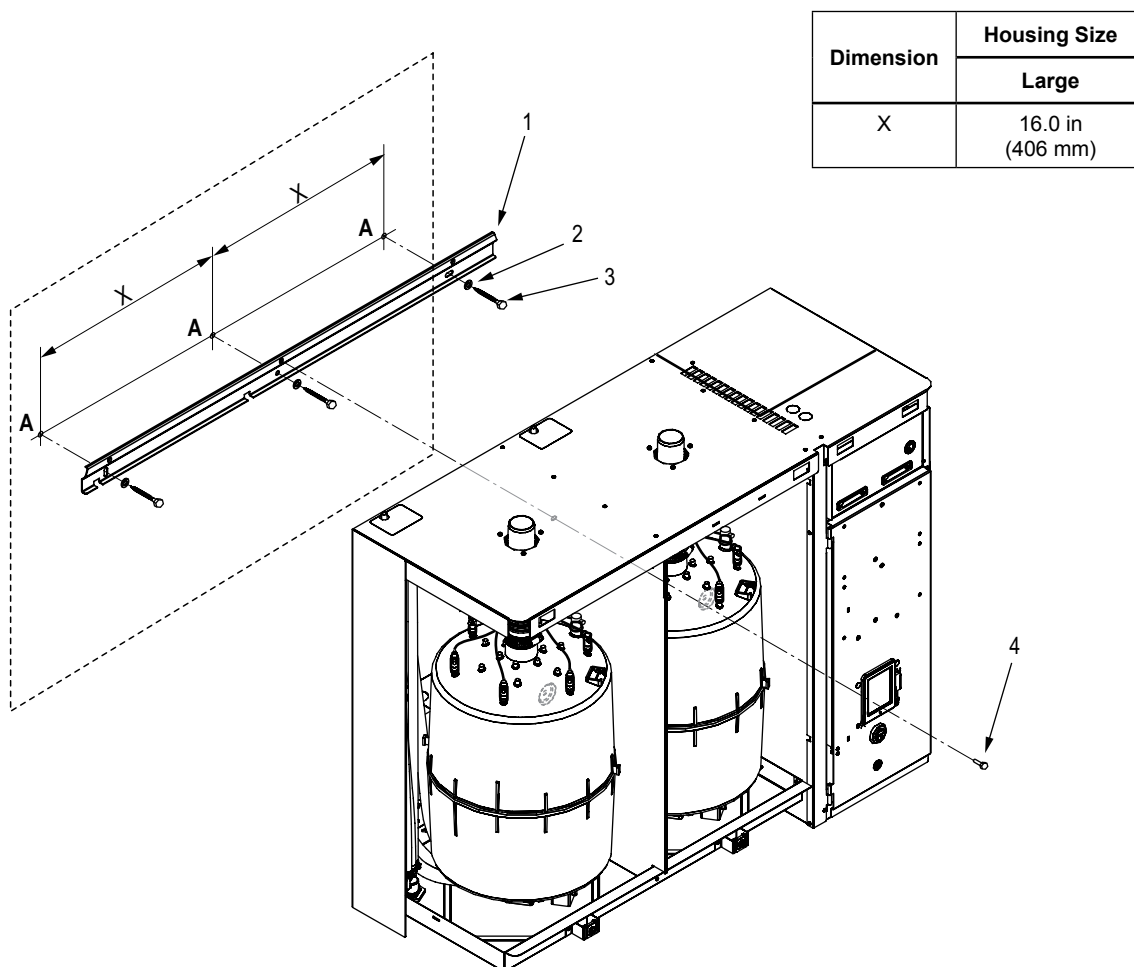


Figure 10: Optional Mounting, Large Housing

- 1 Mounting bar
- 2 Flat washer (×3)
- 3 Lag bolt, 1/4×2 in (×3)
- 4 Screw, M6×10 (×1), supplied

2. Align the holes in the mounting bar with the marks for the attachment points "A", and install the mounting bar on the mounting surface with 1/4×2 in lag bolts and flat washers (supplied by others). Use longer bolts if going through drywall or other structural material into the mounting surface. Level the mounting bar before tightening the lag bolts.
3. Remove the door panels from the humidifier.



WARNING!
Heavy object – risk of injury!

The small humidifier weighs 45 lb (20 kg), and the large humidifier weighs 120 lb (54 kg).

Prevention: Use an appropriate lifting device, or request assistance to raise the humidifier into position.

4. Carefully raise the humidifier into position, and hang it on the mounting bar.
5. Secure the humidifier to the mounting bar with the M6×10 screw (supplied), and fasten securely.
6. Reinstall the door panels, and fasten them securely.

5.4.4 Mounting to OSHPD Seismic Requirements

The Nortec EL is certified to OSHPD seismic requirements in its standard configuration (reference OSP-0225-10); no additional kits are required. The humidifier must be mounted as per the instructions in this section in order to fulfill the seismic requirements.

Locate the Nortec EL humidifier according to "[Location and Clearances](#)" on page 16, and secure it to double-layered 3/4 in (20 mm) thick plywood (or equivalent) as follows:

1. Secure the double-layered 3/4 in (20 mm) plywood sheets to the selected mounting surface.
2. Mark the attachment points "A" and "B" at the desired position on the plywood sheets (or equivalent) with the help of a level. For small or medium housing refer to [Figure 11](#). For large housing refer to [Figure 12](#) on page 23.
3. Install 3/8×2 in grade B5 (or equivalent) lag bolts and flat washers (supplied by others) at attachment points "A". Allow the heads of the screws to extend 0.25 in (5 mm) from the mounting surface so that the humidifier can be installed on the bolts.

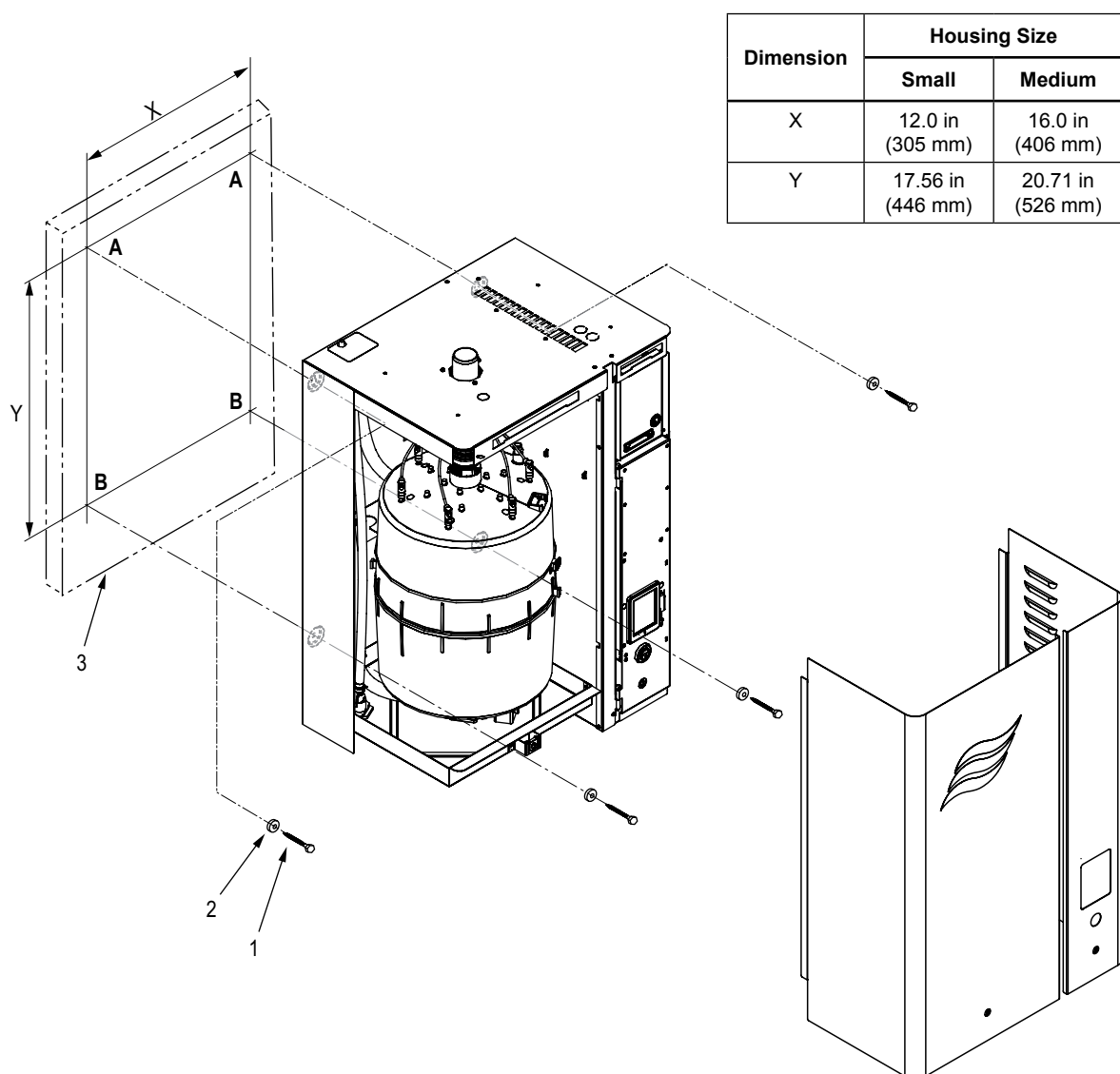


Figure 11: Optional Seismic Mounting, Small or Medium Housing

- 1 Lag bolt, 3/8×2 in, grade B5 (×4)
- 2 Flat washer (×4)
- 3 3/4 in (20 mm) double-layer plywood sheet (or equivalent)

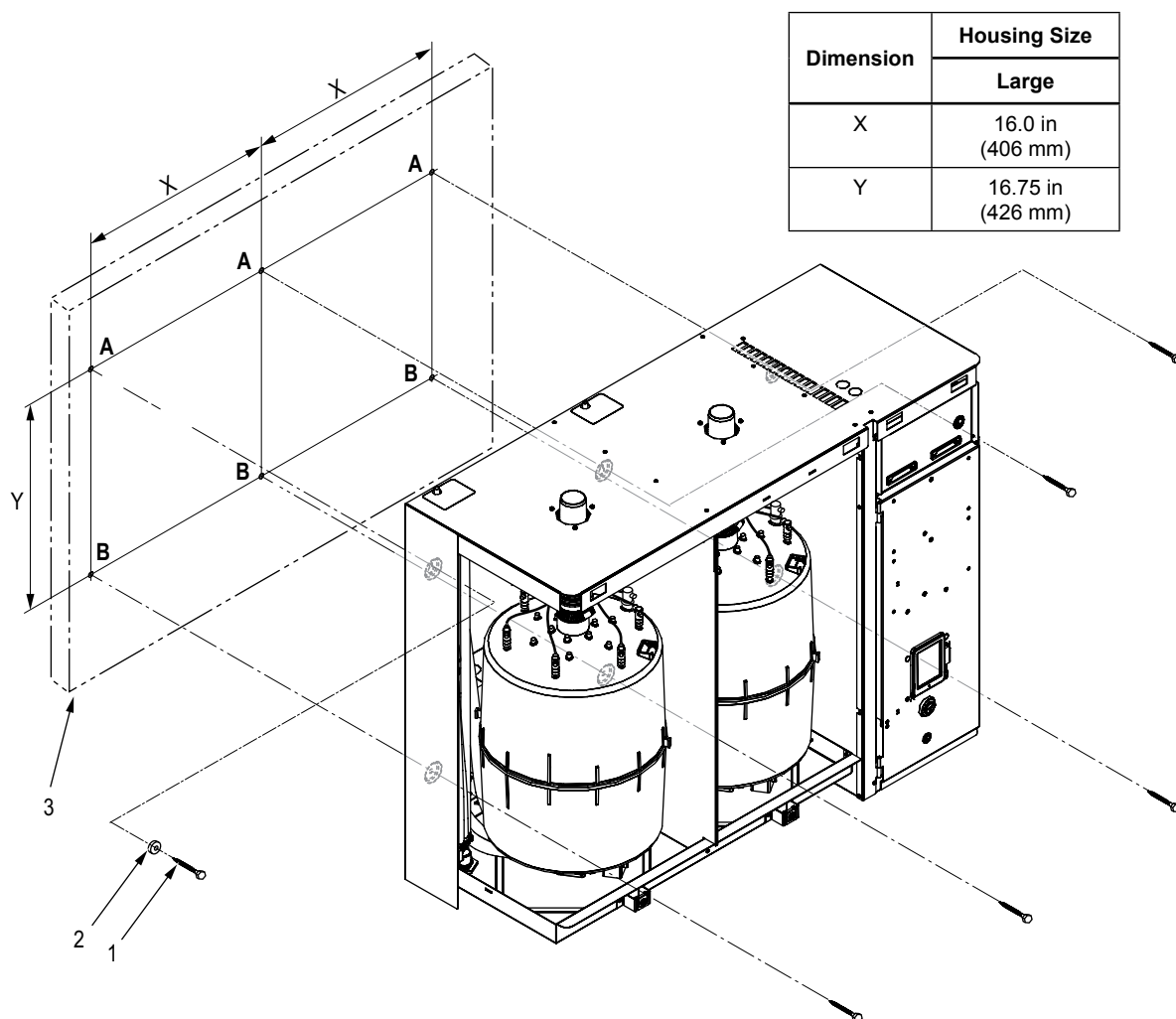


Figure 12: Optional Seismic Mounting, Large Housing

- 1 Lag bolt, 3/8×2 in, grade B5 (×6)
- 2 Flat washer (×6)
- 3 3/4 in (20 mm) double-layer plywood sheet (or equivalent)

4. Remove the door panels from the humidifier.
5. Enlarge the mounting holes in the rear of the cabinet to accommodate the 3/8×2 in lag bolts.



WARNING!
Heavy object – risk of injury!

The small humidifier weighs 45 lb (20 kg), and the large humidifier weighs 120 lb (54 kg).

Prevention: Use an appropriate lifting device, or request assistance to raise the humidifier into position.

6. Carefully raise and install the humidifier onto the installed lag bolts.
7. Align the humidifier with the help of a level, then tighten the lag bolts.
8. Install additional grade B5 (or equivalent) lag bolts and flat washers (supplied by others) into the plywood sheet (or equivalent) at attachment points “B”, and fasten securely.
9. Reinstall the door panels, and fasten them securely.

5.4.5 Mounting Checklist

Check the following to ensure that the humidifier has been mounted correctly:

- ☐ Unit installed in the correct location (according to ["Location and Clearances" on page 16](#))?
- ☐ Mounting surface stable, and capable of supporting the full operating weight of the humidifier?
- ☐ Unit level?
- ☐ Unit fastened securely?

5.5 Steam Line Connections

Steam generated by the Nortec EL humidifier is not pressurized, but is delivered at atmospheric pressure. It can be distributed directly into a conditioned space with a built-on or remote-mounted blower pack, or into an AHU (air handling unit) using Nortec steam distributors or Nortec SAM-e steam distribution manifold.

Read ["Best Practices for Installing Steam and Condensate Lines" on page 26](#) before installing steam lines.

5.5.1 Steam Distribution Using the Air Handling Unit

For placement of the steam distributor or SAM-e steam distribution manifold in the air handling unit, as well as best practices and installation procedures, refer to their installation manuals.

5.5.2 Steam Distribution Using the Blower Pack

5.5.2.1 Placement of Humidifier

[Figure 13 on page 25](#) and [Table 5](#) show the minimum clearances required for installation of a Nortec EL steam humidifier with a built-on Nortec blower pack.

Table 5: Minimum Clearances

	Blower Pack						
Capacity	5 lb/h (2.3 kg/h)	10 lb/h (4.5 kg/h)	20 lb/h (9 kg/h)	30 lb/h (13.6 kg/h)	50 lb/h (22.7 kg/h)	75 lb/h (34.0 kg/h)	100 lb/h (45.4 kg/h)
Low Speed							
Dimension "A" (minimum), Low speed	9 in (0.23 m)	18 in (0.46 m)	75 in (1.91 m)	86 in (2.19 m)	174 in (4.42 m)	189 in (4.81 m)	248 in (6.3 m)
Dimension "B" (minimum), Low speed	12 in (0.31 m)					48 in (1.22 m)	84 in (2.14 m)
High Speed							
Dimension "A" (minimum), High speed	6 in (0.16 m)	60 in (1.53 m)	71 in (1.81 m)	132 in (3.36 in)	153 in (3.89 m)	218 in (5.54 m)	
Dimension "B" (minimum), High speed	12 in (0.31 m)						
Dimension "C" (minimum)	90 in (2.3 m)						
Dimension "D" (suggested)	12 in (0.31 m)					30 in (0.77 m)	

Note:

The values in [Table 5](#) are based on the following nominal conditions: 72°F (22°C), 40% RH.

Blower pack should not be installed near cold surfaces or where dew point may be reached.

Higher humidity or lower room temperature (compared to nominal conditions stated above) will require increased clearances.

