2582954_C_EN_1611

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

US SERIES

OPERATION AND MAINTENANCE MANUAL

Ultrasonic Humidifier
Nortec US Series

Humidification and Evaporative Cooling

nortec

Thank you for choosing Nortec

Installation date (DD/MM/YYYY):
Commissioning date (DD/MM/YYYY):
Site:
Model:
Serial number:

Manufacturer

Contronics Engineering B.V..
Ambachtsweg 8, 5492 NJ Sint-Oedenrode, The Netherlands
Tel. +31 (0) 0413 - 487 000
info@contronics.nl, www.contronics.nl

Contents

1	**Introduction**	**5**
1.1	Before You Start!	5
1.2	General	5
2	**For Your Safety**	**7**
3	**Product Overview**	**9**
3.1	General Description	9
3.2	Functional Description	10
4	**Operator Interface**	**13**
4.1	Controls	13
4.2	Control Software	15
4.2.1	Home Screen	15
4.2.2	General Navigational Elements	16
4.2.3	Operating and Fault Status	16
4.2.4	Maintenance and Service Status	17
4.2.5	Main Menu	17
4.2.5.1	Configuration Menu	18
4.2.5.2	Service Menu	21
4.2.5.3	Administrator menu	21
4.3	Software Configuration	21
5	**Operation**	**22**
5.1	General	22
5.2	Operating Procedures	21
5.2.1	Starting Up	21
5.2.2	Remote Monitoring	21
5.2.3	Inspections During Operation	21
5.2.4	Manually Initiate Reservoir Draining	21
5.2.5	Shutting Down	22
5.2.6	Restarting After Shutdown	22
6	**Maintenance**	**23**
6.1	General	23
6.2	Maintenance List	24
6.2.1	Regular Replacement of the Piezoelectric Transducers	24
6.2.2	Regular Maintenance of Ultrasonic Humidifier	24
6.3	Maintenance Procedures	25
6.3.1	Removal and Installation of Door Panels	25
6.3.2	Removal and Installation of Water Reservoir	26
6.3.3	Removal and Installation of Drain Valve	28
6.3.4	Replacement of Fuses	29
6.3.5	Replacement of piezo transducers	32
6.3.6	Replacing the transducer driver board	33
6.3.7	Removal and installation of the UV assembly	35
6.4	Cleaning	36
6.4.1	Cleaning Agents	36

6.4.2 Cleaning Procedures 36

7 Fault Isolation 39
7.1 General 39
7.2 Fault Indication 39
7.3 General Troubleshooting 39
7.4 Nortec US Warning and Fault List 41
7.5 Resetting Fault Status 41

8 Wiring Diagrams 43

9 Decommissioning 47
9.1 General 47
9.2 Removal from Service for Disposal or Long-term Storage 48
9.3 Disposal/Recycling 48

10 Product Specifications 49
10.1 Performance Data 49
10.2 Operating Data 49
10.3 Size and Weight 50
10.3.1 Size 50
10.3.2 Weight 50

1 Introduction

1.1 Before You Start!

Thank you for purchasing the Nortec US ultrasonic humidifier.

The Nortec US ultrasonic humidifier incorporates the latest technical advances and meets all recognized safety standards. Never-the-less, improper use of the Nortec US ultrasonic 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 US ultrasonic 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

Limitation

The subject of this installation manual is the Nortec US ultrasonic humidifier in its different versions. The various options and accessories are only described in-so-far as is necessary for proper operation of the equipment. Further information on options and accessories can be obtained in their respective instructions.

This manual is restricted to the **operation and maintenance** of the Nortec US ultrasonic 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 operation manual is supplemented by other publications such as the installation 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 operation and maintenance of the Nortec US ultrasonic humidifier must read and understand this manual before performing any work. Knowing and understanding the contents of the operation 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 US ultrasonic 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 US ultrasonic humidifier must be familiar with, and comply with the appropriate regulations on workplace safety and prevention of accidents.

Intended Use

The Nortec US ultrasonic humidifier is intended exclusively for air humidification using a Nortec-approved mist distributor or blower pack within specified operating conditions (refer to *"Operation" on page 22* 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 US ultrasonic humidifier:

DANGER!
Risk of electric shock!

The Nortec US ultrasonic 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: Before performing any work inside the Nortec US ultrasonic humidifier , shut down the humidifier properly and secure it against accidental power-up as described in *"Shutting Down" on page 22*.

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.

Preventing Unsafe Operation

If it is suspected that the Nortec US ultrasonic humidifier cannot be operated safely for any of the reasons listed below, shut it down immediately, as described in *"Shutting Down" on page 22* , and secure it against accidental power-up.

- Humidifier is damaged
- Electrical connections are loose or damaged
- Humidifier is not operating properly
- Leaks in the mist distribution system

All personnel working with the Nortec US ultrasonic humidifier must immediately report to the customer any alternations to the humidifier that may affect safety.

Modifications Prohibited

Modifications are not permitted on the Nortec US ultrasonic humidifier without the express written consent of Nortec.

Always use **original Nortec replacement parts and accessories** available through your local Nortec representative.

3 Product Overview

3.1 General Description

The Nortec US ultrasonic humidifier is an atmospheric mist generator. Miniature water droplets with a size of 1 to 3 microns are ejected above the water surface by means of ultrasonic vibrations (1.7 MHz). The humidifier's air movement system ensures that these water droplets are then blown into the area to be humidified. It is designed for direct room air humidification with blower pack or direct room air humidification with mist distribution piping.

The Nortec US ultrasonic humidifier comes in two different housing sizes – medium and large. The medium size models have a single water reservoir, while the large model is equipped with dual water reservoirs. Each water reservoir has its own dedicated driver board to receive control signal inputs. The dual driver boards allow the large models to be configured to operate in series, in parallel or independent mode to control humidity in one or more zones depending on how they are configured.

Figure 1 shows the various components of the Nortec US ultrasonic humidifier (door panels removed for clarity).