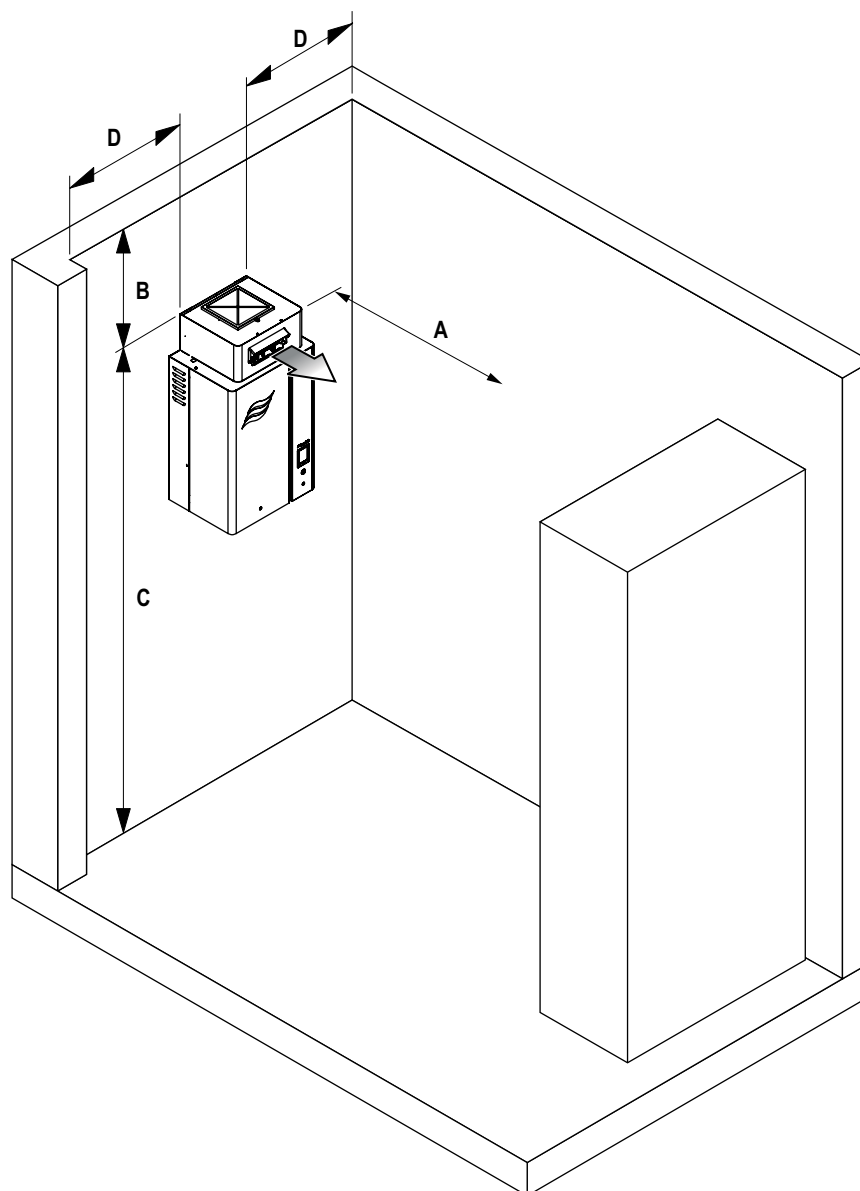


Figure 13: Clearance Requirements for Nortec EL Humidifier with Built-on Blower Pack

5.5.2.2 Remote-Mounted Blower Pack

For the installation requirements and installation procedure for the remote-mounted blower pack, refer to the blower pack manual.

5.5.3 Best Practices for Installing Steam and Condensate Lines

Nortec recommends that you observe the following best practices for installing atmospheric steam lines and condensate lines. Refer to [Figure 16](#), [Figure 17](#), [Figure 18](#) and [Figure 19](#) for installation examples.

Steam Lines

- Use rigid steam pipes made of copper (MED Type-L) or stainless steel (minimum DIN 1.4301) exclusively, and use steam hoses for short distances only. Use original steam and condensate hoses from your local Nortec representative. Steam and condensate lines made of any other materials may adversely affect the operation of the unit, and will void the warranty. Refer to [Table 6 on page 28](#) for details.



WARNING!

Excessive backpressure can result in serious injury or damage to equipment!

Excessive backpressure in the steam line may affect the proper functioning of the humidifier, and may also cause unexpected release of hot steam vapors. Bare skin exposed to the hot steam vapours can result in severe burns.

Prevention: Minimize the length of the steam line and the number of bends, as the backpressure can rise approximately 0.12 in H₂O for every foot (100 Pa for every meter) of steam line, and every 90° elbow.

- The length of the steam line should be kept as short as possible – refer to [Table 6 on page 28](#) for details. Avoid 90° bends, or use long radius elbows. Minimum bend radius is 12 in (300 mm) for steam hoses, and 5× the internal diameter for rigid steam pipes. Exceeding the maximum length can affect performance of the unit and may void the warranty. Backpressure in the line combined with duct static pressure must not exceed 5.5 in H₂O (1.37 kPa) and 10 in H₂O (2.49 kPa) with the optional fill cup extension.

Note: With oversized steam lines the maximum length can be extended. Use Nortec steam hose for short distances only. When calculating the total equivalent length, refer also to [Table 7 on page 28](#) for equivalent length of common fittings.

IMPORTANT! When determining the length and routing of steam lines, allowances must be made for thermal expansion. If a steam hose is used, allowances must be made for shrinkage in the length of the hose due to aging.

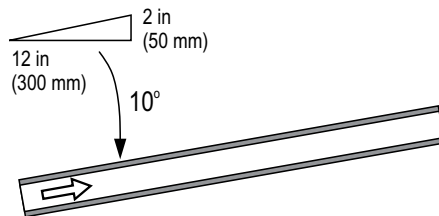
- Do not decrease the diameter of the steam line, as it increases the backpressure in the line and also allows condensation of the steam. If that is unavoidable, install a Nortec steam line reducer at the connection to the steam distributor only, and install a condensate line just before the restriction. Contact your local Nortec representative for details of the reducer.
- If necessary, increase the diameter of the steam line on the downslope and install a condensate trap at the lowest point.
- Do not combine steam lines except at the steam distributor. Use a Nortec adaptor specifically designed for that purpose, and only if the humidifier steam cylinders operate in parallel.
- If using blower packs with large Nortec EL humidifiers, do not connect the output from both steam cylinder to a single blower pack. Each blower pack has a maximum capacity of 100 lb/h (45 kg/h).
- The steam line from the humidifier must lead straight upwards for a minimum of 12 in (300 mm) before continuing on to the steam distribution system.
- The steam line must have a constant minimum upslope of 2 in/12 in (10°), or a constant minimum downslope of 1/2 in/12 in (2°), as shown in [Figure 14 on page 27](#).
- Use short lengths of steam hose to connect the steam line to the humidifier or steam distributor. Secure the steam hoses with clamps.



CAUTION!

Do not over-tighten the hose clamp on the steam hose. Maximum torque for 7/8 in (22 mm) clamps is 12 in·lbs (135 N·cm), and 16 in·lbs (180 N·cm) for 1-3/4 in (45 mm) clamps.

Minimum Upslope



Minimum Downslope

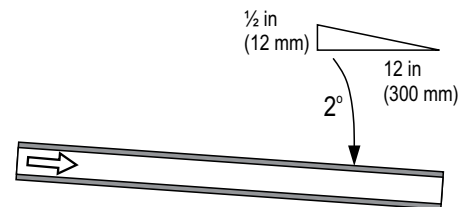


Figure 14: Steam Line Slope

- To minimize formation of condensation and maximize efficiency, the steam lines made of rigid pipes (copper or stainless steel) must be insulated with a minimum of 1 in (25 mm) of pipe insulation over its entire length.
- The weight of the steam line must be supported so there is no load on the humidifier.



WARNING!

Risk of severe burns from exposure to hot steam vapours!

Restrictions in the cross-section of the steam line will cause excessive backpressure in the steam cylinder when the unit is operating, which may cause unexpected release of hot steam vapors. Bare skin exposed to the hot steam vapours can result in severe burns.

Prevention: Observe the following:

- Upon completion of the installation, purge the steam line to remove any contaminants and installation materials.
- If using a steam hose make sure there are no kinks in the hose. A heated hose is more likely to kink.
- To prevent condensate pockets, the steam line must not sag. If necessary, support the steam line with pipe clamps, trough, or wall brackets, and install a condensate drain at the lowest point in the steam line.
- Do not install a shutoff valve (e.g. a manually operated shutoff valve, solenoid valve, etc.) in the steam line.

Table 6: Steam Line Recommendations

Model	Steam Line			Over-sized Steam Line**			Steam Losses***
	Maximum Equivalent Length	MED-L Copper Pipe Diameter	Stainless Steel (min. DIN 1.4301) Pipe Diameter	Maximum Equivalent Length	MED-L Copper Pipe Diameter	Stainless Steel (min DIN 1.4301) Pipe Diameter	
EL005	7 ft (2 m)	3/4 in (20 mm)	7/8 in × 0.049 wall (22 mm × 1.25 mm wall)	14 ft (4 m)	1 in (25 mm)	1-1/8 in × 0.049 wall (29 mm × 1.25 mm wall)	0.06 lb/h/ft (0.09 kg/h/m)
EL010	12 ft (3.5 m)			24 ft (7 m)			
EL020	17 ft (5 m)			34 ft (10 m)			
EL030	22 ft (6.5 m)			44 ft (13 m)			
EL050	43 ft (13 m)	1-1/2 in (40 mm)	1-3/4 in × 0.065 wall (45 mm × 1.65 mm wall)	86 ft (26 m)	2 in (50 mm)	2 in × 0.065 wall (50 mm × 1.65 mm wall)	0.11 lb/h/ft (0.18 kg/h/m)
EL075 EL100	47 ft (14 m)			94 ft (28 m)			
EL150* EL200*	50 ft (15 m)	1-1/2 in (40 mm)	1-3/4 in × 0.065 wall (45 mm × 1.65 mm wall)	100 ft (30 m)	2 in (50 mm)	2 in × 0.065 wall (50 mm × 1.65 mm wall)	
Nortec Steam Hose							
EL005- EL030	10 ft (3 m)	P/N 1328810 – 7/8 in (22 mm)					0.1 lb/h/ft (0.15 kg/h/m)
EL050- EL200	10 ft (3 m)	P/N 1328820 – 1-3/4 in (45 mm)					0.15 lb/h/ft (0.22 kg/h/m)

Notes:

* Use a single steam line for each steam cylinder. Do not combine lines except at a distributor, and only if using the humidifiers in parallel.

** The over-sized lines may require a reducer at the humidifier and the steam distributor.

*** Based on 1 in (25 mm) insulated copper pipe.

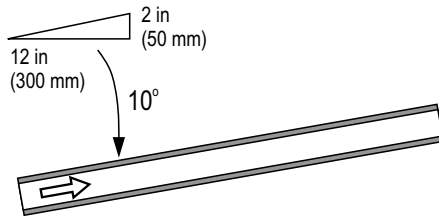
Table 7: Approximate Equivalent Length of Atmospheric Steam Line Fittings

Nominal Tube Size in (mm)	Standard 90° Elbow ft (m)	45° Elbow ft (m)	Side-outlet Tee ft (m)
0.75-0.875 (19-22)	2 (0.6)	1 (0.3)	4 (1.2)
1.5-1.75 (38-45)	3.5 (1.1)	1.75 (0.5)	7 (2.1)
3 (76)	5 (1.5)	2.5 (0.8)	11 (3.4)
4 (102)	8 (2.4)	4 (1.2)	15 (4.6)

Condensate Lines

- The condensate drain line from the steam distributor must have a constant minimum downslope of 1 in/48 in (1.2°), with a minimum trap height of 8 in (200 mm), and may be connected to the fill cup port on the top of the humidifier, or to the building floor drain with condensate cooler as required. The condensate trap must be at least 12 in (300 mm) below the condensate port on the steam distribution system or the "T" connector in the steam line. Refer to [Figure 15](#).

Minimum Upslope



Minimum Downslope

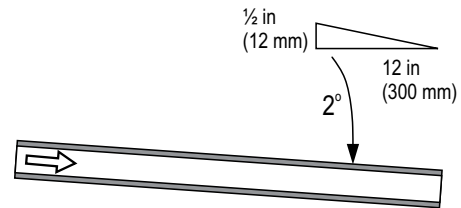


Figure 15: Condensate Drain Lines



WARNING!

Risk of severe burns from hot fluids or steam!

The condensate lines may be filled with hot fluids or steam. Bare skin in contact with hot fluids or steam can result in severe burns.

Prevention: Never plumb the condensate lines to empty into a sink used by personnel. Always connect the lines to a drain according to applicable national and local plumbing codes.

- Condensate lines must also be installed at all low points and at vertical transitions in the steam line. The condensate drain lines should always connect to full-size "T" connectors in the steam line. Install full-size "T" connectors for condensate drain lines at all transitions from vertical to horizontal.
- For a steam line that is longer than 15 ft (4.5 m) up to the maximum recommended length, install condensate lines and traps at regular intervals. The maximum distance between the condensate traps for long runs is 15 ft (4.5 m).
- Use 3/8 in (9.5 mm) Nortec condensate hose, or 3/8 in (9.5 mm) stainless steel pipe or 1/4 in (6.5 mm) copper pipe for traps in the condensate lines.
- Make sure that the condensate lines allow proper flow.
- Do not over-tighten the hose clamps on the condensate lines.

IMPORTANT! Before starting up the unit, prime the traps in the condensate lines with water.

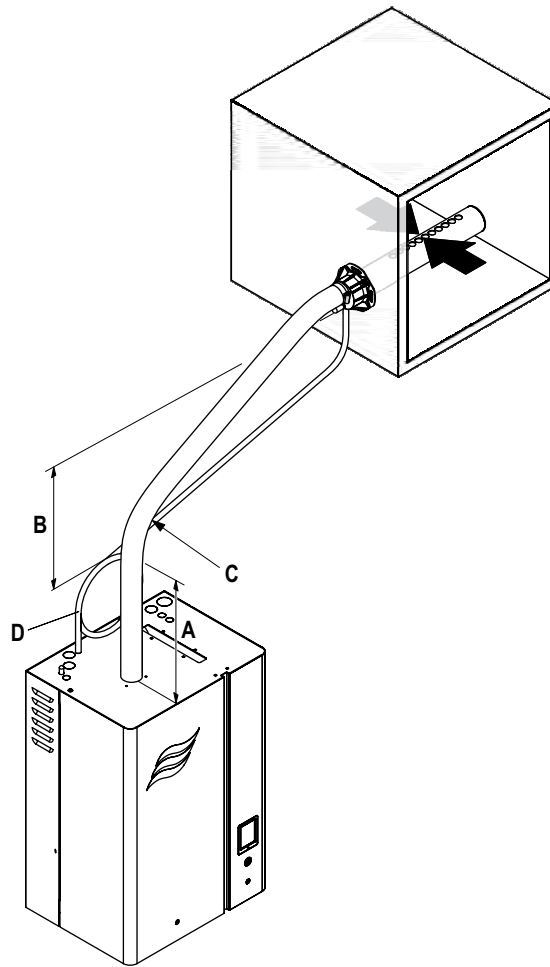


Figure 16: Installation Example – Steam Distributor 20 in (500 mm) Above Humidifier

- A Steam line must run minimum 12 in (300 mm) vertically before continuing on to the steam distributor.
- B All condensate traps must be minimum 12 in (300 mm) below the condensate outlet on the steam distributor, and condensate lines must have a constant minimum downslope of 1 in/48 in (1.2°).
- C The steam line must not exceed the length specified in [Table 6 on page 28](#). The minimum bend radius is 12 in (300 mm) for a steam hose, or 5× the internal diameter for rigid steam pipes.
- D All condensate traps must have a minimum height of 8 in (200 mm).

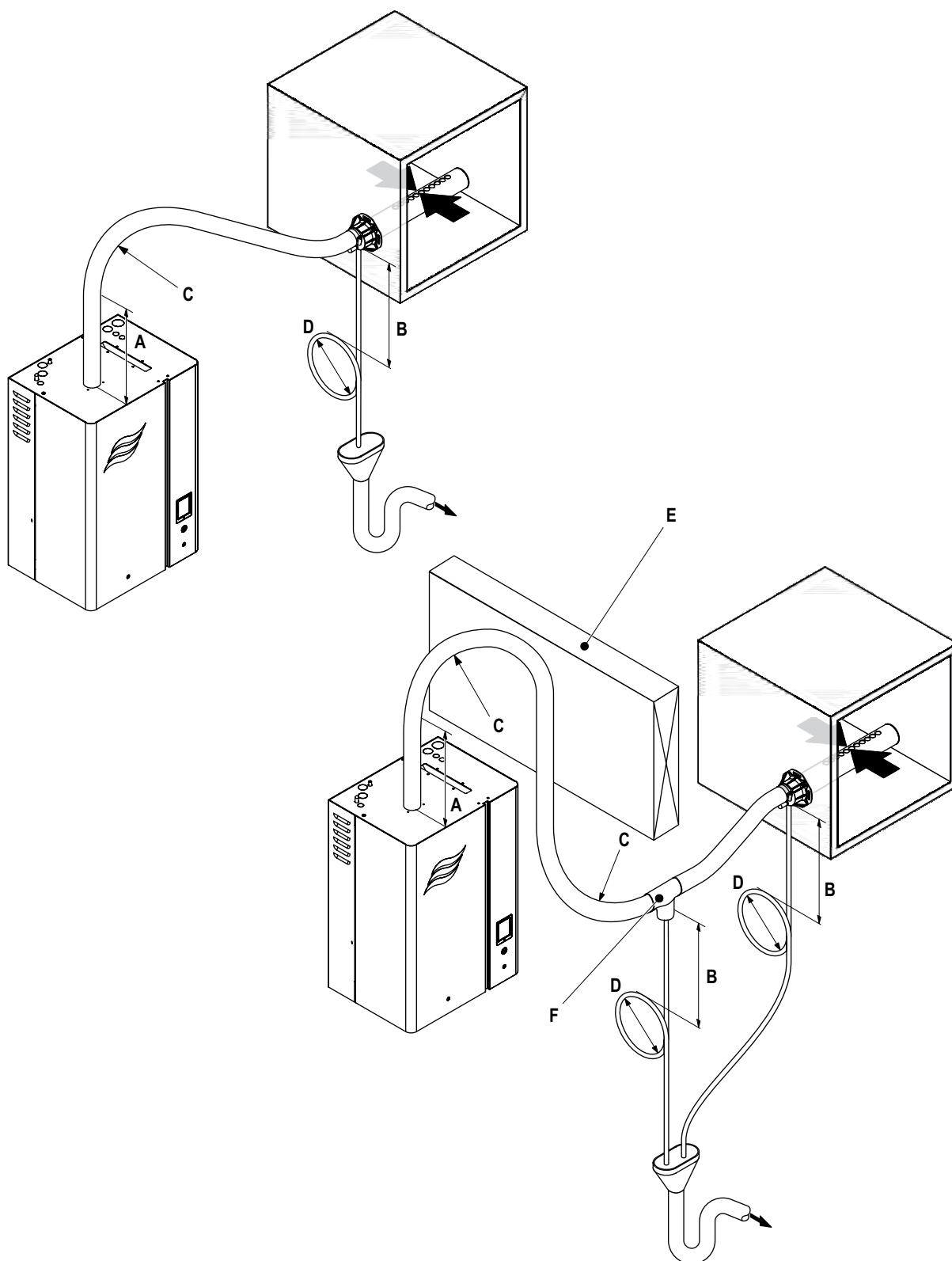


Figure 17: Installation Example – Steam Distributor Less Than 20 in (500 mm) Above Humidifier

- A Steam line must run minimum 12 in (300 mm) vertically before continuing on to the steam distributor.
- B All condensate traps must be minimum 12 in (300 mm) below the condensate outlet on the steam distributor or the steam line.
- C The steam line must not exceed the length specified in [Table 6 on page 28](#). The minimum bend radius is 12 in (300 mm) for a steam hose, or 5× the internal diameter for rigid steam pipes.
- D All condensate traps must have a minimum height of 8 in (200 mm).
- E Obstacle
- F Condensate line must connect into a full-size "T" connector installed at the lowest point in the steam line.

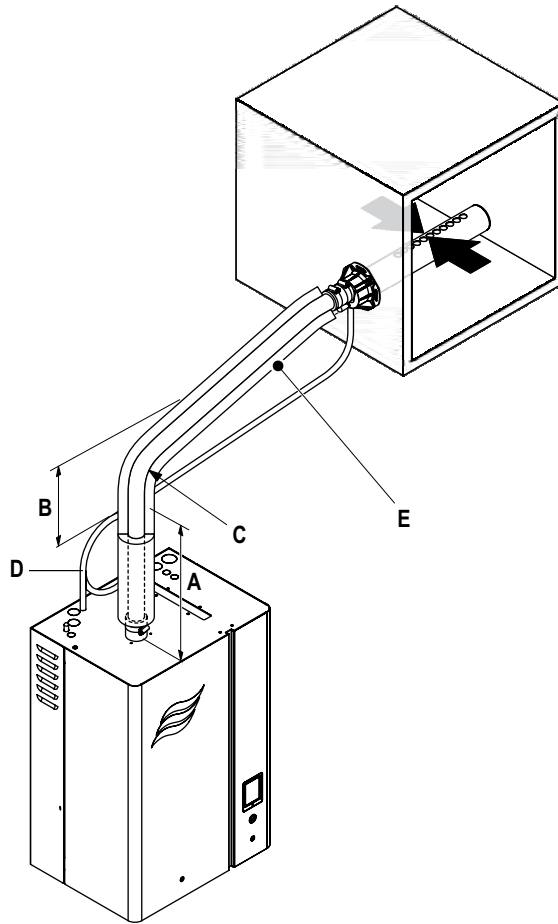


Figure 18: Installation Example – Rigid Steam Pipe With Insulation

- A Steam line must run minimum 12 in (300 mm) vertically before continuing on to the steam distributor.
- B All condensate traps must be minimum 12 in (300 mm) below the condensate outlet on the steam distributor, and condensate lines must have a constant minimum downslope of 1 in/48 in (1.2°).
- C The steam line must not exceed the length specified in [Table 6 on page 28](#). The minimum bend radius is 12 in (300 mm) for a steam hose, or 5× the internal diameter for rigid steam pipes.
- D All condensate traps must have a minimum height of 8 in (200 mm).
- E Steam line must have a minimum of 1 in (25 mm) of pipe insulation over its entire length.

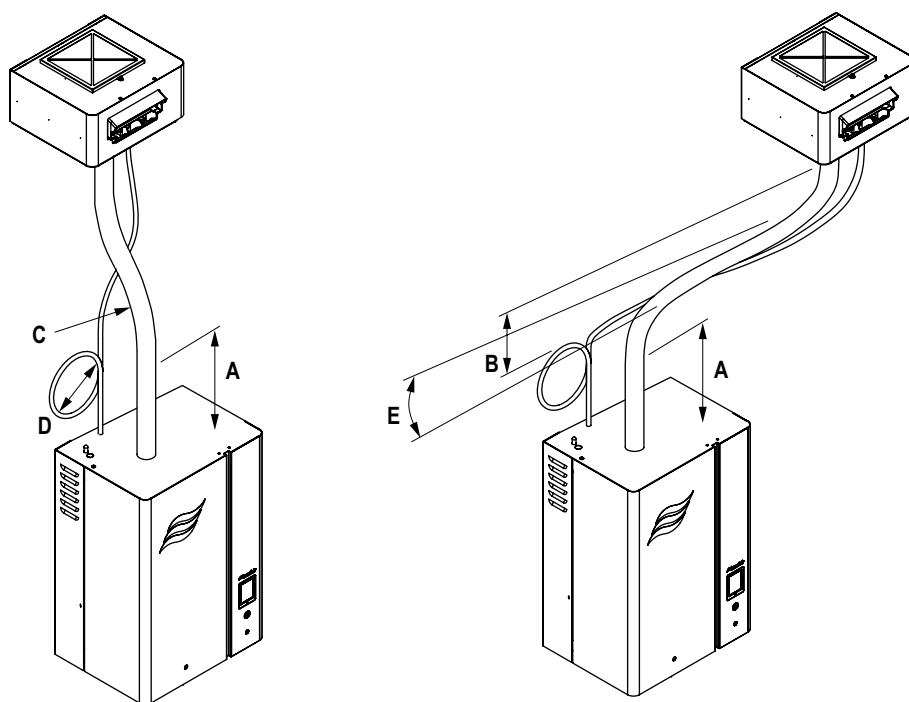


Figure 19: Installation Example – Remote-Mounted Blower Pack

- A Steam line must run minimum 12 in (300 mm) vertically before continuing on to the blower pack.
- B All condensate traps must be minimum 12 in (300 mm) below the condensate outlet on the blower pack.
- C The steam line must not exceed the length specified in [Table 6 on page 28](#). The minimum bend radius is 12 in (300 mm) for a steam hose, or 5× the internal diameter for rigid steam pipes.
- D All condensate traps must have a minimum height of 8 in (200 mm).
- E Steam line must have upslope (minimum 10°) /downslope (minimum 2°), and condensate line must constant minimum downslope of 1 in/48 in (1.2°).

5.5.3.1 Common Steam and Condensate Line Installation Mistakes

Some common steam and condensate line installation mistakes are shown in [Figure 20](#).

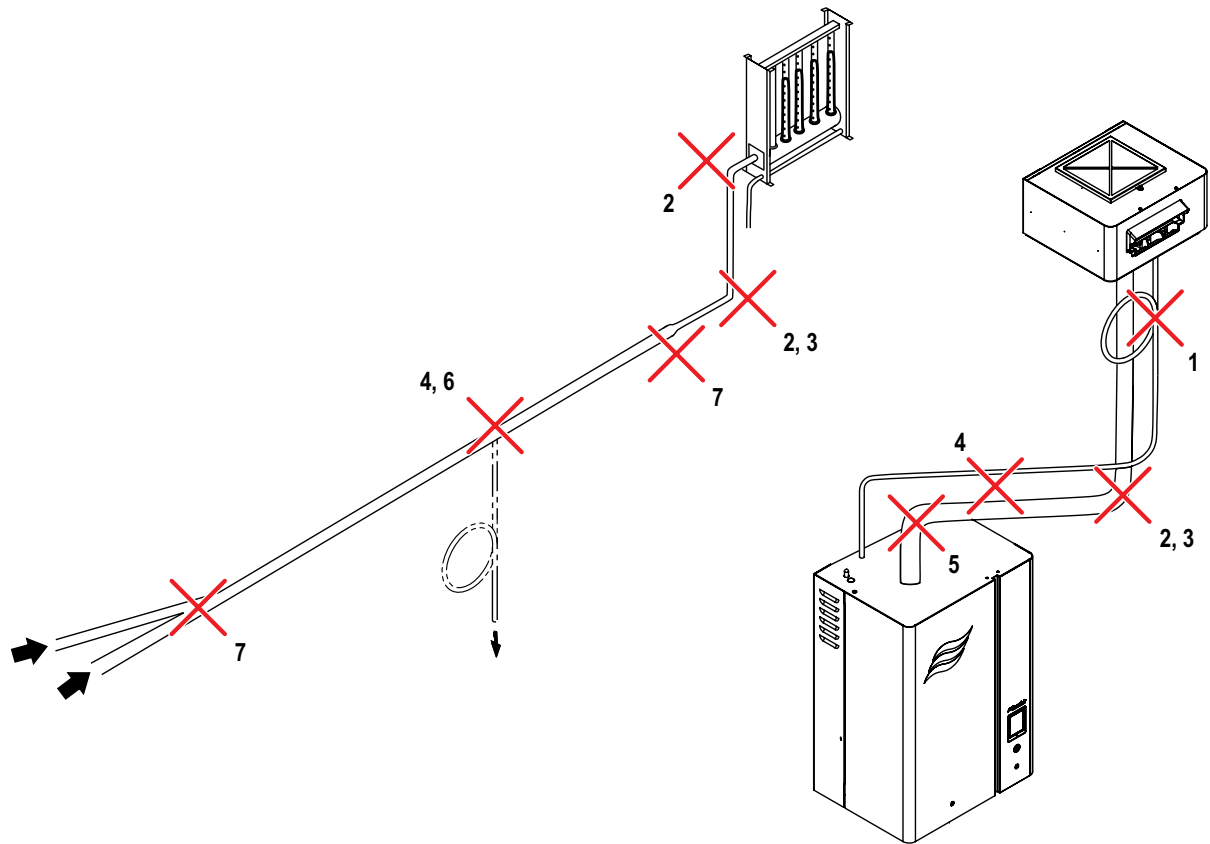


Figure 20: Common Steam and Condensate Line Installation Mistakes

- 1 The condensate trap is located less than the required minimum 12 in (300 mm) below the steam distributor.
- 2 The minimum bend radius of 12 in (300 mm) for the steam hose (or 5× the internal diameter for rigid pipes) is not maintained.
- 3 No condensate trap is installed at the vertical transition.
- 4 The minimum slope for steam and condensate lines is not maintained.
- 5 The steam line does not run straight up for the required minimum 12 in (300 mm) before continuing on to the steam distributor.
- 6 On long steam line runs, condensate traps are required every 15 ft (4.5 m), and must connect into full-size "T" connectors in the steam line. A condensate trap must also be installed a minimum of 12 in (300 mm) below the steam line.
- 7 Steam lines must not merge or reduce in diameter except at the steam distributor (only through a Nortec adaptor), and must have a condensate line just before the restriction.

5.5.4 Steam Connections Checklist

Check the following to ensure that the steam connections for the humidifier have been installed correctly:

Steam Line

- ☐ Observed all best practices?
- ☐ Steam line exceed maximum length specified in [Table 6 on page 28](#)?
- ☐ Minimum bend radius of 12 in (300 mm) for steam hose, or 5× internal diameter for rigid pipes maintained?
- ☐ Steam line sized correctly?
- ☐ Backpressure in the line combined with duct static pressure exceed 5.5 in H₂O (1.37 kPa), or 10 in H₂O (2.49 kPa) with the optional Fill Cup Extension?
- ☐ Steam lines run straight up from the humidifier steam outlet for at least 12 in (300 mm) before bend?
- ☐ Steam line have a constant minimum upslope of 2 in/12 in (10°), or a constant minimum downslope of 1/2 in/12 in (2°)?
- ☐ Steam lines do not reduce in diameter except, if required, at the steam distributor, and condensate line installed just before the restriction?
- ☐ Steam lines do not merge except at the steam distributor through a Nortec adaptor?
- ☐ Steam line does not sag or kink? Supported adequately? Any low points in line without condensate trap?
- ☐ If a steam hose is used, is it attached securely with clamps? Clamps secure without crushing steam line?
- ☐ Allowances for thermal expansion during operation, and shortening of the hose due to aging taken into consideration?

Condensate Line

- ☐ Local codes on drain water temperature requirements have been satisfied?
- ☐ Condensate line from the steam distributor condensate port connected to the humidifier fill cup port, or the drain?
- ☐ Condensate lines installed at all low points, and at vertical transitions in the steam line?
- ☐ Condensate lines in the steam line always connect to full-size "T" connectors?
- ☐ Condensate traps have a minimum loop height of 8 in (200 mm) and installed at least 12 in (300 mm) below the "T" connector or steam distributor?
- ☐ All condensate lines have a constant minimum downslope of 1 in/48 in (1.2°)?
- ☐ Maximum distance between the condensate traps on long runs is 15 ft (4.5 m)?
- ☐ Condensate traps primed with water?

5.6 Water Connections

Refer to "[Site Requirements](#)" on page 15 for the water supply and drain requirements.

Read "[Water Connection Requirements](#)" on page 38, and perform the water connections as shown in [Figure 21](#) on page 36 and [Figure 22](#) on page 37.

5.6.1 Water Connections Overview

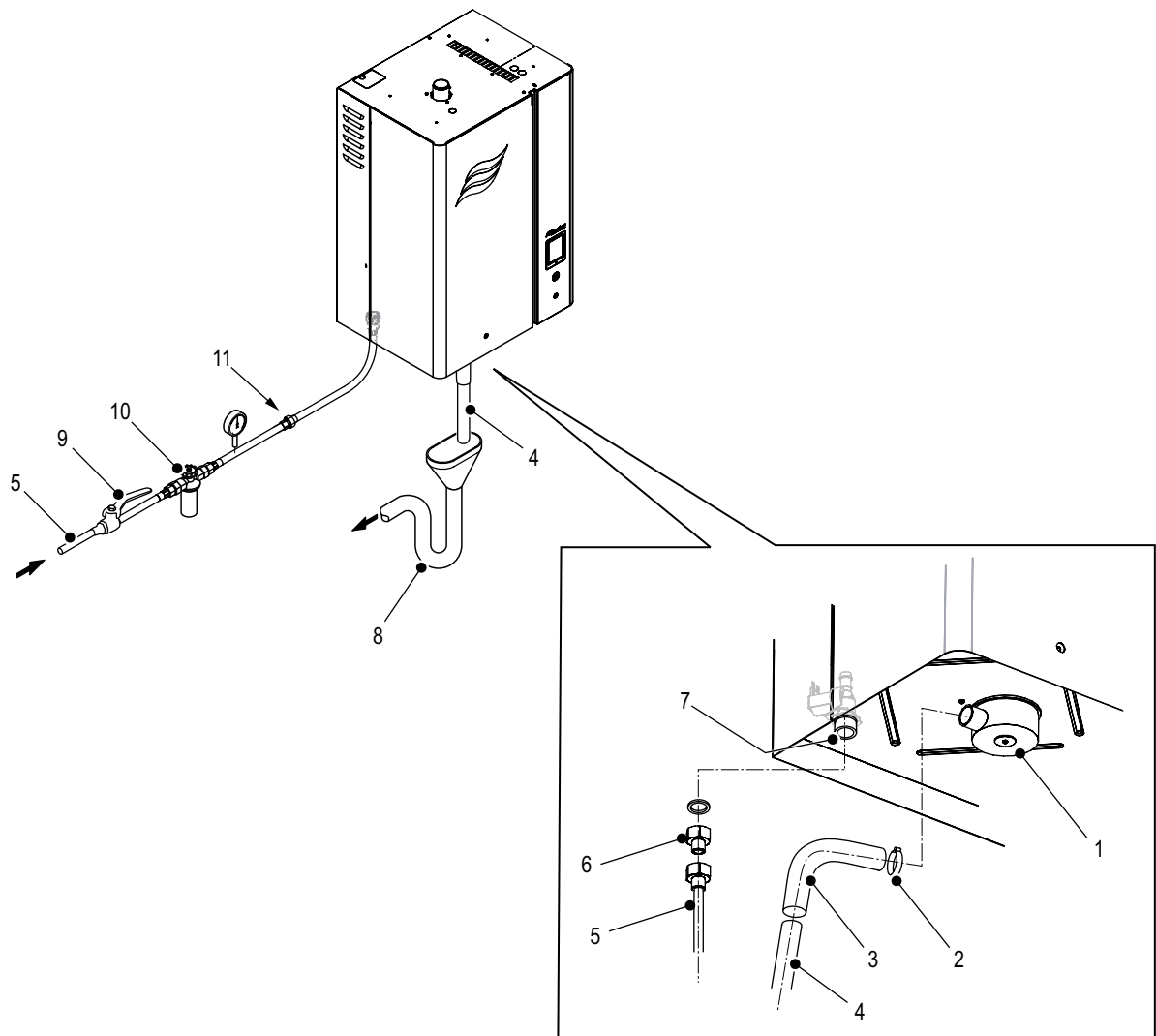


Figure 21: Water Supply and Drain Connections, Small and Medium Units

- 1 Drain canal (outlet un-threaded), 1-3/16 in (30 mm) O.D.
- 2 Hose clamp (supplied)
- 3 Flexible bent hose (supplied)
- 4 Drain line, minimum 7/8 in (22 mm) I.D. (not supplied)
- 5 Water supply line, minimum 1/2 in (13 mm) (not supplied)
- 6 Adaptor, 3/4 BSPP to 1/2 in NPT (supplied)
- 7 Fill valve (3/4 in BSPP plastic threads)
- 8 Air gap and optional trap (not supplied)
- 9 Shutoff valve (not supplied)
- 10 Filter, 5 μ m (optional, but recommended)
- 11 Union fitting (not supplied)