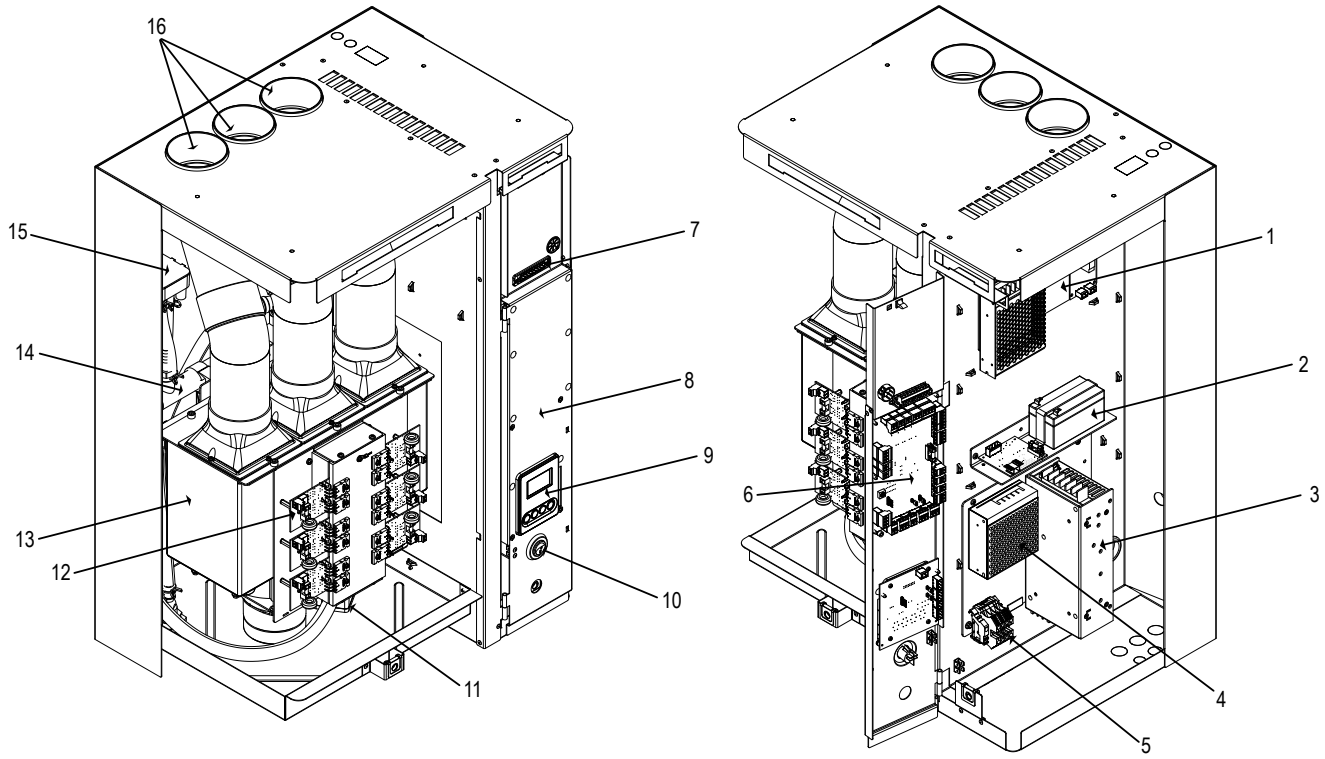


Figure 1: Nortec US Ultrasonic Humidifier (Medium size model shown)

1 Blower pack control assembly
2 Battery backup
3 Power supply 48 VDC
4 Power supply 24 VDC
5 Terminal block, high voltage supply
6 Driver board
7 Low voltage terminal
8 Swing panel
9 Control board with LCD
10 On/Off switch
11 Drain valve Sensor, high water level (orange wire)
12 Misting unit board
13 Water reservoir
14 UV sterilizer
15 Fill cup
16 Mist outlets

3.2 Functional Description

Refer to *Figure 2 on page 11* and *Figure 3 on page 12*.

Water Supply

Water enters the humidifier through the fill valve into the fill cup with integral air gap, and then flows down through the UV light into the water reservoir.

Water Level Monitoring

The water level in the reservoir is continuously monitored with a level sensor. If the water level drops below the sensor switching point, from normal operation, the sensor supplies a signal to the controller. This opens the inlet valve and the water reservoir is filled up. When the water level reaches the operating level the sensor supplies a signal to the controller to close the inlet valve.

Mist Generation

When the humidifier receives a signal to supply mist, the unit fan and the piezoelectric transducers start operating. The fine mist is blown out of the humidifier 80mm outlets by the unit fan.

Flushing

To prevent the growth of bacteria in the unit, a flush cycle is implemented to replace the content of the water reservoir with fresh water. The flushing is carried out at an adjustable time interval.

The production of mist is interrupted during the flushing process. The drain valve will open and the reservoir will be completely discharged through the water discharge (drain) connection. The inlet valve will open and flush out any stagnant water in the water supply line. The drain valve is closed and the inlet valve is closed after the water level inside the reservoir reaches the normal operation level. After a flush cycle the unit resumes normal operation .

Control

Mist production can be controlled using the continuous proportional (P) or the proportional-integral (PI) controller internal to the humidifier, or an external modulating controller, or with an On/Off control signal from an external humidistat.