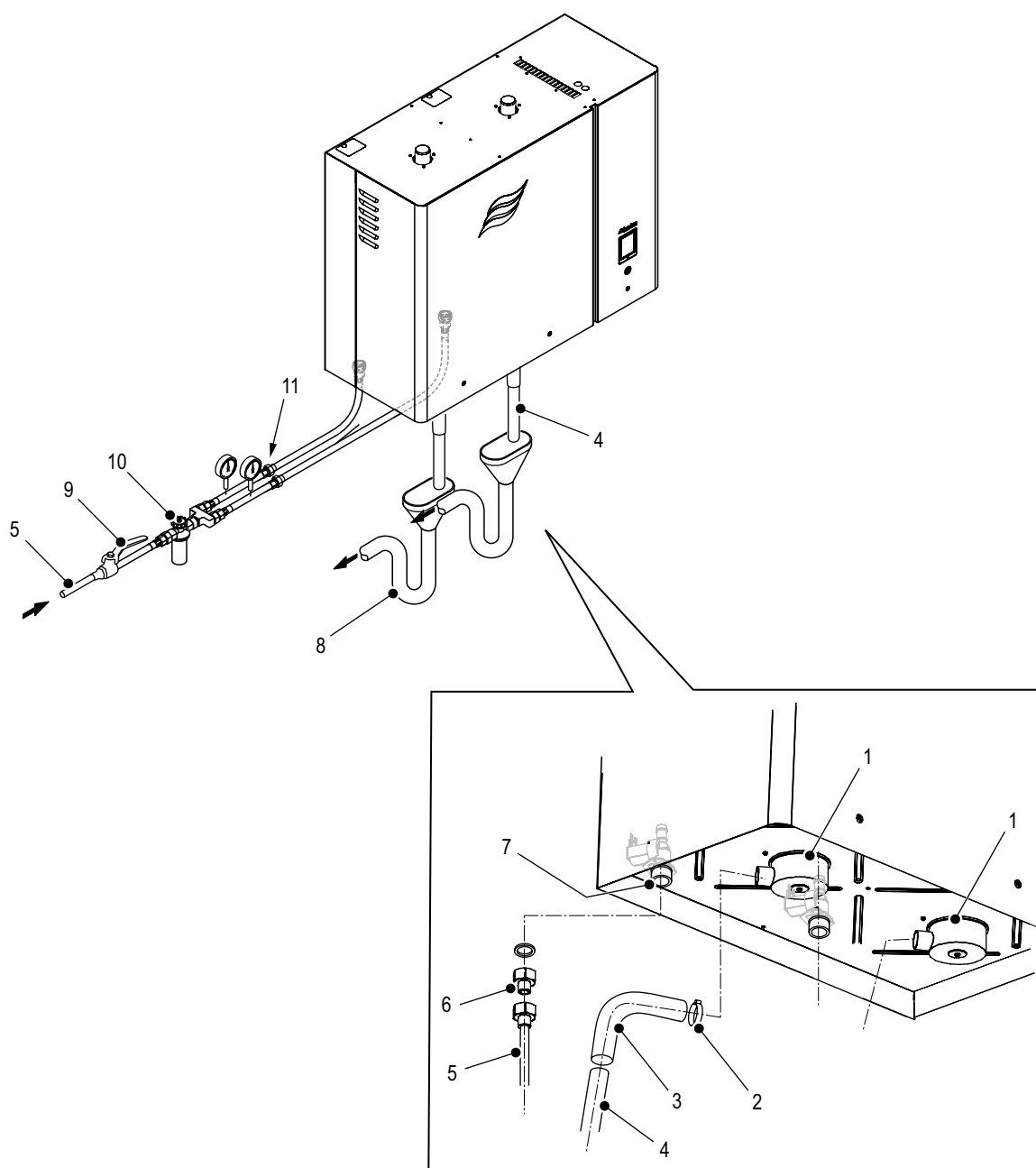


Figure 22: Water Supply and Drain Connections, Large Units

- 1 Drain canal (outlet un-threaded), 1-3/16 in (30 mm) O.D.
- 2 Hose clamp (supplied)
- 3 Flexible bent hose (supplied)
- 4 Drain line, minimum 7/8 in (22 mm) I.D. (not supplied)
- 5 Water supply line, minimum 1/2 in (13 mm) (not supplied)
- 6 Adaptor, 3/4 BSPP to 1/2 in NPT (supplied)
- 7 Fill valve (3/4 in BSPP plastic threads)
- 8 Air gap and optional trap (not supplied)
- 9 Shutoff valve (not supplied)
- 10 Filter, 5 μ m (optional, but recommended)
- 11 Union fitting (not supplied)

5.6.2 Water Connection Requirements

Water and drain connections must meet the following requirements:

- All water supply and drain connections are to be installed to local plumbing codes.
- For ease of maintenance, a water shutoff valve and union fitting must be installed in the supply line before the humidifier.
- The water supply piping should have a minimum diameter of 1/2 in (13 mm), with a 1/2 in NPT female end. The piping material should be made of copper, stainless steel or plastic certified for drinking water systems.



CAUTION!

Risk of damage to the plastic threads!

The threads on the fill valve are made of plastic.

Prevention: Hand-tighten the NPT adaptor to the fill valve.

- The (optional but recommended) water filter must be installed as close as possible to the humidifier.
- The air gap funnel should have a minimum diameter of 2-1/2 in (64 mm).
- The air gap and optional trap should be located away from the control cabinet to keep any rising steam from damaging the electrical components in the cabinet.
- The drain piping should have a minimum internal diameter of 7/8 in (22 mm).
- The flexible bent hose exiting the humidifier should be connected to a drain line with a minimum internal diameter of 7/8 in (22 mm) and secured with clamps.
- The drain line should be as short as possible, and have a constant minimum downslope of 1 in/48 in (1.2°) to the funnel without touching its sides or bottom. Use stainless steel or copper pipe to handle temperatures up to 212°F (100°C).
- Drain lines from large humidifiers with dual steam cylinders must empty into separate open air gap funnels before connecting to the drain. Combined drain line minimum 1.5 in (38 mm) ID.
- Upon completion of installation, flush the water supply and drain lines to clear out any debris in the lines. Check the strainer in the fill valve to ensure it is clear of all debris.

5.6.3 Water Connections Checklist

Check the following to ensure that the water connections for the humidifier have been installed correctly:

- ☐ Shutoff valve and union fitting installed in supply line?
- ☐ Water supply piping minimum 1/2 in (13 mm) diameter, and made of copper, stainless steel or plastic certified for drinking water systems?
- ☐ Optional 5 µm water filter installed in the supply line close to the humidifier?
- ☐ Water supply temperature 34-104°F (1-40°C)?
- ☐ Water supply surge-free and pressure regulated to 30-80 psig (207-550 kPa)?
- ☐ Leak-free water supply line?
- ☐ Air gap funnel has a minimum diameter of 2-1/2 in (64 mm)?
- ☐ Air gap funnel and any other drain located away from the control cabinet in the humidifier?
- ☐ Drain lines have a minimum internal diameter of 7/8 in (22 mm)?
- ☐ Drain line have a constant minimum downslope of 1 in/48 in (1.2°) to funnel without touching its sides or bottom?
- ☐ Drain lines from large humidifiers with dual steam cylinders empty into separate open air gap funnels before connecting to the drain? Combined drain line minimum 1.5 in (38 mm) ID?
- ☐ All debris flushed from supply and drain lines?

5.7 Humidity Control Systems

5.7.1 Control Device Locations

The following schematic describes a potential system setup with respect to control devices. Refer to [Figure 23](#).

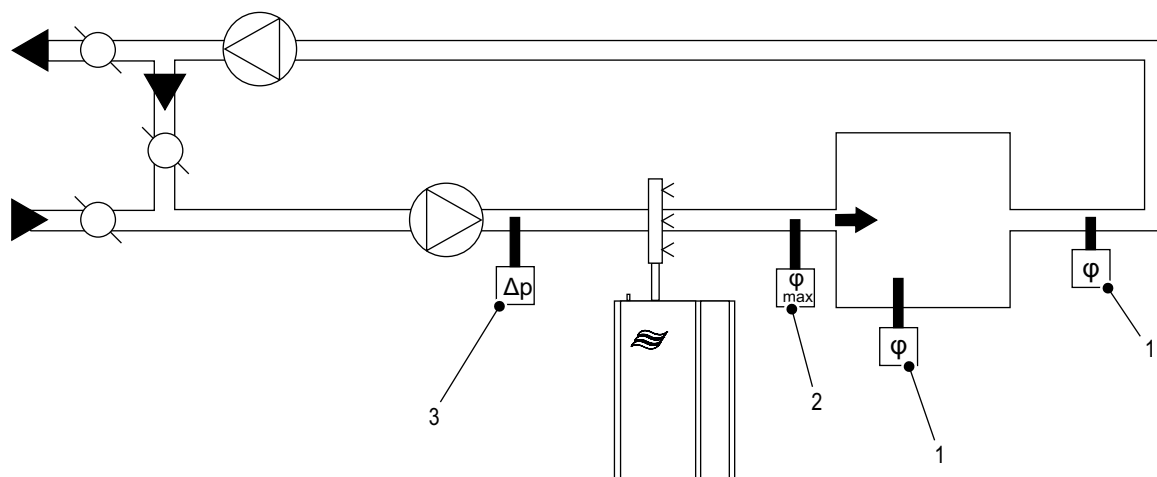


Figure 23: System Setup Schematic

- 1 On/Off humidistat, modulating humidistat, or humidity sensor
- 2 On/Off high limit humidistat, modulating humidistat, or humidity sensor
- 3 Air proving switch

Notes:

- Humidity sensors and humidistats (1) can be modulating or On/Off. Preferred location is in the return duct, as the supply air is well mixed with the room air at this location. Avoid placing near discharge diffuser, near doorways, in sunlight, or in airflow “dead-zones”.
- Locate the high limit humidistat or humidity sensor (2) downstream of the humidifier’s distributor so that it can sense a duct that is over-humidified. Recommended setting is 85% RH. Locate it downstream of the distributor – at least 5x the absorption distance away. If the absorption distance is not known, locate it at least 10 feet (3 m) downstream from the distributor. Can be a humidistat (modulating or On/Off), or a humidity sensor.
- Locate the air proving switch (3) in the same duct as the humidifier’s distributor so that it can sense air flow (or lack thereof).

5.7.2 Permissible Control Signal Inputs

[Table 8](#) shows the different permissible control signal inputs the Nortec EL steam humidifier can handle.

Table 8: Permissible Control Signal Inputs

Humidity Control with External Controller Control Signals	Humidity Control with Internal PI Controller Humidity Sensor Signals	Digital Inputs (via Modbus, BACnet IP/MSTP slave)
0-5 VDC (potentiometer 135-10kΩ) 1-5 VDC 0-10 VDC 2-10 VDC 0-20 VDC 0-16 VDC 3.2-16 VDC 0-20 mA 4-20 mA	0-5 VDC (potentiometer 135-10kΩ) 1-5 VDC 0-10 VDC 2-10 VDC 0-20 VDC 0-16 VDC 3.2-16 VDC 0-20 mA 4-20 mA	Standard BACnet IP, BACnet MSTP (slave), Modbus Optional BACnet IP (BTL), BACnet MSTP (Master, BTL), Lonworks
Humidistat (24 V On/Off)		

5.8 Electrical Connections

Refer to the specification label in [Figure 3 on page 9](#) for the electrical requirements.

Install the electrical connections according to the wiring diagram(s) ([Figure 24 on page 41](#), and [Figure 25 on page 43](#), as applicable) and the instructions for ["External Connections" on page 44](#).

For connecting multiple Nortec EL humidifiers, refer to ["Connecting Multiple Units Using Linkup" on page 54](#).

5.8.1 General

Safety

The electrical installation work requires removal of the door panels in the humidifier. Observe the following safety precautions:



DANGER!
Risk of electric shock!

The Nortec humidifier is mains powered. Live parts may be exposed when the door panels are open. Touching live parts may cause severe injury or even death.

Prevention: The Nortec humidifier must be connected to the mains only after all installation work has been completed, checked for correct workmanship, and the door panels are closed and fastened securely.



CAUTION!
Electrostatic discharge (ESD)!

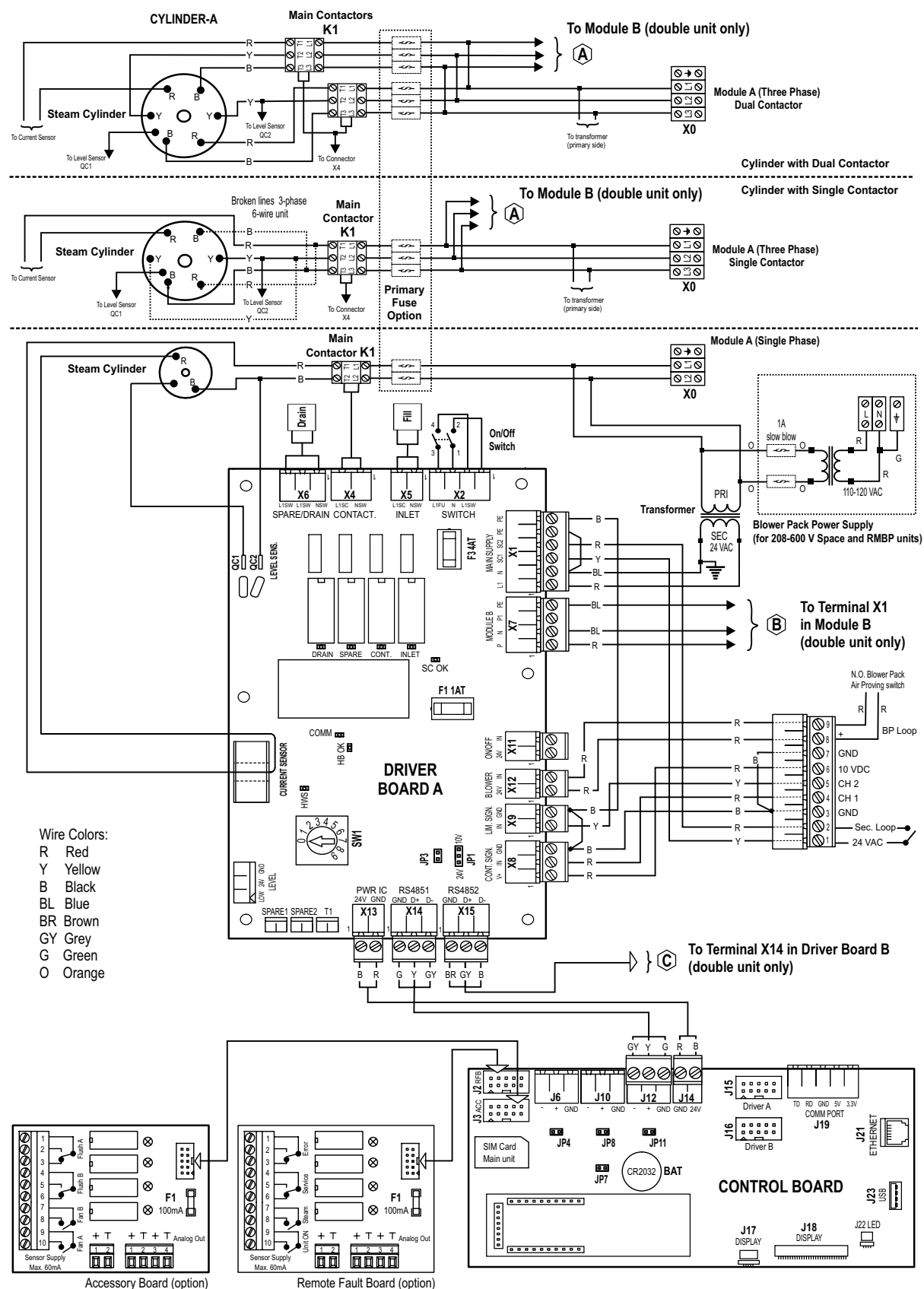
The electronic components inside the humidifier are sensitive to electrostatic discharge (ESD).

Prevention: Take appropriate measures to protect the electronic components inside the unit against damage caused by electrostatic discharge (ESD). Refer to ANSI/ESD-S20.20.

- All electrical installation work must be performed only by a licensed electrician authorized by the customer. It is the customer's responsibility to verify qualifications of the personnel.
- The electrical installation must be performed according to the wiring diagrams in this manual, the instructions in this section, as well as applicable national and local codes.
- All cables must lead into the unit, via appropriate cable glands or grommets, and be properly supported.
- Make sure the cables are secured, and do not rub on any components or become a tripping hazard.
- Observe national and local codes for maximum cable length and required wire sizes for cables.

5.8.2 Wiring Diagrams

5.8.2.1 Nortec EL Steam Humidifier, Steam Cylinder A



Legend:

- F1 Internal fuse, driver board (1A, slow-acting)
- F3 Internal fuse, driver board (4A, slow-acting)
- JP4 Jumper for activating the termination resistor for Modbus or BACnet MSTP network.
- J6 Modbus connector (RS485 interface)
- JP7 Jumper for activating Modbus or BACnet MSTP communication via connector J6.
- JP8 Termination, Linkup system
- J10 Linkup connector
- K1 Main contactor, supply voltage
- LV Low voltage terminal strip A
- SW1 Rotary switch, module identification (Module A: 0)
- X0 Terminal block, supply voltage

5.8.2.2 Nortec EL Steam Humidifier, Steam Cylinder B (Large Units Only)

Figure 25 shows the wiring diagram for large humidifiers with a second steam cylinder (usually referred to as Cylinder B).