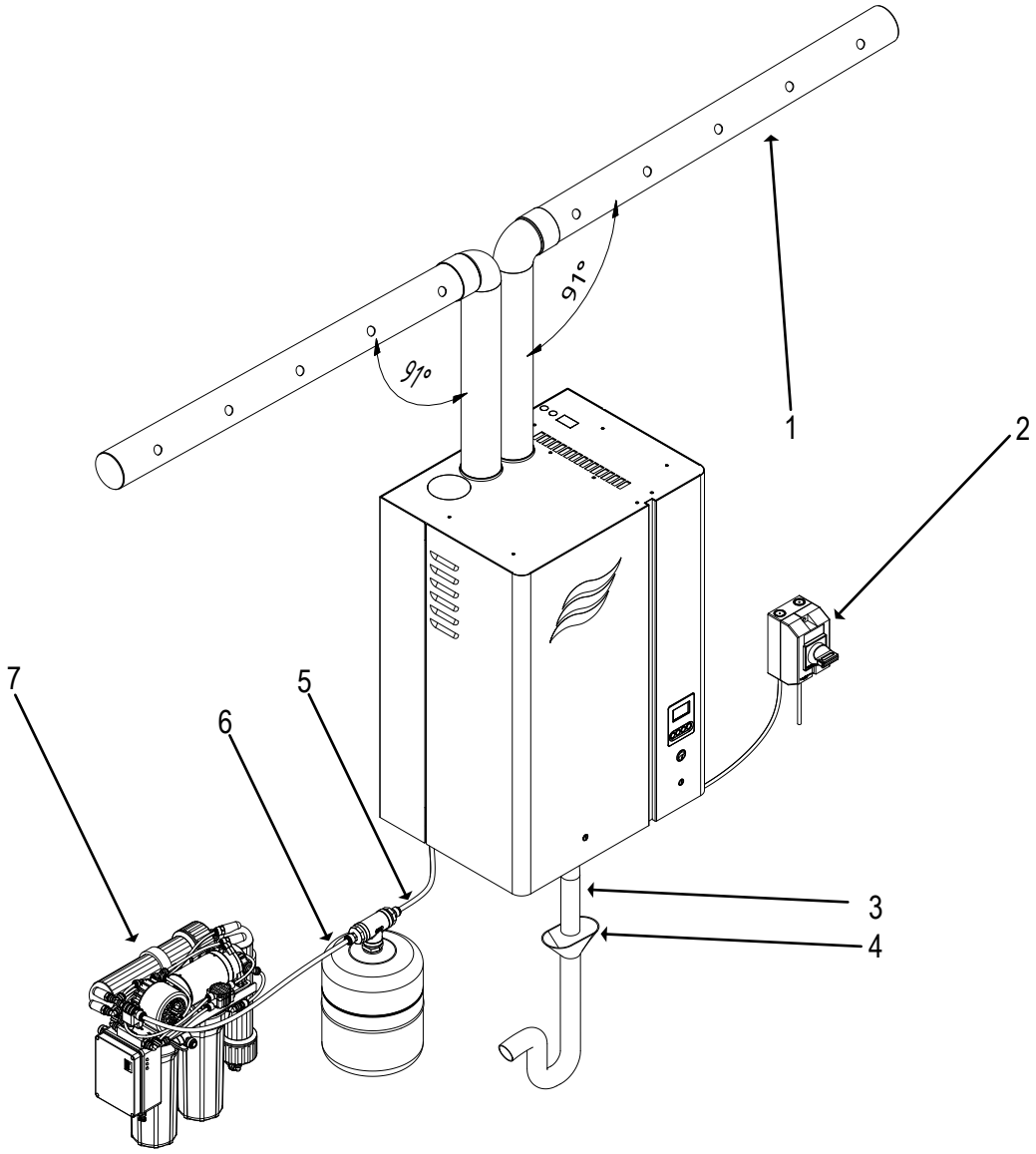


Figure 2: Nortec US humidifier with Mist Piping

1 Mist distribution
2 Electrical disconnect, high voltage supplly
3 Drain line
4 Open funnel with trap ideally located 8" (20 cm) lateral off-set to the unit
5 Water supply pipe
6 Flow thru buffer tank
7 R.O system

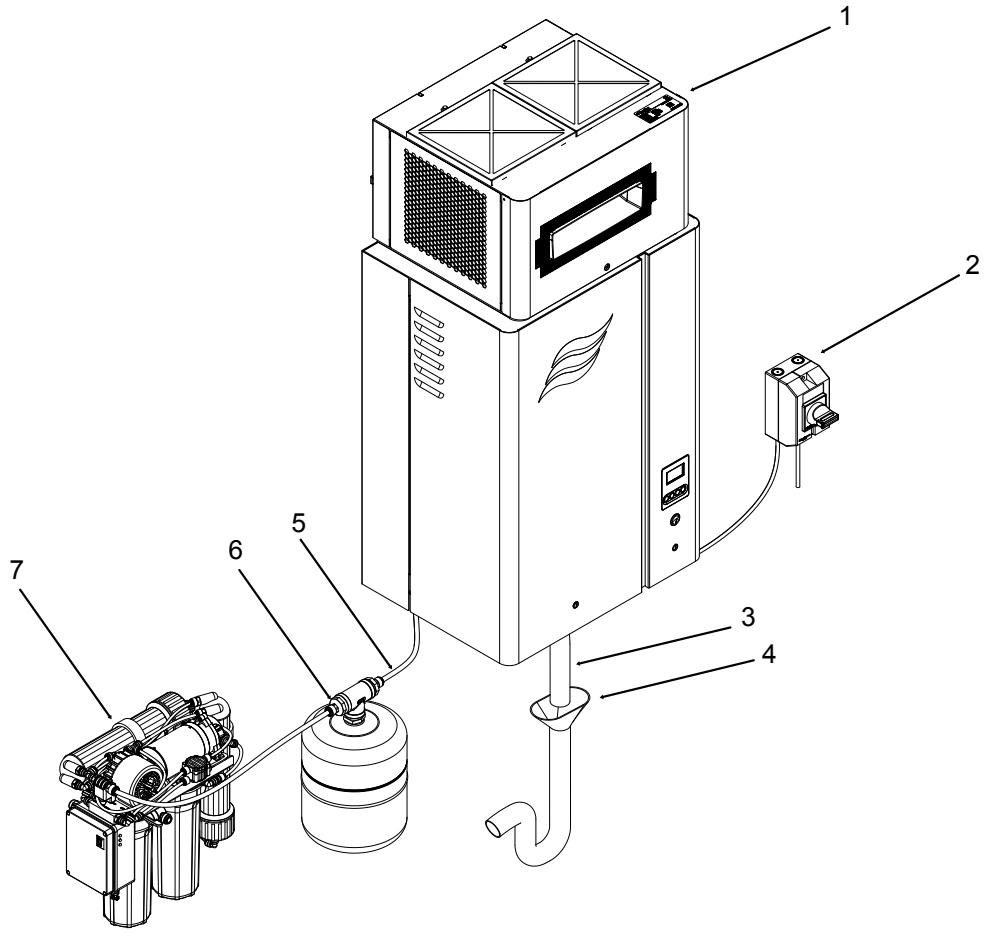


Figure 3: Nortec US Humidifier with Blower Pack

1 Blower Pack
2 Electrical disconnect, high voltage supplly
3 Drain line
4 Open funnel with trap ideally located 8" (20 cm) lateral off-set to the unit
5 Water supply pipe
6 Flow thru buffer tank
7 R.O system

4 Operator Interface

4.1 Controls

The unit interface of the Nortec US ultrasonic humidifier is located on the front of the unit – refer to *Figure 4*. It consists of a display with 4 buttons and an On/Off switch. Refer to *Table 1 on page 15* for a description of each of these elements.

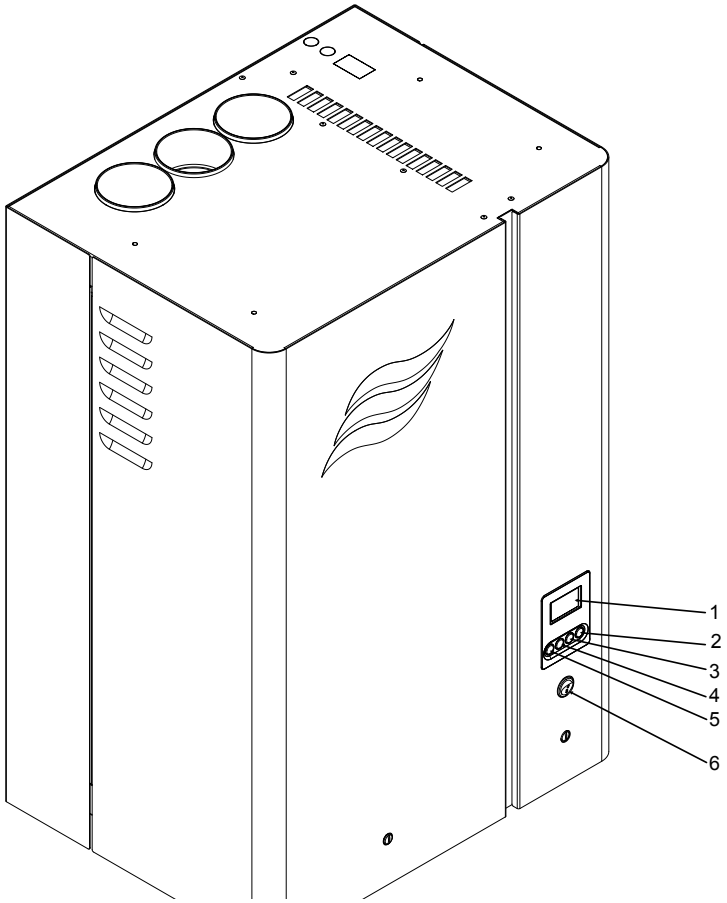


Figure 4: Nortec US Operator Interface

1 Display
2 Menu button
3 Up button
4 Down button
5 Enter button
6 On/Off switch

DANGER!
Risk of electric shock!