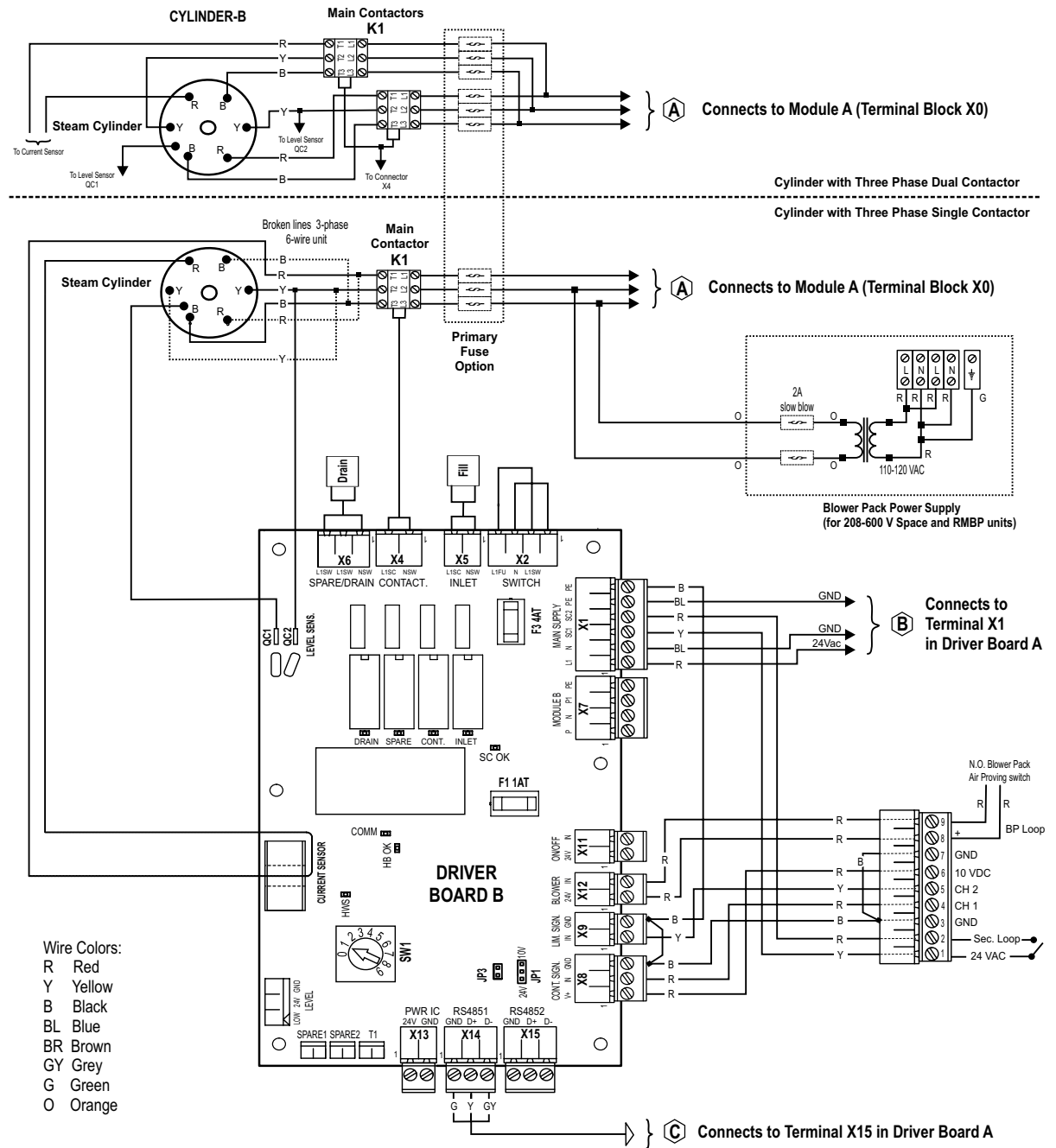


Figure 25: Wiring Diagram - Nortec EL Humidifier, Steam Cylinder B (Module B)

- F1 Internal fuse, driver board (1A, slow-acting)
- F3 Internal fuse, driver board (4A, slow-acting)
- K1 Main contactor, supply voltage
- LV Low voltage terminal strip B
- SW1 Rotary switch, module identification (Module B: 1)

5.8.3 External Connections

The different external connections to the Nortec EL steam humidifier are discussed below.

5.8.3.1 3-Phase Power Supply Connection

[Figure 26](#) shows the 3-phase power supply connections for the Nortec EL steam humidifier.

IMPORTANT! The optional internal fuse is not a substitute for an external fuse. A dedicated external fused disconnect switch must be installed, and the fuse rating must not exceed the maximum circuit protection indicated on the specification label – refer to [Figure 3 on page 9](#).

All wiring must be in accordance with national and local electrical codes.

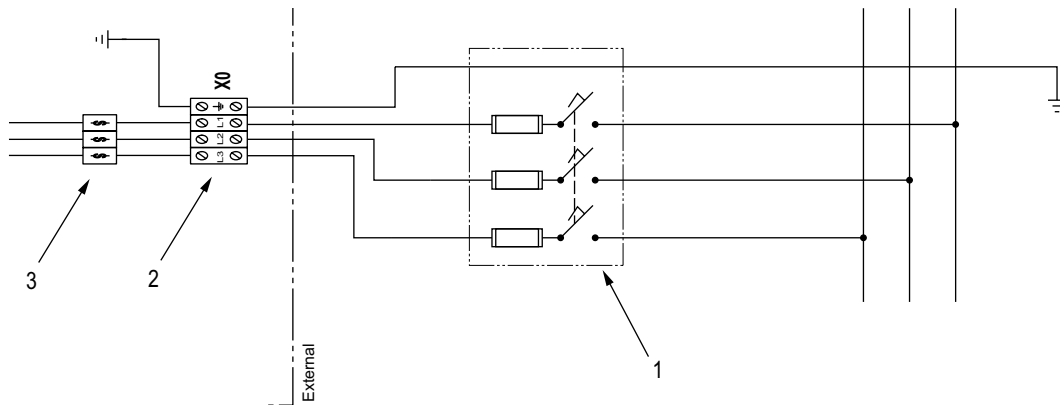


Figure 26: 3-Phase Power Supply Connections

- 1 External fused disconnect switch
- 2 Terminal block, power supply (X0)
- 3 Optional internal primary fuse

5.8.3.2 Single-Phase Power Supply Connection

Figure 27 shows the single-phase power supply connections for the Nortec EL steam humidifier.

IMPORTANT! The optional internal fuse is not a substitute for an external fuse. A dedicated external fused disconnect switch must be installed, and the fuse rating must not exceed the maximum circuit protection indicated on the specification label – refer to [Figure 3 on page 9](#).

All wiring must be in accordance with national and local electrical codes.

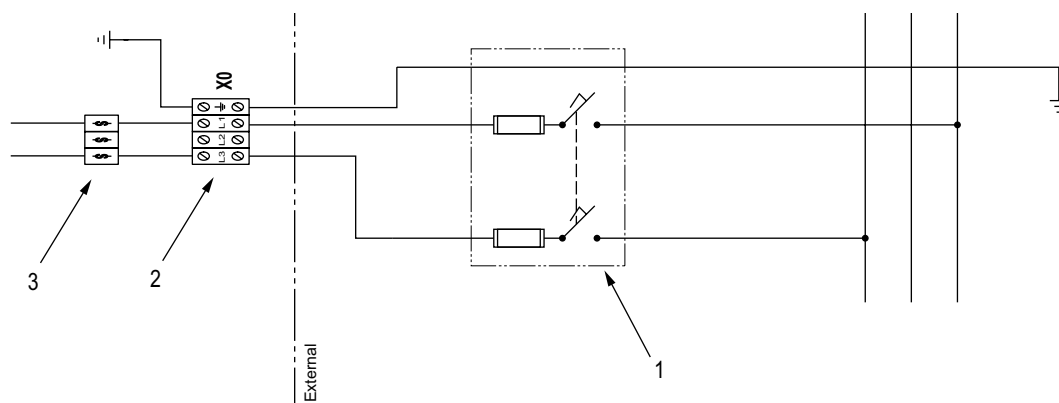


Figure 27: Single-Phase Power Supply Connections

- 1 External fused disconnect switch
- 2 Terminal block, power supply (X0)
- 3 Optional internal primary fuse

5.8.3.3 External Safety Chain

The external safety chain consists of potential-free contacts of the external monitoring devices (for example, high limit humidistat, air proving switch, etc.) which are connected in series to terminal points "1" and "2" on the low voltage terminal strip. Refer to [Figure 24 on page 41](#) and [Figure 28](#).

If the blower pack is installed, then connect it to terminal points "8" and "9" on the low voltage terminal strip. Make sure that no other wires are connected to these terminal points. If using multiple blower packs, make sure that they are connected in series.

Note: Interrupting the external safety chain disconnects power from the contactor and fill valve, and is intended as a safety precaution. To control the humidifier with an on/off humidistat refer to ["External On/Off Input" on page 49](#) for details.

IMPORTANT! Install a jumper between terminal points "8" and "9" on the low voltage terminal strip if the blower pack is not used.

IMPORTANT! A high limit humidistat is highly recommended to prevent over-humidification and potential damage to property.

IMPORTANT! Install a jumper between terminal points "1" and "2" on the low voltage terminal strip if no external On/Off devices are connected to the safety chain – not recommended.

The connecting cables must lead into the control cabinet through a cable gland or grommet.



CAUTION!
Risk of damage to internal components!

Prevention: DO NOT apply voltage to low voltage terminal strip terminal points "1" and "2" through the contacts of the external On/Off devices.

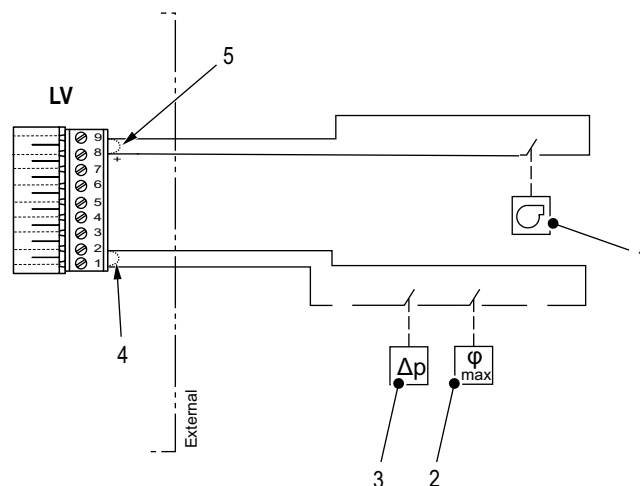


Figure 28: External Safety Chain Connections

- 1 Blower pack
- 2 High limit humidistat – highly recommended
- 3 Air proving switch
- 4 Jumper (installed if no devices connected to safety chain – not recommended)
- 5 Jumper (installed if the blower pack is not used)

5.8.3.4 Modulating Demand or Humidity Signal

Connect an external humidity sensor input or direct demand modulating input to terminal points "3" and "4" in the low voltage terminal strip. Refer to [Figure 24 on page 41](#) and [Figure 29](#). The permissible control signal input values are shown in [Table 8 on page 39](#).

Do not connect multiple modulating signals to the same modulating input on the humidifier. If necessary, a second modulating signal can be connected to terminal point "5" and "3", using terminal point "3" as common. Make sure that Control Channels is set to "Dual" in the control software to utilize the second modulating signal – refer to the Operation and Maintenance Manual.

Alternately, transducer signals or demand signals can be written to the humidifier via a valid digital communication protocol. Set Source to "Modbus", "BACnet IP", "BACnet MSTP" or "Lonworks".

The signal cable must lead into the control cabinet through a cable gland or grommet. If a shielded signal cable is used, connect the shielding to terminal point "3".



CAUTION!

If the shielding of the signal is already connected to a potential or a grounded conductor, do not connect it to terminal point "3".

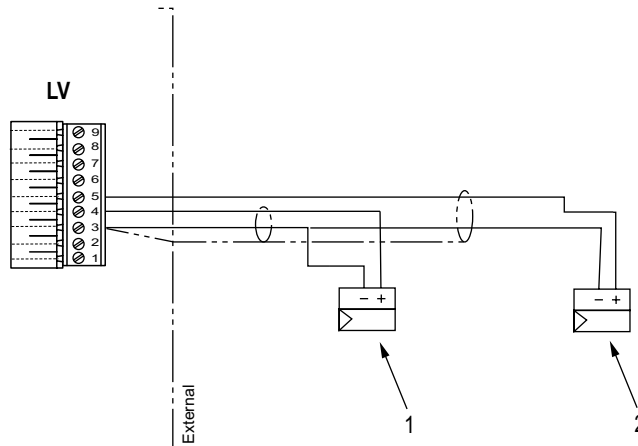


Figure 29: Modulating Demand or Humidity Signal Connection

- 1 Modulating demand or humidity sensor signal
- 2 Modulating demand or humidity sensor signal (additional)

5.8.3.5 Ohmic Humidity Controller (Passive)

If a passive 135-10k Ω ohmic humidity controller is used, connect the signal cable to the terminal points 3", "4" and "6" in the low voltage terminal strip. Refer to [Figure 24 on page 41](#) and [Figure 30](#). The permissible control signal input values are shown in [Table 8 on page 39](#).

The signal cable must lead into the control cabinet through a cable gland or grommet.

IMPORTANT! When connecting an ohmic humidity controller, jumper JP1 on the driver board must be set to 10V (so that output of terminal point "6" is 10V), and Signal Type must be set to "0-10V" in the control software. Refer to the Operation and Maintenance Manual.

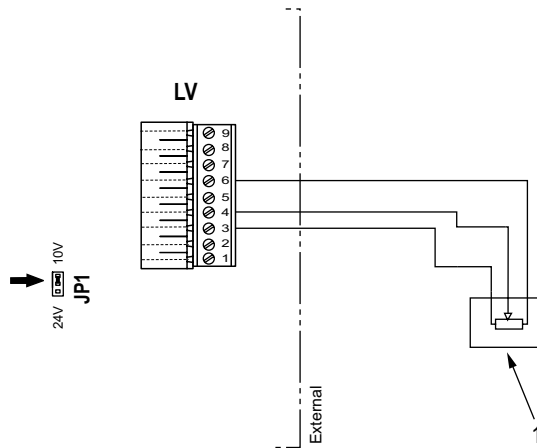


Figure 30: Ohmic Humidity Controller Connection

- 1 Ohmic humidity controller, 135-10k Ω

5.8.3.6 24V On/Off Humidistat

If a 24V On/Off humidistat is used, connect the signal cable to the terminal points "4" and "6" in the low voltage terminal strip. Refer to [Figure 24 on page 41](#) and [Figure 31](#).

The signal cable must lead into the control cabinet through a cable gland or grommet.

IMPORTANT! When connecting a 24V On/Off humidistat, jumper JP1 on the driver board must be set to 24V (so that terminal point "6" will output 24VDC), and Control Mode must be set to "On/Off" in the control software. Refer to the Operation and Maintenance Manual.

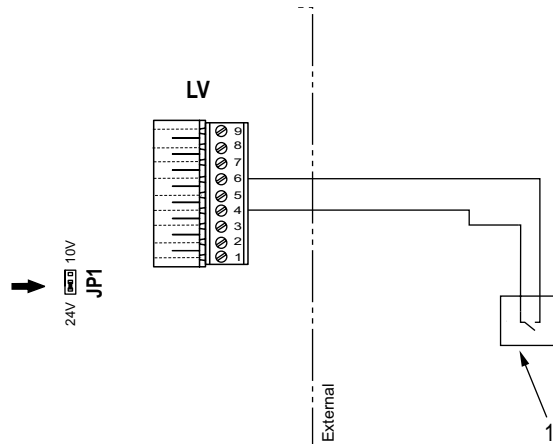


Figure 31: 24V On/Off Humidistat Connection

1 24V On/Off humidistat

5.8.3.7 External On/Off Input

The humidifier can also be controlled by an external On/Off input through connector X11 on the driver board – refer to [Figure 24 on page 41](#).

The signal cable must lead into the control cabinet through a cable gland or grommet

Enable Input must be set to "On" in the control software to use this input signal – refer to the Operation and Maintenance Manual.

5.8.3.8 Dual Steam Cylinders Control Wiring

The dual steam cylinders in the large model Nortec EL steam humidifier can be configured to operate in series, in parallel, or independently – by setting Dual Cylinder Mode in the controls software. Refer to the Operation and Maintenance Manual.

In series or parallel mode, all the control signals are wired to low voltage terminal strip A. Connections are made to terminal strip A in the same way as for a single cylinder unit. In addition, a jumper wire must be installed between the terminal points "2" in the low voltage terminal strips A and B. Refer to [Figure 32](#).

The independent mode is used to control humidity in two separate zones, each with its own separate set of control signals. Connections are made as shown for single cylinder units but with independent connections to each terminal strip. All the control signals from Zone A are connected to low voltage terminal strip A, and signals from Zone B are connected to low voltage terminal strip B. Refer to [Figure 33](#).