The control cabinet in the Nortec US ultrasonic humidifier has live voltage. Turning off the unit at the On/Off switch does not shut off power to the control cabinet. Touching live parts may cause severe injury or even death.

Prevention: Shut down the humidifier properly as described in *"Shutting Down" on page 22* **before accessing the control cabinet in the humidifier.**

Table 1: Touchscreen display -- > Display and Buttons

Element	Description
Touchscreen display	Allows the user to monitor or control the Nortec US ultrasonic humidifier. Refer to *"Control Software" on page 15* for details of the software interface.
On/Off switch	Allows the user to turn the Nortec US humidifier on or off.

4.2 Control Software

The control software runs in the background and controls all the functions of the Nortec US ultrasonic humidifier. The user interacts with the control software through the screens on the display. Details of the screens are described in the sections below.

Note: The screens shown in this chapter are for representation purposes only, and may differ from what is displayed on your humidifier.

4.2.1 Home Screen

When the Nortec US ultrasonic humidifier is turned on, it starts initializing and performs system checks. When initialization and system checks are completed successfully, it goes into the normal operating mode. The Home screen then appears on the display.

The major elements of the Home screen are shown in *Figure 5*.

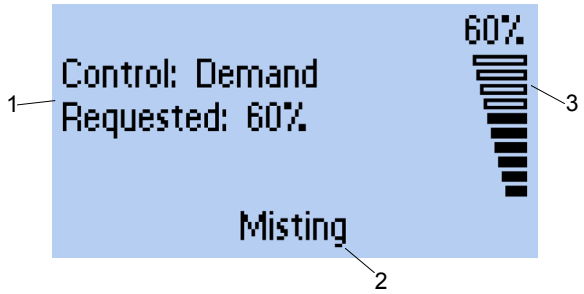


Figure 5: Home Screen Elements

1 Humidity control information – shows the type of control signal and the requested demand.
2 Operating/Service/Warning/Fault status message.
3 Visual indication of the current mist output level.

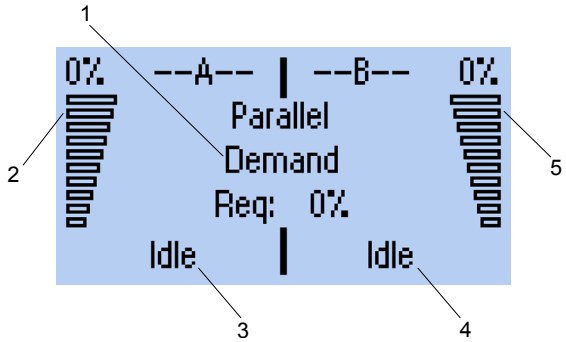


Figure 6: Home Screen Double Unit

1 Humidity control information – shows the type of control signal and the requested demand.
2 Humidifier A Visual indication of the current mist output level.
3 Humidifier A Operating/Service/Warning/Fault status message.
4 Humidifier B Operating/Service/Warning/Fault status message
5 Humidifier B Visual indication of the current mist output level.

4.2.2 General Navigational Elements

Figure 7 shows the user interface with display and buttons.

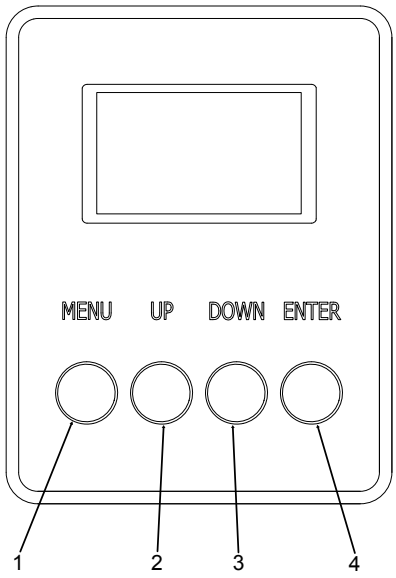


Figure 7: General Navigational Elements

1 **Menu** button – Entering and exiting (sub) menus.
2 Up button – Navigation through the menu and increment settings
3 **Down button – Navigation through the menu and decrease settings**.
4 Enter button – Access submenus and settings.

4.2.3 Operating and Fault Status

The operating status areas of the Home screen (refer to Figure 5) shows the current operating status message. The messages are described in *Table 2 on page 16*.

Table 2: Operating and Fault Status Descriptions

Message	Description
Starting	The humidifier is starting up.
Idle	The humidifier is idle and waiting for demand.
Idle Drain	The humidifier is idle and the reservoir is empty.
Filling	The reservoir is filling with water.
Misting	The humidifier is producing mist.
Flushing	The humidifier is flushing the water reservoir.
Ext. Disabled	The humidifier has been stopped via an external enable contact (remote enable/disable).
Safety Loop Open	The safety loop is interrupted.
Blower Pack Fault	A fault has occurred in one of the blower pack fans. The humidifier stops producing mist
Service Stop	The humidifier has stopped operation and needs service
Filling Timeout	The humidifier has exceeded the maximum allowed filling time. It will continue filling after a wait period.
Drain Fault	The humidifier detected a problem with the draining of the reservoir and stops operation.
UV Fault	The UV module detected a fault, the humidifier stops operation.

Message	Description
High temperature	The humidifier has detected a high temperature in the electronics and stops operation.
Fan failure	The interval fan has a malfunction and the humidifier stops operation.

4.2.4 Maintenance and Service Status

The Home screen shows service reminders on top of the normal information.

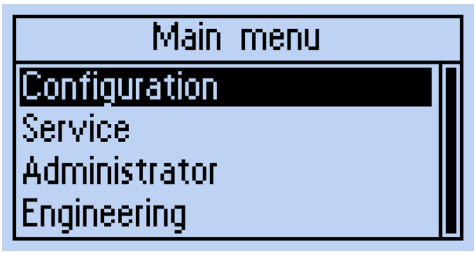
The generic service reminders displayed are described in *Table 3*

Table 3: Service Status Descriptions

Message	Description
Service Warning	This warning message appears if the control software has detected that the humidifier has been running for more than 2000 hours. It allows to continue using the humidifier for an extra 500 hours.
Service Required	This message appears if the control software has detected that the humidifier has been running for more than 2500 hours without service. The unit stops operating
UV Service Required	The UV assembly needs service / maintenance

4.2.5 Main Menu

Press the **<Menu>** button to view the Main menu.



To access the Configuration menu and its features, refer to *"Configuration Menu" on page 18*.

To access the Service menu and its features, refer to *"Service Menu" on page 21*.

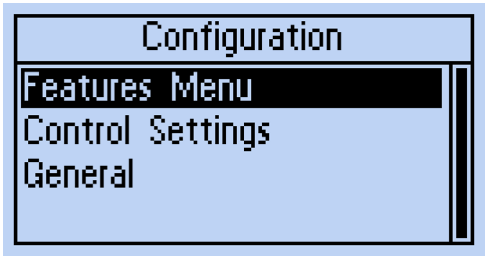
To access the Administrator menu and its features, refer to *"Administrator menu" on page 21*.

The structure of the Main menu and its sub-menus is shown in *Table 4*

Table 4: The structure of the Main menu and its sub-menus

Main Menu	*"Configuration Menu" on page 18*	*"Features menu" on page 18*	
		"Control Settings Menu" on page 18	Channel 1
			Channel 2
		"General Menu" on page 20	
	"Service Menu" on page 21		
	"Administrator menu" on page 21		
	Engineering” on page x		

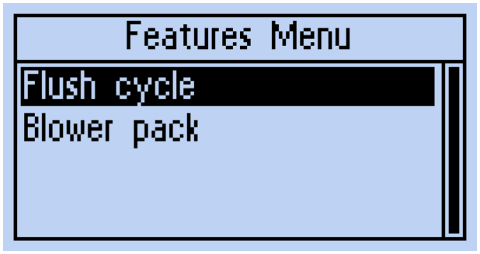
4.2.5.1 Configuration Menu



The configuration menu lets you configure the operation of the Nortec US humidifier. The menu and sub-menu items are discussed below. Refer to Table x on page x for the menu structure.

Features menu

Each item in the features menu is discussed below.



- **Flush cycle (A/B)**: Set the desired interval time in hours. A flush cycle is triggered as soon as the set interval time has elapsed of each reservoir.

  Setting range: 1-24 *hours*

  Factory setting: 1 *hour*

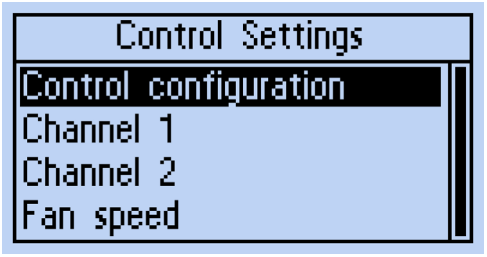
- **Blower pack (A/B)**: with this setting you can activate (“Installed") or deactivate (“Not installed") the software functions for the optional blower pack. .

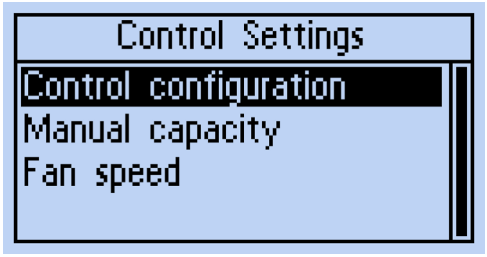
  Options: *Not installed or Installed*

  Factory setting: *Not installed*

Control Settings Menu

Each item and submenu under the Control settings menu is described below. Refer to the structure of the menus in *Table 2 on page 16*.





- **Dual humidifier mode**: allows you to configure the operation of humidifiers with dual nebulizing modules. **Note**: This function appears only on units with dual nebulizing modules.

  Options: *Parallel* – the modules operate in parallel based on humidifier demand. This results in a lower turn on ratio, but even wear on both modules.

  Series – the modules are modulated in sequence to meet humidifier demand. Module A will operate from 0-50% demand, and module B will operate from 51-100% demand.

  Independent – the modules work independently based on control signals from

two separate zones.

Factory setting: *Series*

- **Control configuration:** allows you to select the control configuration for the humidifier

  Options: *Single channel* – single control

  Dual channel – two control signals (typically a control, plus a high limit signal).

  Manual capacity – the demand of the humidifier is set manually.

  Factory setting: *Manual capacity*

- **Manual capacity:** allows you to set the manual capacity demand. **Note**: This function appears only if Control configuration is set to *Manual capacity.*

  Setting range: *0-100%*

  Factory setting: *0%*

- **Channel 1:** Submenu with channel 1 settings. Note: This submenu only appears if *Control configuration* is set to *Single* or *Dual* channel.

- **Channel 2**: Submenu with channel 2 settings. Note: This submenu only appears if *Control configuration* is set to *Dual* channel.

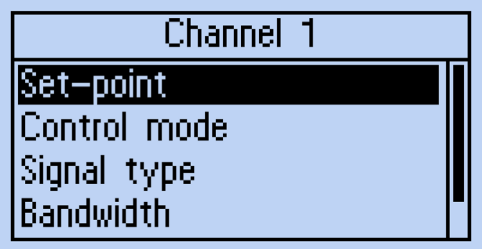
- **Fan speed**: allows you to set the blower fan speed.

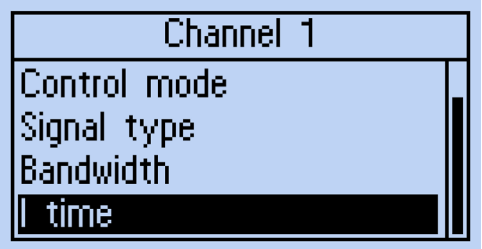
  Setting range: *0-100%*

  Factory setting: *100%*

Channel 1/2 Menu

The channel menu lets you configure the different options for each control channel.





- **Setpoint:** allows you to set the humidifier to operate at a fixed humidity setpoint value.
  Setting range: *0-100%*
  Factory setting: *50%*

- **Control mode**: allows you to select the general control mode for the incoming control signal
  Options: *Demand* – control signal is from an external controller
  RH P – control signal uses the internal P (proportional) controller to interpret sensed humidity into demand.
  RH PI – control signal uses the internal PI (proportional-integral) controller to interpret sensed humidity into demand.
  On/Off – control signal is from an external On/Off humidistat.
  Factory setting: *Demand*

- **Signal type:** allows you to select the signal type of the incoming control signal.

  Options: *0-5V, 1-5V, 0-10V, 2-10V, 0-20V, 0-16V, 3.2-16V, 0-20mA, 4-20mA*

  Factory setting: *0-10V*

- **Bandwidth:** allows you to adjust the proportional range of the internal P/PI controller as a percentage of relative humidity (% RH) within which the humidifier will modulate between 0 and 100% output.

  Setting range: *2-65%*

  Factory setting: *10%*

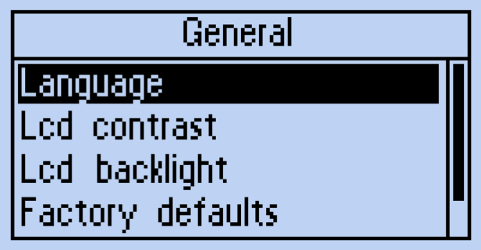
- **I time**: allows you to set the integral time for error corrections by the internal PI controller.

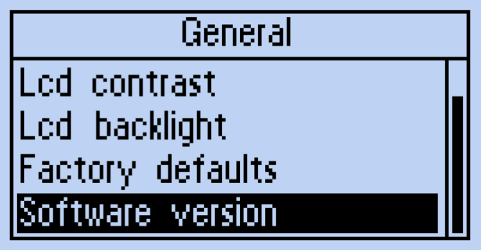
  Setting range: *1-60 minutes*

  Factory setting: *5 minutes*

General Menu

Each item of the General menu is discussed below. Refer to *Table 2 on page 16*





- **Language:** allows you to adjust the language of the user interface of the humidifier

  Options: *English*

  Factory setting: *English*

- **LCD contrast:** allows you to adjust the LCD contrast.