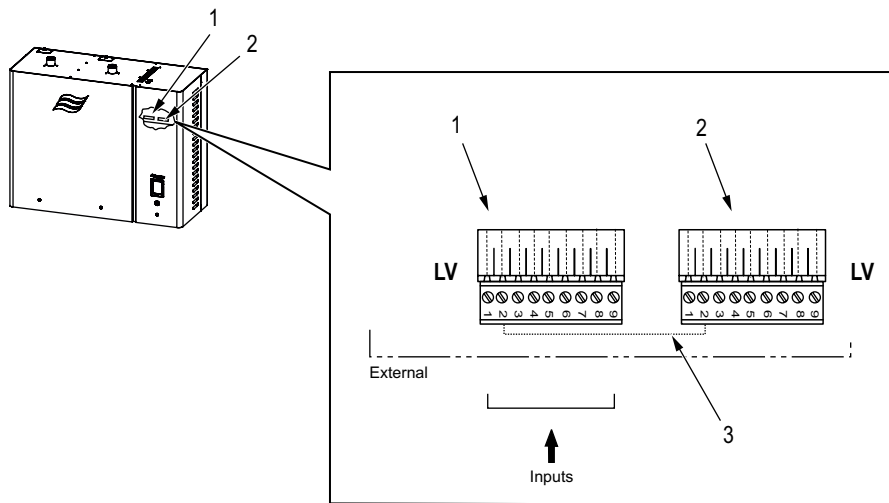


Figure 32: Dual Steam Cylinders Control Wiring, Series/Parallel Mode

- 1 Low voltage terminal strip A
- 2 Low voltage terminal strip B
- 3 Jumper wire (for parallel or series mode only)

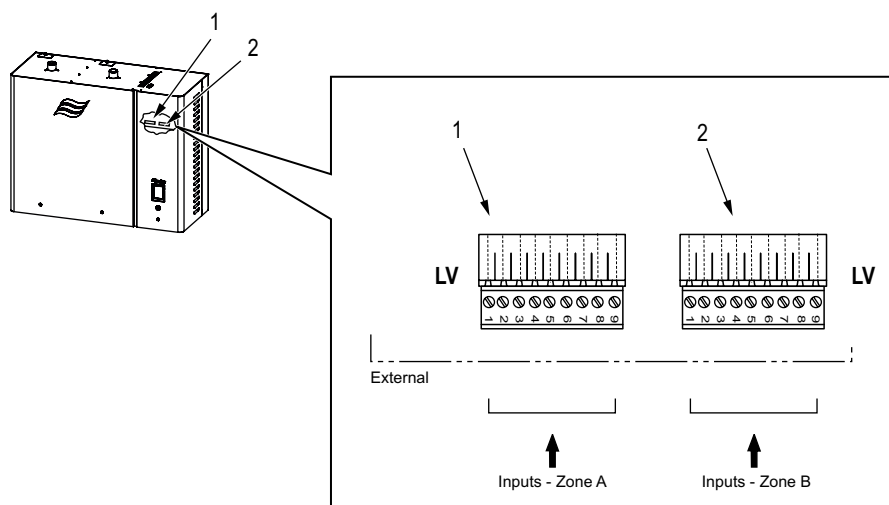


Figure 33: Dual Steam Cylinders Control Wiring, Independent Mode

- 1 Low voltage terminal strip A, Zone A
- 2 Low voltage terminal strip B, Zone B

5.8.3.9 Remote Relay PCB Connections

The optional remote relay PCB (printed circuit board) on the Nortec EL steam humidifier has the following four potential-free relay contacts for remote display of humidifier status and fault conditions. Refer to [Figure 34](#) for the relevant terminal contacts.

- Error – this relay can be wired to open (NC) or close (NO) when a fault is detected by the humidifier controls.
- Service – this relay is activated when the set maintenance interval elapses. It can be wired to open (NC) or close (NO) when a service warning appears on the touchscreen panel of the humidifier and the status LED turns yellow in color.

Note: The way this relay handles system warnings (all warnings or service warnings only) can be configured in the control software – refer to the Remote Fault Board tab in the Operation and Maintenance Manual.

- Steam – this normally open (NO) relay closes when the control board detects a current draw and production of steam.
- Unit on – this normally open (NO) relay closes when the humidifier has power, and the On/Off switch is in the On position.

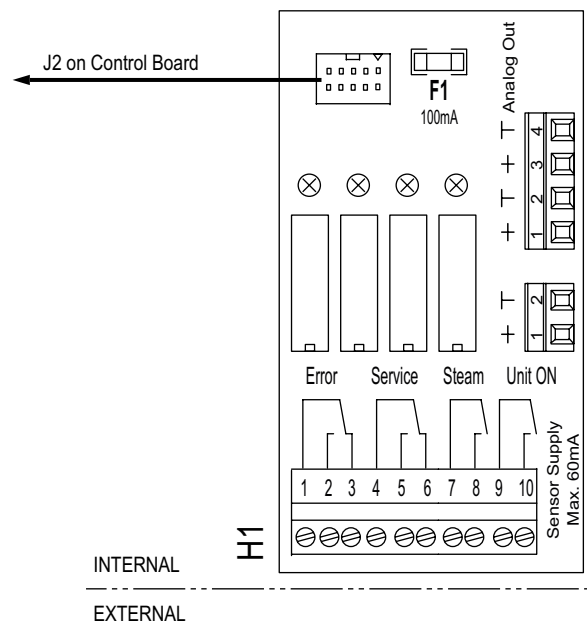


Figure 34: Remote Relay PCB Connections

The remote relay PCB connects to the connector J2 on the Nortec EL control board.

5.8.3.10 Accessory Relay PCB Connections

The optional accessory relay PCB on the Nortec EL steam humidifier has the following four potential-free relay contacts that can be used to control other accessory devices. Refer to [Figure 35](#) for the relevant terminal contacts.

- Flush A – this normally open (NO) relay can be wired to activate or deactivate the optional valve for flushing the water supply line for steam cylinder A.
- Flush B – this normally open (NO) relay can be wired to activate or deactivate the optional valve for flushing the water supply line for steam cylinder B.
- Fan Activate B – this normally open (NO) relay can be wired to activate or deactivate an external fan of the AHU (air handling unit) connected to steam cylinder B.
- Fan Activate A – this normally open (NO) relay can be wired to activate or deactivate an external fan of the AHU connected to steam cylinder A.

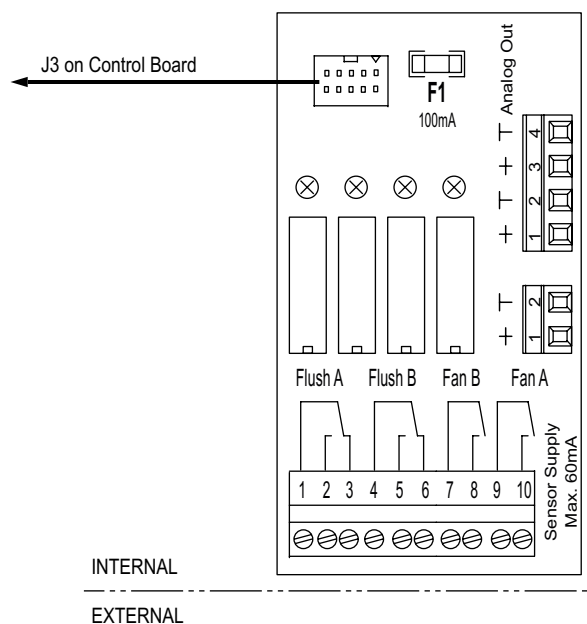


Figure 35: Accessory Relay PCB Connections (Optional)

The accessory relay PCB connects to the connector J3 on the Nortec EL control board.

5.8.3.11 Modbus Connection

The Nortec EL steam humidifier comes standard with a Modbus communications interface, which can be used to remotely control its output or monitor its operation.

Refer to [Figure 36](#) and connect the Modbus communication cable to the Nortec EL steam humidifier as follows:

1. Connect a Modbus cable to the connector J6 on the Nortec EL control board. Refer to [Table 9](#) for Modbus cable requirements, and [Table 10](#) for communication parameters. Contact your Nortec representative if assistance is needed to change the default communication parameters.

Note: The jumper JP7 on the control board must be installed to activate Modbus or BACnet MSTP communication via RS485 interface (J6). If the jumper is not installed, no communication will take place through J6.

2. Install the jumper JP4 on the control board if the Nortec EL steam humidifier is the first or last unit in the network. Termination is generally not required if the network is less than 3280 ft (1000 m) in length.

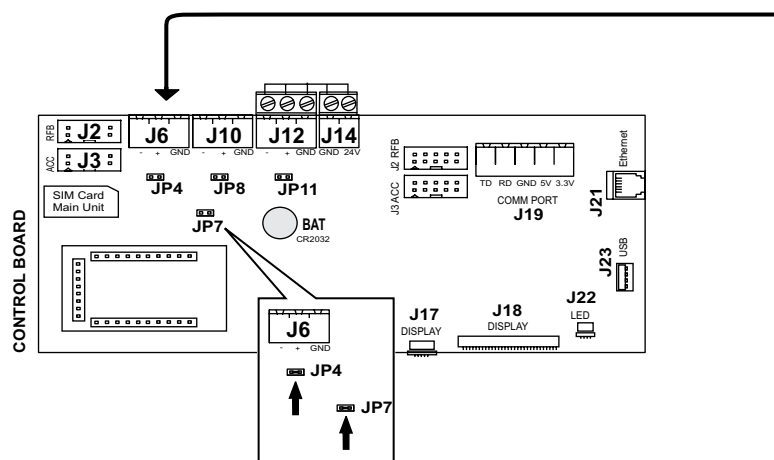


Figure 36: Modbus Connection on Nortec EL steam humidifier

JP4 Jumper for activating the termination resistor for Modbus or BACnet MSTP network

J6 Modbus connector (RS485 interface)

JP7 Jumper for activating Modbus or BACnet MSTP communication via RS485 interface (J6)

Table 9: ModBus Cable Requirements

BMS Protocol	Signal Type	Recommended Cable	Maximum Distance from Nortec humidifier to BMS
Modbus	EIA-485, 2-wire	18-24 AWG shielded, twisted pair, 120Ω *	2200 ft (670 m)

* Connect humidifiers in a daisy chain to the Modbus RTU. Ground shield at on end only – either at the BMS or the humidifier.

Table 10: Modbus Communication Parameters

Parameter	Default	Software Adjustable Range
Signal type	EIA-485	–
Transmission mode	RTU	–
Baud rate	9600	110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800 or 115200
Data bits	8	–
Stop bits	1	–
Parity	Even	Odd, Even, None
Address	10	1-247
Time out	300 s	1-300 s

5.8.4 Connecting Multiple Units Using Linkup

The integrated controller in the Nortec EL steam humidifier allows up to six integrated controllers (for a maximum of 12 steam cylinders) to be connected in a "main-extension" configuration using Nortec's Linkup system. All the humidifiers within this setup must share the same location, and all linked units will be controlled by one set of control signals connected to the main unit.

Refer to [Figure 37](#) and connect multiple unit using Linkup as follows:

1. Connect all control signals for the entire Linkup configuration to the low voltage terminal strip A in the main unit.
2. Install a jumper wire between the terminal points "1" and "2" in the low voltage terminal strip on all extension units.
3. Connect a multi-strand twisted pair shielded cable (18-24 AWG, 120 Z) between the J10 connectors on the control board of each Nortec EL steam humidifier in the Linkup system.

IMPORTANT! Do not reverse polarity.

4. Install the termination jumper JP8 in the control board of the last extension unit in the Linkup system.
5. Finally, refer to the Operation and Maintenance Manual to set up the multi-unit configuration in the control software.

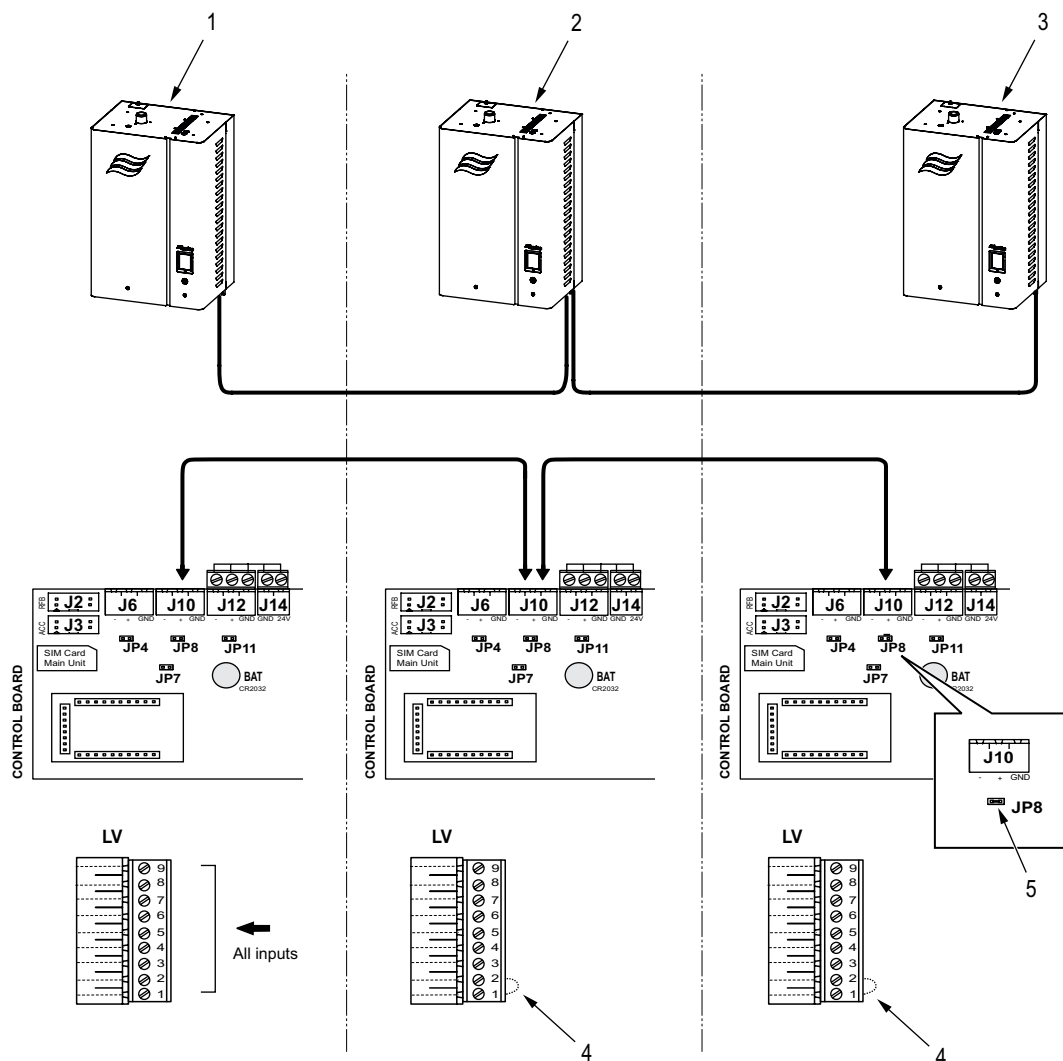


Figure 37: Multi-Unit Linkup Connections

- 1 Main unit (all control signals to unit)
- 2 Extension unit #1 (no control signals to unit)
- 3 Extension unit #X (no control signals to unit)
- 4 Jumper (on all extension units)
- 5 Termination jumper, JP8 (only on last unit in Linkup chain)

5.8.5 Maximum External Fuse

Table 11: Maximum External Fusing, Nortec EL Duct Single-Phase

Model	110-120V/1~			208V/1~			220-240V/1~			277V/1~			380-425V/1~			440-480V/1~			550-600V/1~		
	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)
EL Duct 005	1.9	15.6	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EL Duct 010	-	-	-	3.7	18.0	25	3.7	15.6	20	3.7	13.5	20	3.7	9.0	15	3.7	7.8	15	3.7	6.2	15
EL Duct 020	-	-	-	7.5	36.0	45	7.5	31.2	40	7.5	27.0	35	7.5	18.0	25	7.5	15.6	20	7.5	12.5	20
EL Duct 030-200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 12: Maximum External Fusing, Nortec EL Duct 3-Phase

Model	208V/3~			220-240V/3~			380-415V/3~			440-480V/3~			550-600V/3~		
	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)
EL Duct 005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EL Duct 010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EL Duct 020	7.5	20.8	25	7.5	18.0	25	7.5	10.4	15	7.5	9.0	15	7.5	7.2	15
EL Duct 030	11.2	31.1	40	11.2	27.0	35	11.2	15.6	20	11.2	13.5	20	11.2	10.8	15
EL Duct 050	18.7	51.9	70	18.7	45.0	60	18.7	26.0	35	18.7	22.5	30	18.7	18.0	25
EL Duct 075	28.1	77.9	100	28.1	67.5	90	28.1	39.0	50	28.1	33.7	45	28.1	27.0	35
EL Duct 100	33.7	93.4	125	37.4	90.0	125	37.4	52.0	70	37.4	45.0	60	37.4	36.0	45
EL Duct 150	56.1	155.7	200	56.1	135.0	175	56.1	78.0	100	56.1	67.5	90	56.7	54.0	70
EL Duct 200	67.3	186.9	250	74.8	180.0	225	74.8	104.1	150	74.8	90.0	125	74.8	72.0	90

Table 13: Maximum External Fusing, Nortec EL Space Single-Phase

Model *	110-120V/1~			208V/1~			220-240V/1~			277V/1~			380-415V/1~			440-480V/1~			550-600V/1~		
	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)
EL Space 005	2.0	16.8	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EL Space 010	-	-	-	3.9	18.7	25	3.9	16.2	25	3.9	14.0	20	3.9	9.4	15	3.9	8.1	15	3.9	6.5	15
EL Space 020	-	-	-	7.6	36.7	50	7.6	31.8	40	7.6	27.5	35	7.6	18.4	25	7.6	15.9	20	7.6	12.7	20
EL Space 030-200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Space or RMBP (remote blower pack powered by the humidifier) configuration

Table 14: Maximum External Fusing, Nortec EL Space 3-Phase

Model *	208V/3~			220-240V/3~			380-415V/3~			440-480V/3~			550-600V/3~		
	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)	Maximum Output (kW)	Maximum Current (A)	Maximum External Disconnect (A)
EL Space 005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
EL Space 010	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
EL Space 020	7.7	21.5	30	7.7	18.6	25	7.7	10.8	15	7.7	9.3	15	7.7	7.4	15
EL Space 030	11.5	31.9	40	11.5	27.6	35	11.5	16.0	20	11.5	13.8	20	11.5	11.0	15
EL Space 050	19.0	52.6	70	19.0	45.6	60	19.0	26.4	35	19.0	22.8	30	19.0	18.2	25
EL Space 075	28.3	78.6	100	28.3	68.1	90	28.3	39.4	50	28.3	34.1	45	28.3	27.2	35
EL Space 100	33.9	94.2	125	37.7	90.6	125	37.7	52.4	70	37.7	45.3	60	37.7	36.2	50

* Space or RMBP (remote blower pack powered by the humidifier) configuration

5.8.6 Electrical Connections Checklist

Check the following to ensure that the electrical connections for the humidifier have been installed correctly:

- ☐ Power supply meet the voltage and current requirements shown on the specification label ([Figure 3 on page 9](#))?
- ☐ Power supply have an external dedicated fused disconnect?
- ☐ All wiring done according to the wiring diagram and instructions in this manual?
- ☐ All cables fastened securely?
- ☐ All cables free of tension and pass through cable glands or grommets?
- ☐ Electrical installation meet the applicable national and local codes?
- ☐ All door panels closed and fastened securely?

This page intentionally left blank

6 Product Specifications

6.1 Weights

Table 15: Weights

Model		Small	Medium	Large
EL	Net weight	45 lb (21 kg)	85 lb (39 kg)	120 lb (55 kg)
	Operating weight	65 lb (30 kg)	150 lb (68 kg)	245 lb (112 kg)
EL Space	Net weight	83 lb (38 kg)	123 lb (56 kg)	–
	Operating weight	103 lb (47 kg)	188 lb (85 kg)	–

6.2 Dimensions

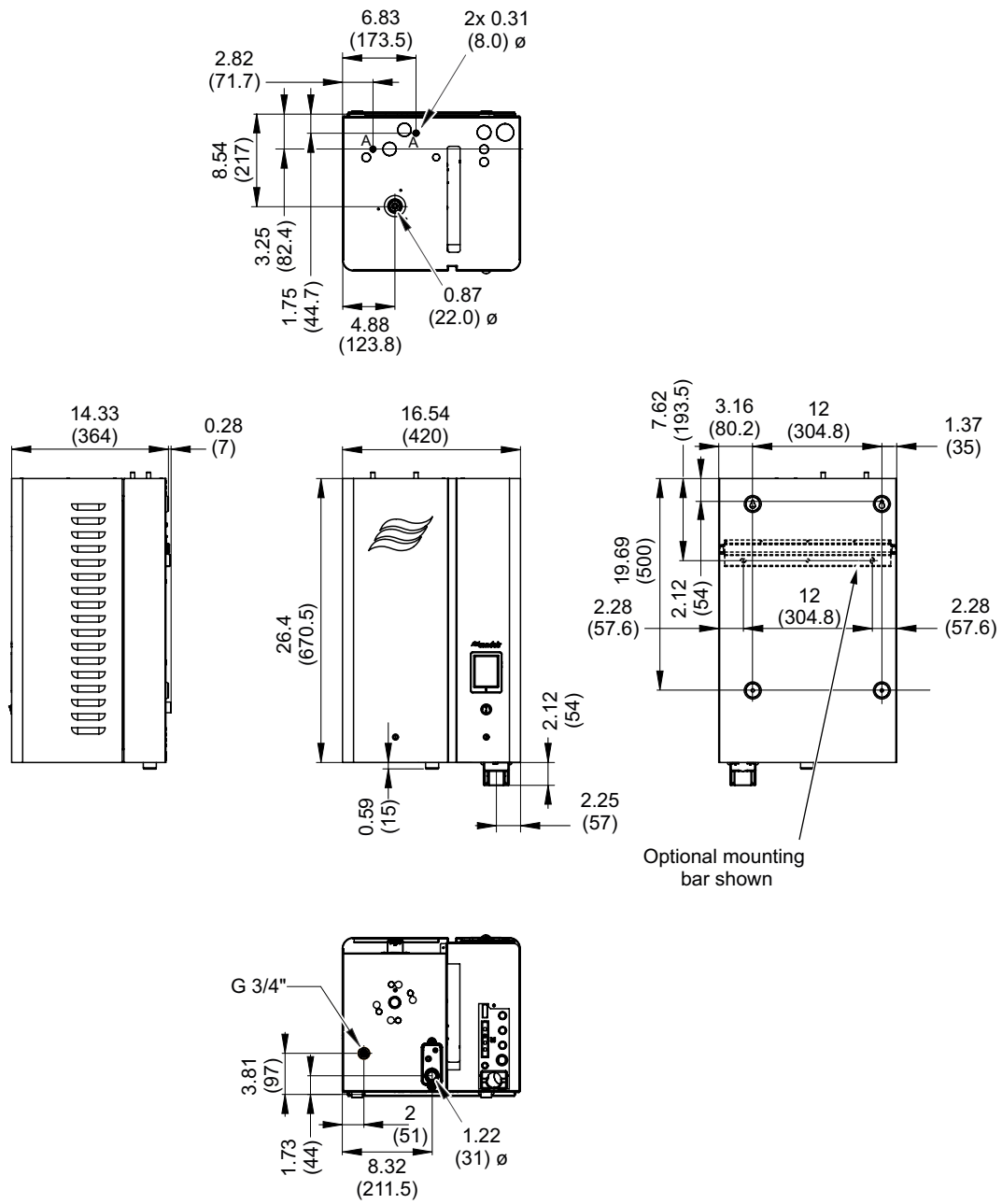


Figure 38: Nortec EL Steam Humidifier, Small Housing

Dimensions are in inches, and values in brackets are in millimeters.