  Setting range: *1-10*

  Factory setting: *5*

- **LCD backlight:** allows you to adjust the LCD backlight timeout

  Setting range: *0-60 seconds*

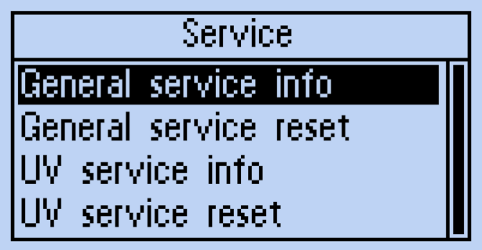
  Factory setting: *30 seconds*

- F**actory defaults:** allows you to restore the factory default settings of the humidifier.

- **Software version:** allows you to view the software version of both the controller and the driver board(s) installed.

4.2.5.2 Service Menu

The Service menu lets you view and reset the status of the General and UV service reminders.



- **General service info:** allows you to view the current runtime hours and remaining hours before a general service has to be performed.
- **General service reset:** allows you to reset the general service reminder after a general service has been performed.
- **UV (A/B) service info:** allows you to view the current runtime hours and remaining hours before a UV service has to be performed. Note: On units with dual humidifier modules a separate setting for UV A and UV B is available.
- **UV (A/B) service reset:** allows you to reset the UV service reminder after a UV service has been performed. Note: On units with dual humidifier modules a separate reset function for UV A and UV B is available.

4.2.5.3 Administrator menu

To be done later.

4.3 Software Configuration

To be included if found necessary

5 Operation

5.1 General

Personnel Qualifications

The Nortec US ultrasonic humidifier must only be operated by personnel who are adequately qualified, well trained and are authorized by the customer.

Safety

Certain operations of the Nortec US ultrasonic humidifier may require the user to access the control cabinet or plumbing cabinet, which may expose the user and equipment to the hazards described below.

DANGER!
Risk of electric shock!

The Nortec US ultrasonic 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: Shut down the unit as described in *"Shutting Down" on page 22* before opening the door panels.

CAUTION!
Electrostatic discharge (ESD)!

The electronic components inside the control cabinet in 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.

5.2 Operating Procedures

5.2.1 Starting Up

Start the Nortec US ultrasonic humidifier as follows:

1. Set the On/Off button to the On position – *Figure 4 on page 13*

   The control software then starts initializing and performs system checks. When initialization and system checks are completed successfully, the Home screen is displayed on the LCD – refer to *Figure 5 on page 15* The humidifier goes into normal operating mode.

   The humidifier starts with a water line flush of 20 seconds to remove all standing water from the water lines. The water is send to the drain during the water line flush.
   After the water line flush the humidifier starts filling the reservoir. This will take between 2 and 5 minutes depending on the water pressure.

   When the water reaches the desired level inside the reservoir, the humidifier will be ready to produce mist. If there is no humidity demand, the humidifier will remain in the IDLE state and wait for a humidity demand.

5.2.2 Remote Monitoring

The Nortec US ultrasonic humidifier can be monitored remotely by connecting the fault relay to a remote monitoring system.

[Add specific information on the fault relay function after the specification document is revised and the software is updated]

5.2.3 Inspections During Operation

Perform regular inspection of the Nortec US ultrasonic humidifier and the humidification system when it is in operation. Inspect the following:

- ☐ Check the water and mist connections for any leakages.
- ☐ Check the humidifier and other system components have not shifted from their mountings, and are fastened securely.
- ☐ Visually check the electrical wiring for any damage.
- ☐ Check the Home screen on the humidifier for maintenance or alarm messages.

If any irregularities (leakages, fault messages or damaged components) are found, shut down the the Nortec US ultrasonic humidifier before performing service – refer to *"Shutting Down" on page 22*. If you require assistance, contact your Nortec representative for assistance.

5.2.4 Manually Initiate Reservoir Draining

The reservoir of the Nortec US ultrasonic humidifier is drained after switching Off the On/Off button of the humidifier. The humidifier opens the drain valve for 70 seconds to allow the complete draining of the reservoir.

5.2.5 Shutting Down

DANGER!
Risk of electric shock!

The control cabinet in the Nortec US ultrasonic humidifier has live voltage. Turning off the unit at the On/Off switch does not shut off power to the control cabinet. Touching live parts may cause severe injury or even death.

Prevention: Before performing any work inside the humidifier or with the humidification system, shut down the humidifier properly as described below.

Shut down the Nortec US ultrasonic humidifier as follows:

1. Shut off the water supply to the humidifier.
2. Make a note of the fault code, if any, displayed on the Home screen.
3. Set the On/Off button to the Off position
4. Wait for the humidifier to drain the reservoir and shutdown.
5. Disconnect the power supply to the humidifier at the external disconnect switch. To prevent accidental power-up, lockout and tag out according to the established safety practices at your facility.

5.2.6 Restarting After Shutdown

Restart the Nortec US ultrasonic humidifier after a shutdown as follows:

DANGER!
Risk of harm to personnel or damage to property.

Operating a damaged or improperly secured humidifier presents a risk of danger to personnel or damage to property.

Prevention: Do not restart a damaged or improperly secured humidifier.

1. Examine the humidifier and other system components for damage. Check for loose or damaged electrical connections, and make sure that the humidifier and its components have not shifted from their mountings, and are fastened securely.
2. Turn on the water supply to the humidifier, and check for any water leaks.
3. Install both door panels. Make sure that they are fastened securely. Refer to *"Regular Maintenance of Utrasonic Humidifier" on page 23*.
4. Remove the lock and tag from the external disconnect switch, and restore power to the humidifier.
5. Set the On/Off button to the On position.
   The humidifier then powers up and awaits a humidity demand signal to resume mist production.

6 Maintenance

6.1 General

Perform only those maintenance procedures described in this manual, and follow all instructions closely.

Use only original Nortec replacement parts.

Personnel Qualifications

Maintenance work in the Nortec US ultrasonic humidifier must only be performed by well qualified and properly trained personnel authorized by the customer. It is the customer's responsibility to verify qualifications of the personnel.

Safety

Certain maintenance tasks in the Nortec US ultrasonic humidifier may require the user to access the inside of the control and plumbing cabinets in the humidifier, which may expose the user and equipment to the hazards described below.

DANGER!
Risk of electric shock!

The Nortec US ultrasonic 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: Shut down the unit as described in *"Shutting Down" on page 22* before performing any maintenance work.

CAUTION!
Electrostatic discharge (ESD)!

The electronic components inside the control cabinet in 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.

6.2 Maintenance List

Regular maintenance of the Nortec US ultrasonic humidifier is a requirement for maintaining the safety and operational efficiency of the humidifier. Maintenance of the Nortec US ultrasonic humidifier is broken down into two categories – regular replacement of the piezoelectric transducers, and regular maintenance of the ultrasonic humidifier.