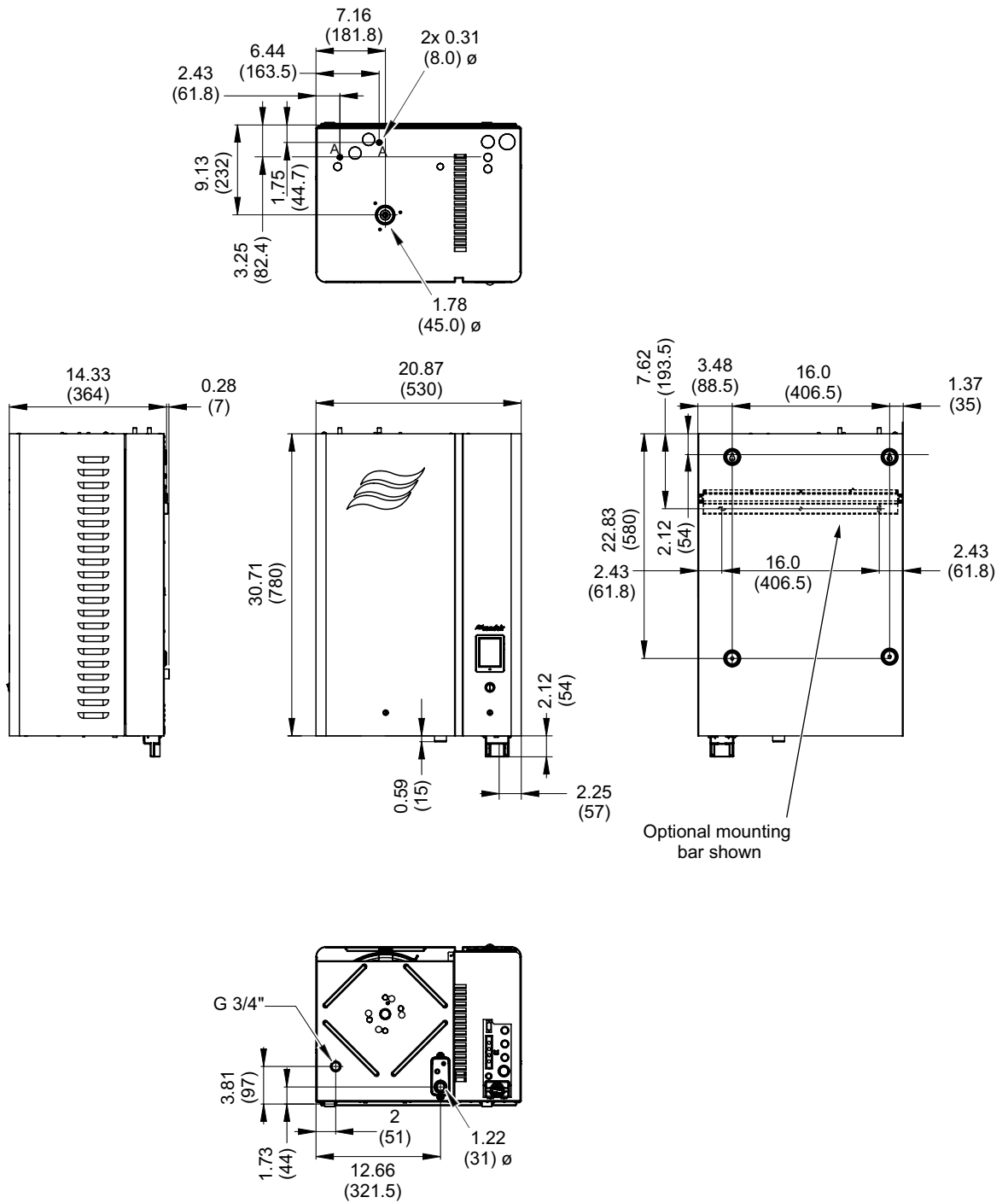


Figure 39: Nortec EL Steam Humidifier, Medium Housing

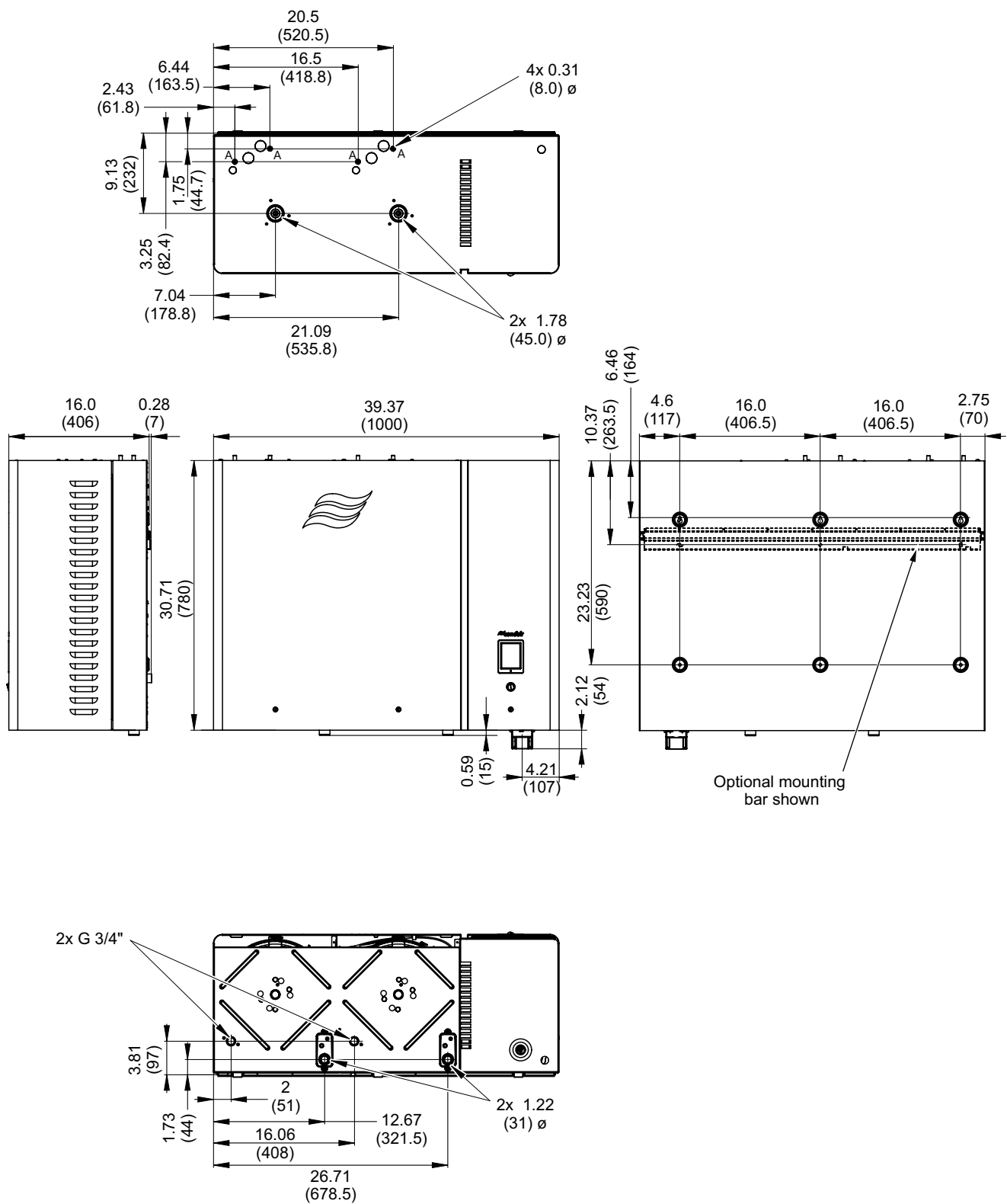


Figure 40: Nortec EL Steam Humidifier, Large Housing

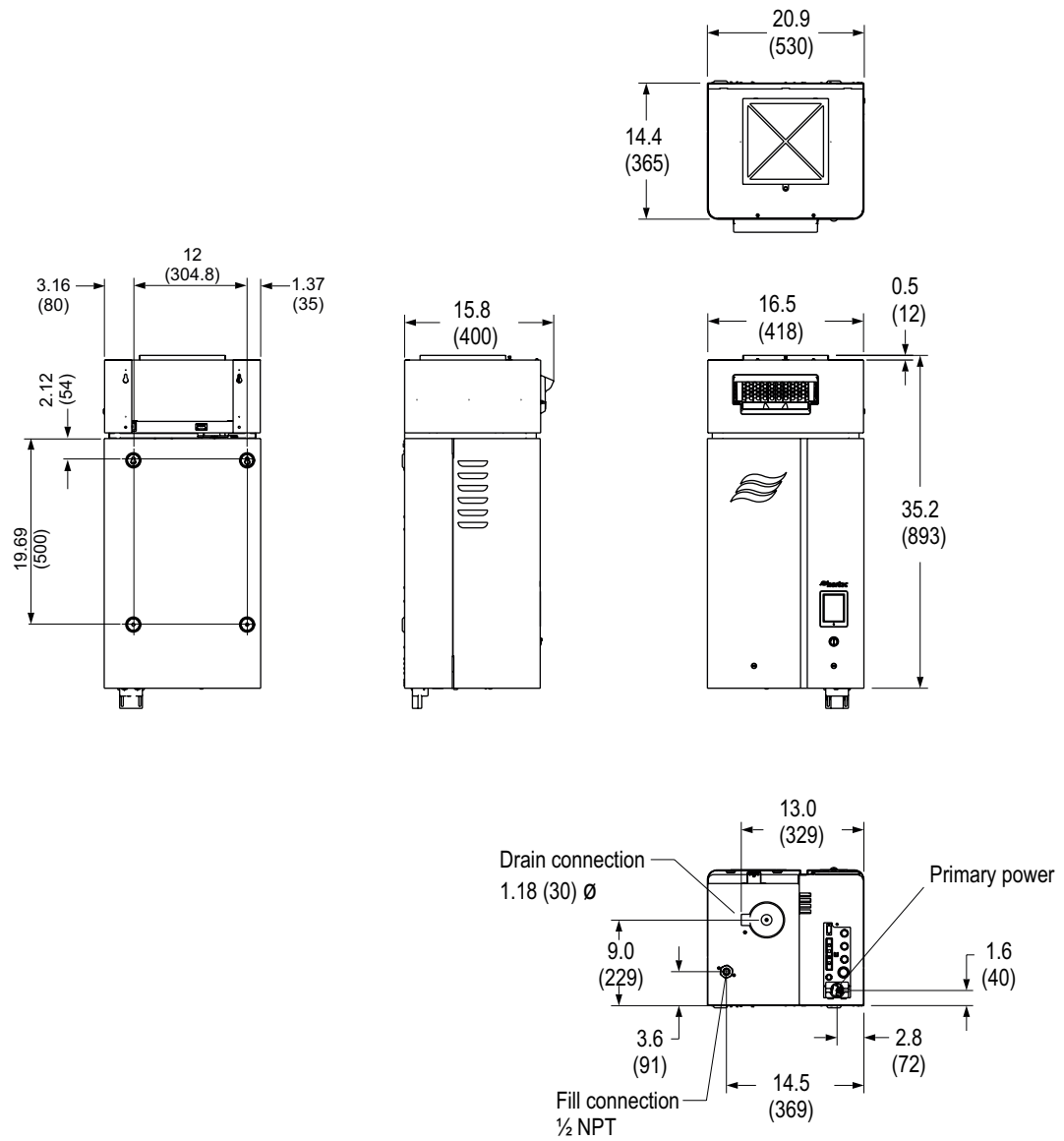


Figure 41: Nortec EL Space Steam Humidifier, Small Housing

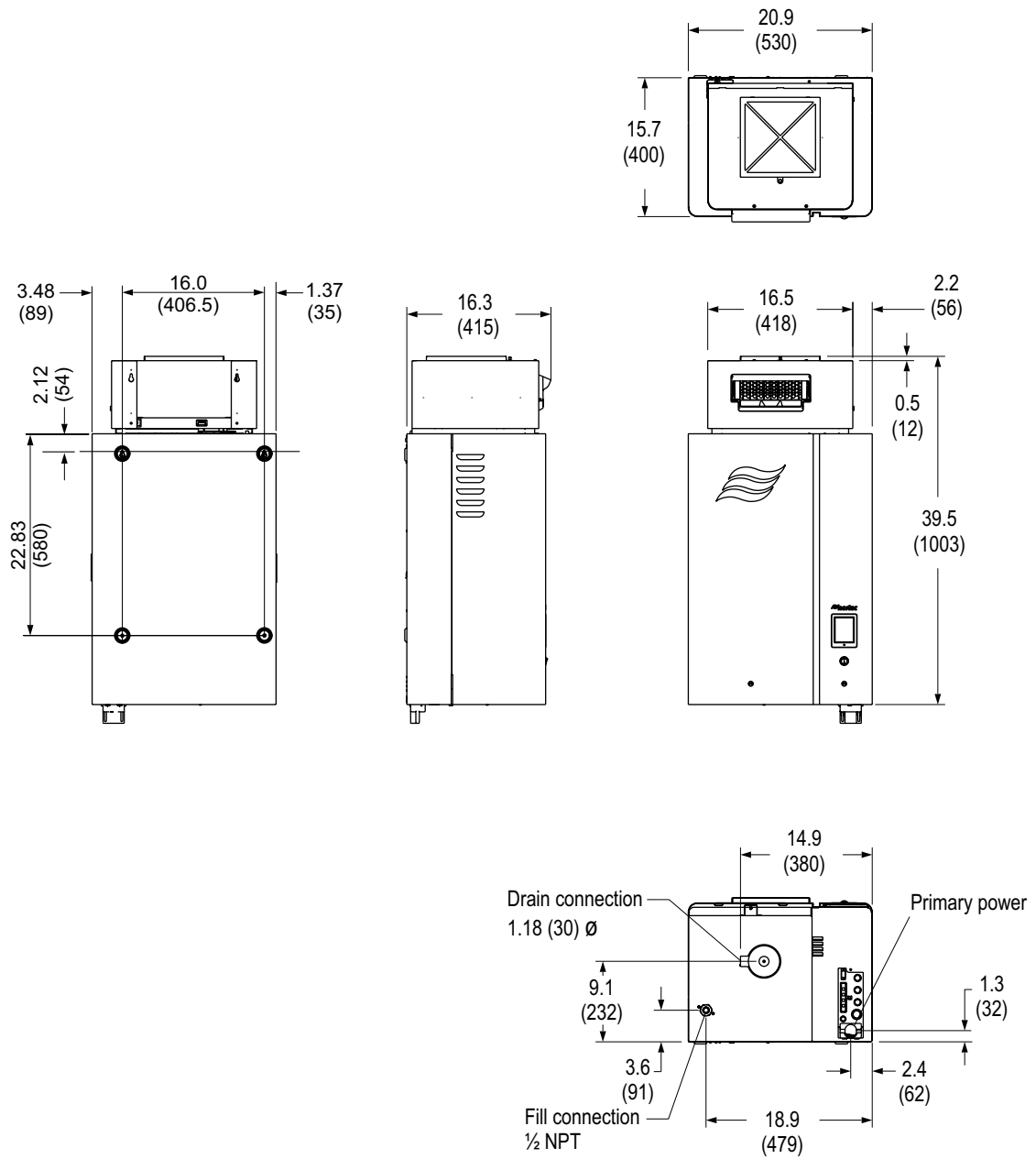


Figure 42: Nortec EL Space Steam Humidifier, Medium Housing

A Appendix

A.1 Installation Checklist

The following is a consolidated installation checklist that can be used in the commissioning of the unit:

Mounting

- ☐ Unit installed in the correct location (according to *"Location and Clearances" on page 16*)?
- ☐ Adequate clearance for servicing unit?
- ☐ Mounting surface stable, and capable of supporting the full operating weight of the humidifier?
- ☐ Unit level?
- ☐ Unit secured properly?

Steam Line

- ☐ Observed all best practices?
- ☐ Steam line exceed maximum length specified in *Table 6 on page 28*?
- ☐ Minimum bend radius of 12 in (300 mm) for steam hose, or 5× internal diameter for rigid pipes maintained?
- ☐ Steam line sized correctly?
- ☐ Backpressure in the line combined with duct static pressure exceed 5.5 in H₂O (1.37 kPa), or 10 in H₂O (2.49 kPa) with the optional Fill Cup Extension?
- ☐ Steam lines run straight up from the humidifier steam outlet for at least 12 in (300 mm) before bend?
- ☐ Steam line have a constant minimum upslope of 2 in/12 in (10°), or a constant minimum downslope of 1/2 in/12 in (2°)?
- ☐ Steam lines do not reduce in diameter except, if required, at the steam distributor, and condensate line installed just before the restriction?
- ☐ Steam lines do not merge except at the steam distributor through a Nortec adaptor?
- ☐ Steam line does not sag or kink? Supported adequately? Any low points in line without condensate trap?
- ☐ If a steam hose is used, is it attached securely with clamps? Clamps secure without crushing steam line?
- ☐ Allowances for thermal expansion during operation, and shortening of the hose due to aging taken into consideration?

Condensate Line

- ☐ Local codes on drain water temperature requirements have been satisfied?
- ☐ Condensate line from the steam distributor condensate port connected to the humidifier fill cup port, or the drain?
- ☐ Condensate lines installed at all low points, and at vertical transitions in the steam line?
- ☐ Condensate lines in the steam line always connect to full-size "T" connectors?
- ☐ Condensate traps have a minimum loop height of 8 in (200 mm) and installed at least 12 in (300 mm) below the "T" connector or steam distributor?
- ☐ All condensate lines have a constant minimum downslope of 1 in/48 in (1.2°)?
- ☐ Maximum distance between the condensate traps on long runs is 15 ft (4.5 m)?
- ☐ Condensate traps primed with water?

Water Connections

- ☐ Shutoff valve and union fitting installed in supply line?
- ☐ Water supply piping minimum 1/2 in (13 mm) diameter, and made of copper, stainless steel or plastic certified for drinking water systems?
- ☐ Optional 5 µm water filter installed in the supply line close to the humidifier?
- ☐ Water supply temperature 34-104°F (1-40°C)?
- ☐ Water supply surge-free and pressure regulated to 30-80 psig (207-550 kPa)?
- ☐ Leak-free water supply line?
- ☐ Air gap funnel has a minimum diameter of 2-1/2 in (64 mm)?
- ☐ Air gap and any other drain located away from the control cabinet in the humidifier?
- ☐ Drain lines have a minimum internal diameter of 7/8 in (22 mm)?
- ☐ Drain line have a constant minimum downslope of 1 in/48 in (1.2°) to funnel without touching its sides or bottom?
- ☐ Drain lines from large humidifiers with dual steam cylinders empty into separate open air gap funnels before connecting to the drain? Combined drain line minimum 1.5 in (38 mm) ID?
- ☐ All debris flushed from supply and drain lines?

Electrical Connections

- ☐ Power supply meet the voltage and current requirements shown on the specification label ([Figure 3 on page 9](#))?
- ☐ Power supply have an external dedicated fused disconnect?
- ☐ All wiring done according to the wiring diagram and instructions in this manual?
- ☐ All cables fastened securely?
- ☐ All cables free of tension and pass through cable glands or grommets?
- ☐ Electrical installation meet the applicable national and local codes?
- ☐ All door panels closed and fastened securely?

B Appendix

B.1 Commissioning Checklist

The Nortec EL humidifier must always be commissioned for the first time by a service technician from your local Nortec representative, by a Nortec employee, or by personnel who are well trained and authorized by the customer. It is the customer's responsibility to verify the qualifications of personnel.

The intent of the commissioning checklist is to verify that the humidification system has been installed according to the installation manual.

Commissioning of the Nortec EL humidifier consists of two steps – an inspection of the site services and the installation prior to start-up, and performance tests of the unit. Complete the ["Pre-Start-Up Checklist"](#) below and ["Performance Checklist"](#) on page vi. Enter all notes and exceptions in the space provided on page vii. Retain this copy in the installation manual, and submit a copy of the completed forms to your local Nortec representative.

B.1.1 Pre-Start-Up Checklist

Inspect the site services and the installation, and fill out the form below. **Note:** When filling out the form leave the checkbox un-checked if the item does not apply, or if the requirement is not satisfied.

Serial Number:		Tag:	
Model:		Capacity:	Voltage and Phase:
Customer/Job:		Nortec representative:	
Customer Address:			

Site Ambient Conditions

Ambient temperature: (Permissible range – 41-104 °F (5-40 °C))	
Ambient humidity level: (Permissible range – 5-95% RH, non-condensing)	

Site Water Supply

	Well water
	City water
	Softened water (Not recommended for EL series)
	Reverse osmosis (RO) (Not permitted for EL series)
	De-ionized water (DI) (Not permitted for EL series)

Refer to [Table 4 on page 15](#) for water quality requirements. **Note:** Run the water for approximately five minutes before performing the tests:

Site Water Quality	Measurement*
Conductivity (µS/cm):	
Hardness (gpg):	
Silica (ppm):	
Chlorides (ppm):	
pH level:	

* Test sample must be collected as close as possible to the fill valve in the humidifier, so that the sample reflects the characteristics of the supply water entering the unit.

Site Water Supply, continued...

Note: For units with dual steam cylinders, check water supply to each fill valve.

Water supply pressure meets requirement: (Permissible range – 30-80 psig (207-550 kPa) Select checkbox, or enter measurement, as appropriate).	
Water supply pipe sized correctly: (Minimum 1/2 in (13 mm) diameter required).	
Water supply temperature meets requirement: (Permissible range – 34-104 °F (1-40 °C) Select checkbox, or enter measurement, as appropriate).	
Water supply piping material: (Copper, stainless steel or plastic certified for drinking water systems permitted).	
Filter installed close to humidifier: (5 µm – optional, but recommended)	
Shutoff valve and union fitting installed:	
No pressure surges: (Surge protection device must be installed, if necessary).	
All debris flushed from supply line:	
No leakages in supply line:	

Drainage

Humidifier drain pipe diameter meets requirement: (Minimum 7/8 in (22 mm) diameter required).	
Humidifier drain piping material meets requirement: (Must handle temperatures to 212 °F (100 °C)).	
Drain pipe sloped adequately: (Minimum downslope of 1 in/48 in (1.2") to air gap funnel).	
Air gap funnel size meets requirement: (Minimum 2-1/2 in (64 mm) diameter required).	
Drain pipe does not touch sides or bottom of air gap funnel:	
Air gap funnel location does not permit any rising steam to enter control cabinet:	
Separate air gap funnels (for large units with dual cylinders), and combined drain size meets requirement: (Drain lines from large units must empty into separate open air gap funnels before connecting to the drain. Combined drain line minimum 1.5 in (38 mm) ID).	
Drainage rate if building drain meets requirement: (Minimum 2.3 gal/min (8.7 L/min) per steam cylinder required).	
Building drain piping material meets requirement: (Only copper or stainless steel permitted).	

Humidifier Mounting

Refer to [Figure 6 on page 17](#) for clearances.

Non-combustible mounting surface? (Withstand temperatures 140-158 °F (60-70 °C))	
Unit level?	
Front clearance:	
Left side clearance:	
Right side clearance:	
Ground clearance:	
Overhead clearance:	

Steam Line(s)

Note: For units with dual steam cylinders, check steam line connected to each cylinder.

Steam line diameter meets requirement: (Refer to Table 6 on page 28 for steam line diameter).	
Steam line piping material meets requirement: (Copper (MED Type-L) or stainless steel (minimum DIN 1.4301) required).	
Type of insulation:	
Slope of steam line meets requirement: (Minimum constant upslope of 2 in/12 in (10°), or minimum constant downslope of 1/2 in/12 in (2°) required).	
Steam line rises straight up minimum 12 in (300 mm) before first bend:	
Steam lines do not reduce in diameter or merge, except at steam distributor:	
No restrictions/kinks in steam line:	
Steam line fully supported, with no sags:	
All debris flushed from steam line:	
Backpressure meets requirement: (Maximum permissible static pressure and backpressure in steam line – 5.5 in H ₂ O (1.37 kPa); or 10 in H ₂ O (2.49 kPa) with the optional fill cup extension)	
Duct static pressure: (Enter static pressure (if available), and if positive or negative pressure).	

Steam Line Condensate Drains

Note: Make sure all condensate drains meet these requirements.

Slope of all condensate lines meets requirement: (Minimum constant downslope of 1 in/48 in (1.2") required).	
Condensate lines connect to full-size Tee connectors:	
Diameter of condensate traps meets requirement: (Minimum 9 in (200 mm) required).	
Condensate trap drop meets requirement: (Minimum 12 in (300 mm) below condensate Tee and steam distributor required).	
Condensate traps installed at all low points, and horizontal-to-vertical transitions in steam line:	
Condensate traps installed at regular intervals on long runs exceeding 15 ft (4.5 m):	
Condensate lines have individual traps before emptying into a common drain:	
Condensate lines connect to: (Humidifier or drain)	
No restrictions/kinks in condensate line:	
All debris flushed from condensate line:	
Condensate cooling installed, (if required by local code):	
All condensate traps primed:	

Controls

Note: If Nortec control devices are installed, enter their locations below; otherwise leave empty.

Nortec humidity controls location:	
Nortec high limit switch location: (Minimum 3× absorption distance from the distributor required).	
Nortec air proving switch location:	

Electrical Power Connections

Power supply meets voltage and current requirements shown on specification label:	
Dedicated external fused disconnect switch installed to local code: (Fusing must not exceed the maximum current rating shown on specification label).	
Dedicated external non-fused disconnect switch (if installed) located in vicinity of humidifier:	
Phase-to-phase voltage measurements:	
All contactor screws torqued properly: (Refer to label on contactor for correct torque value).	
Proper grounding: (Green wire must be connected to GND in the supply)	
All wiring and connectors fastened securely:	

B.1.2 Performance Checklist

Complete the performance tests after inspecting the site services and the installation, then fill out the form below. **Note:** When filling out the form leave the checkbox un-checked if the item does not apply, or if the requirement is not satisfied. Enter all notes and exceptions in the space provided [on page vii](#).

Preliminary	
Pre-start-up checklist completed:	
Gas leakage test inside unit completed:	
Check for water leaks inside unit completed:	
Steam cylinder seated properly in its base:	
Condensate trap inside the unit primed: (Nortec GS CS/NX models only).	
All access panels installed and fastened securely:	

Start-Up	
Shutoff valve in water supply line open:	
Fill tests completed successfully:	
Ignition safety shutoff test completed successfully:	
Manual gas shutoff valve open:	
On/Off switch set to the On position:	
Software version:	

Distribution System	
Note: For commissioning the distribution system itself, refer to the individual commissioning checklist for the distribution system.	
SAM-e	
Mini-SAM-e	
Blower Pack	
ASD/BSD/CSD	
Model:	
Number of XSD units:	
Distance to obstruction: (Minimum 1× absorption distance required from the distributor to first obstruction (coil/bend) downstream).	
Distance to filter: (Minimum distance between the distributor and filter downstream – 1.5-2× absorption distance for class C filter, and 2.5-3× absorption distance for sub-micron particle filter).	

Controls				
Select the type of signal input connected to the channels of the low voltage terminal strip #1: (Enter setpoint value (if applicable) in the field below the checkbox).	Demand Humidistat (modulating)	On/Off Humidistat	Transducer (modulating)	Digital Controls
CH 1:				
CH 2:				
On/Off:				
If a second set of inputs is connected to the channels of the low voltage terminal strip #2 (on dual cylinder units running in independent mode only), select the type of signal input connected to the terminal strip #2: (Enter setpoint value (if applicable) in the field below the checkbox).	Demand Humidistat (modulating)	On/Off Humidistat	Transducer (modulating)	Digital Controls
CH 1:				
CH 2:				
On/Off:				
Control signal configuration in the software matches inputs connected to unit:				

Controls, continued...	
Sensed humidity less than setpoint value (if transducer is used):	
Security loop closed: (On a dual cylinder unit running in series or parallel mode, a jumper must be installed between the pins '2' in the two low voltage terminal strips).	
Blower pack loop closed:	
Humidifier responds to control signal interruption:	

Notes

Enter notes and exceptions in the space below.

Notes:			
Commissioned by:		Commissioning Date:	
Company:			

To print the completed forms (if using an electronic version of the manual), select the **Print Form** button above. In the Print dialog box that appears, select the page numbers under *Pages to Print*, and the **Fit** option under *Page Sizing & Handling*. Click **Print**.

To save the completed electronic forms, first select the **Save Form** button above, and select "Adobe PDF" from the *Printer* drop-down list in the dialog box. Then select the page numbers, and click **Print**. Finally, enter a file name in the dialog box, and click **Save**.

Warranty

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

THE COMPANY's obligations and liabilities under this warranty are limited to furnishing replacement parts to the customer, F.O.B. THE COMPANY's factory, provided that the defective part(s) is returned freight prepaid by the customer. The replacement parts 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 manufactured by the COMPANY, 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 to the humidifier, supply lines, drain lines, or steam distribution systems caused by freezing.

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



Consulting, Sales and Service:

U.S.A.

835 Commerce Park Drive,
Ogdensburg, NY 1366-2209

CANADA

2740 Fenton Road
Ottawa, ON, K1T 3T7

Tel: 1.866.NORTEC1
Fax: 613.822.7964

Email: nortec@humidity.com
Website: www.humidity.com