6.2.1 Regular Replacement of the Piezoelectric Transducers

The Nortec US humidifier uses piezoelectric transducers to produce mist. These transducers have an average life of 10,000 hours. To ensure optimal performance it is advised to replace the piezoelectric transducers every year during the regular maintenance of the ultrasonic humidifier- see *"Regular Replacement of the Piezoelectric Transducers" on page 24*

6.2.2 Regular Maintenance of Ultrasonic Humidifier

Regular maintenance should be performed on the Nortec US ultrasonic humidifier at least once a year,

Table 5: Maintenance List

Component	Description	Frequency
Drain valve	Inspect and clean, if necessary – refer to *"Removal and Installation of Drain Valve" on page 28*.	Annually
Fill valve	Remove and clean the fill valve strainer.	Annually
Drain cup	Inspect and clean, if necessary.	Annually
Fill cup and hoses	Inspect and clean, if necessary.	Annually
Mist installation	Inspect the mist pipes and condensate hoses in the humidifier for cracks, and check that they are fastened securely. Replace cracked pipes and hoses.	Annually
Water installation	Inspect the water hoses for cracks, and check that they are fastened securely. Replace cracked hoses. Clean the water filter in the supply line.	Annually
Electrical installation	Inspect all cables for damage and insulation breakdown. Replace damaged cables. Make sure that all cables are securely properly.	Annually

6.3 Maintenance Procedures

Make sure that the humidifier is shut down properly as described in *"Shutting Down" on page 22*, and observe all safety precautions before performing any maintenance work on the humidifier.

6.3.1 Removal and Installation of Door Panels

Removal

Remove the two door panels in the humidifier as follows. Refer to *Figure 10*.

1. Turn the captive screw in each door panel counter-clockwise with a screwdriver.
2. Lift up the door panel slightly so that the tabs clear the notches in the cabinet, then carefully remove the panel.

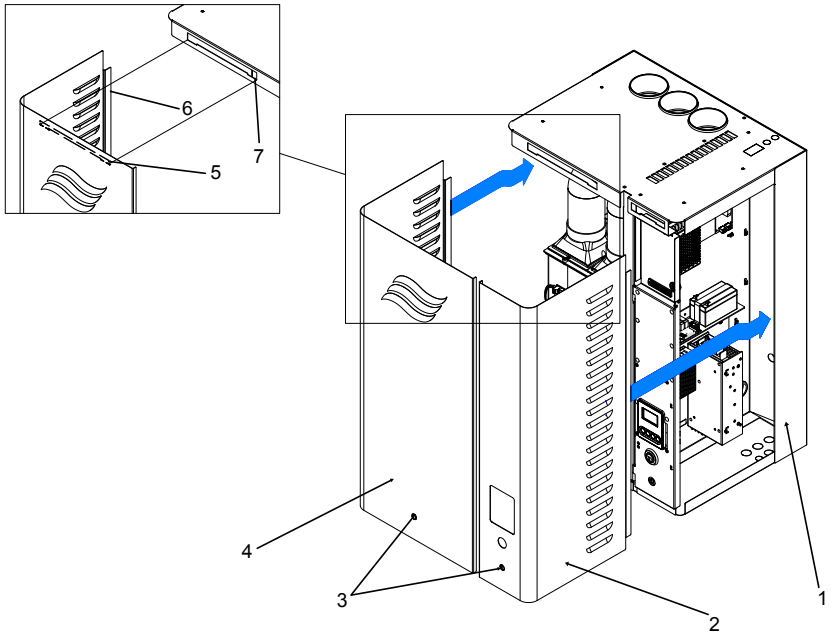


Figure 10: Door Panels Removal and Installation

1 Stationary panel
2 Door panel, control cabinet
3 Captive screw
4 Door panel, plumbing cabinet
5 Top tab, door panel
6 Long tab, door panel
7 Notch, cabinet

Installation

Install the two door panels in the humidifier as follows. Refer to *Figure 10*.

1. Position each door panel so that the two tabs in the top rear of the panel align with the notches in the cabinet.
2. Lower the door panel to seat the tabs in the notches, while ensuring that the long tab on the side of the panel slides behind the stationary panel.
3. Make sure that the door panel fits flush on the front and the side. Turn the captive screw in the door panel clockwise with a screwdriver to secure the door panel. Check that it is fastened securely.

6.3.2 Removal and Installation of Water Reservoir

Removal

Remove the water reservoir as follows. Refer to *Figure 11*.

1. Shut down the humidifier as described in *"Shutting Down" on page 22*.
2. Remove the door panels – refer to *"Removal and Installation of Door Panels" on page 25*.
3. Remove the mist pipes on top of the water reservoir.
4. Disconnect the two electrical connectors on the water reservoir.
5. Disconnect the earth connector from the earth tab.
6. Unscrew fastening bolt on the top of the water reservoir.
7. Lift the water reservoir out of the drain valve by wiggling the reservoir.
8. Discard the O-ring in the drain valve.

Installation

Install the water reservoir as follows. Refer to *Figure 11 on page 27*.

1. For Safety reasons, always install a new O-ring in the drain valve when installing the reservoir. Lubricate the O-ring with water – do not use grease or oil, or any other lubricant.
2. Make sure the new reservoir is of the same model as the one removed. This can be determined by the size of the reservoir or the number of piezo transducers.
3. Position the water reservoir above the drain valve. Carefully slide the drain connection of the reservoir into the drain valve.
4. Insert and tighten the two fastening bolts on top of the reservoir to secure the reservoir in place.
5. Connect the earth connection on the earth tab.
6. Connect the two electrical connectors on the water reservoir.
7. Install the mist pipes on top of the water reservoir.
8. Restart the humidifier as described in *"Restarting After Shutdown" on page 22*.

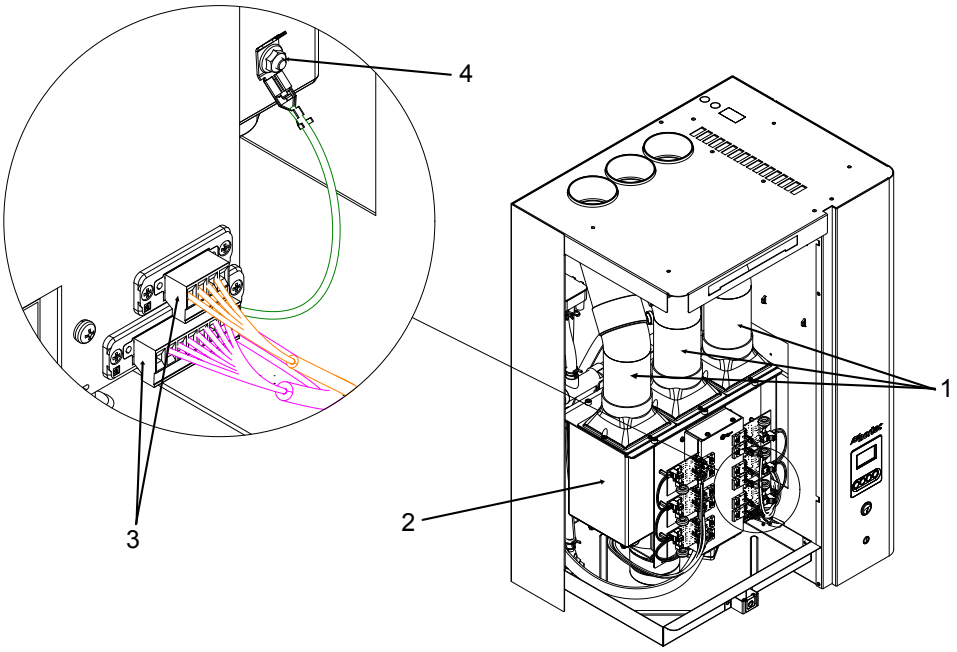


Figure 11: Water Reservoir and Connections

1 Mist pipes
2 Water reservoir
3 Electrical connections
4 Earth connection

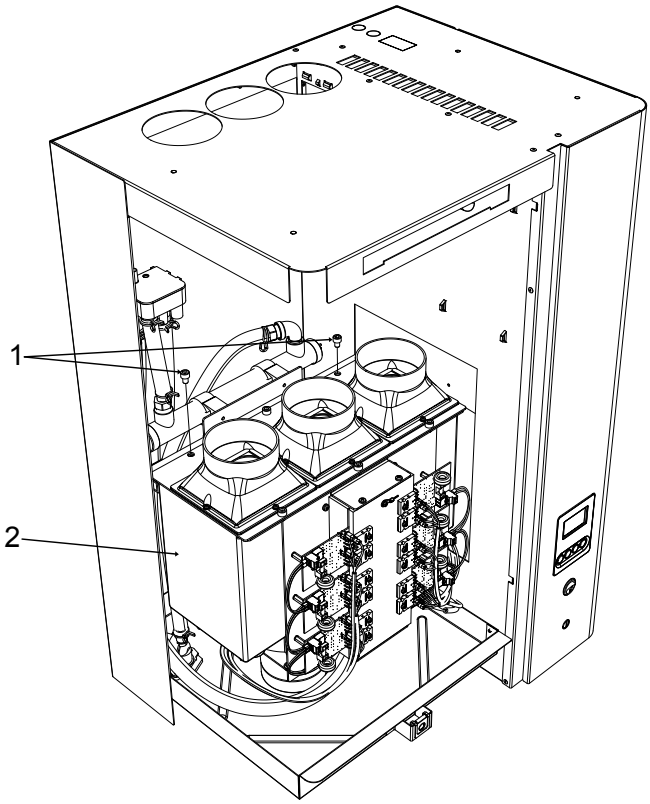


Figure 12: Water Reservoir Mounting

1 2 x Hexagon socket screw M6 x 8mm
2 Water Reservoir

6.3.3 Removal and Installation of Drain Valve

Removal

Remove the drain valve as follows. Refer to *Figure 13*.

1. Remove the water reservoir – refer to *"Removal and Installation of Water Reservoir" on page 26*.
2. Release the hose clamp, and disconnect the fill hose (fill cup to cylinder) from the drain valve.
3. Disconnect the electrical connectors and the ground wire from the drain valve.
4. Remove the two screws that secure the drain valve to the cabinet.
5. Remove and discard the O-ring in the drain valve.
6. To disassemble the valve, loosen the brass nut and remove the solenoid assembly from the valve body.
7. Disassemble the solenoid assembly, and clean all components.

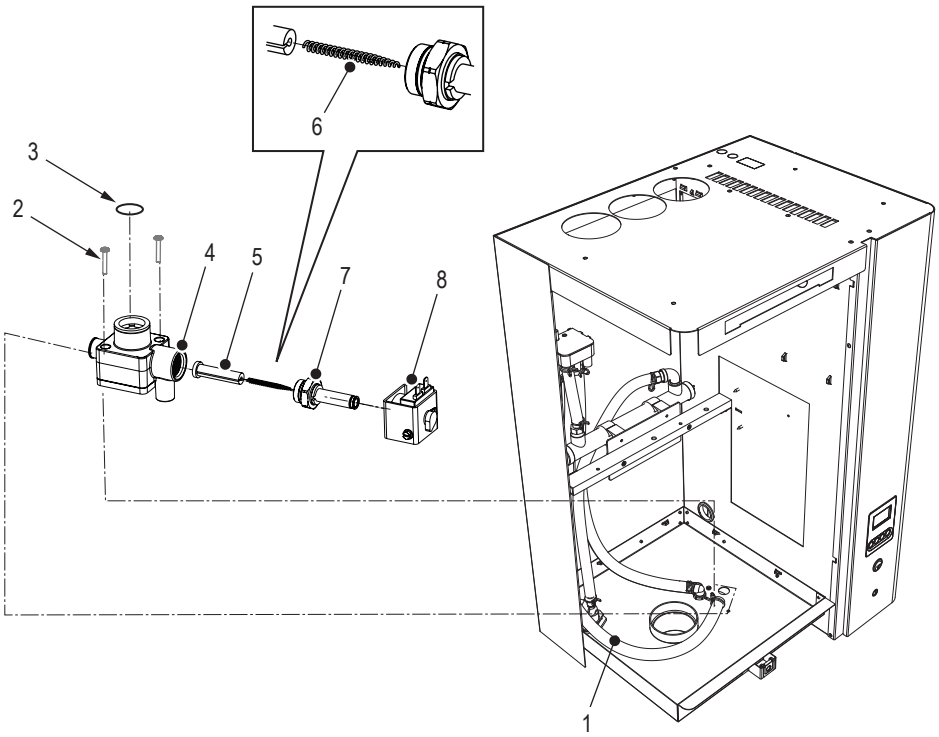


Figure 13: Drain Valve Removal and Installation

1 Fill hose (fill cup to cylinder)
2 Screw (×2)
3 O-ring
4 Valve body
5 Plunger
6 Spring (notes its orientation)
7 Brass nu and solenoid
8 Solenoid

Installation

Install the drain valve as follows. Refer to *Figure 13*.

1. For safety reasons, always install a new O-ring in the drain valve.
2. Assemble the solenoid assembly making sure that the tapered end of the spring is oriented as shown.
3. Assemble the solenoid assembly to the valve body, and hand-tighten. Then turn an additional quarter turn.
4. Install the drain valve and secure it to the cabinet with the two screws.

5. Connect the fill hose to the drain valve, and secure it with the hose clamp.
6. Connect the electrical connectors to the drain valve.
7. Install the water reservoir – refer to *"Removal and Installation of Water Reservoir" on page 26*.

6.3.4 Replacement of Fuses

DANGER!
Risk of electric shock!

The Nortec US ultrasonic 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: Shut down the unit as described in *"Shutting Down" on page 22* before replacing the backup battery or fuses.

CAUTION!
Electrostatic discharge (ESD)!

The electronic components inside the control cabinet in 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.

Only a qualified service technician authorized by the customer should replace the fuses in the humidifier.

Always replace defective fuses with new fuses that match the specifications given in the procedure below. **Never** short-circuit and bypass the fuses.

Replace the backup battery fuse and the driver board fuse as follows. Refer to *Figure 14 on page 30*.

1. Remove the door panel on the control cabinet. Remove the locking screw and swing the front panel open.
2. Replace the fuse “F1”, located on the driver board, with a new slow-acting 315mA fuse.
3. Replace the fuse “F1”, located on the battery backup board with a new slow-acting 4A fuse
4. Close the front panel and install the locking screw to secure it. Install the door panel, making sure that it is fastened securely.

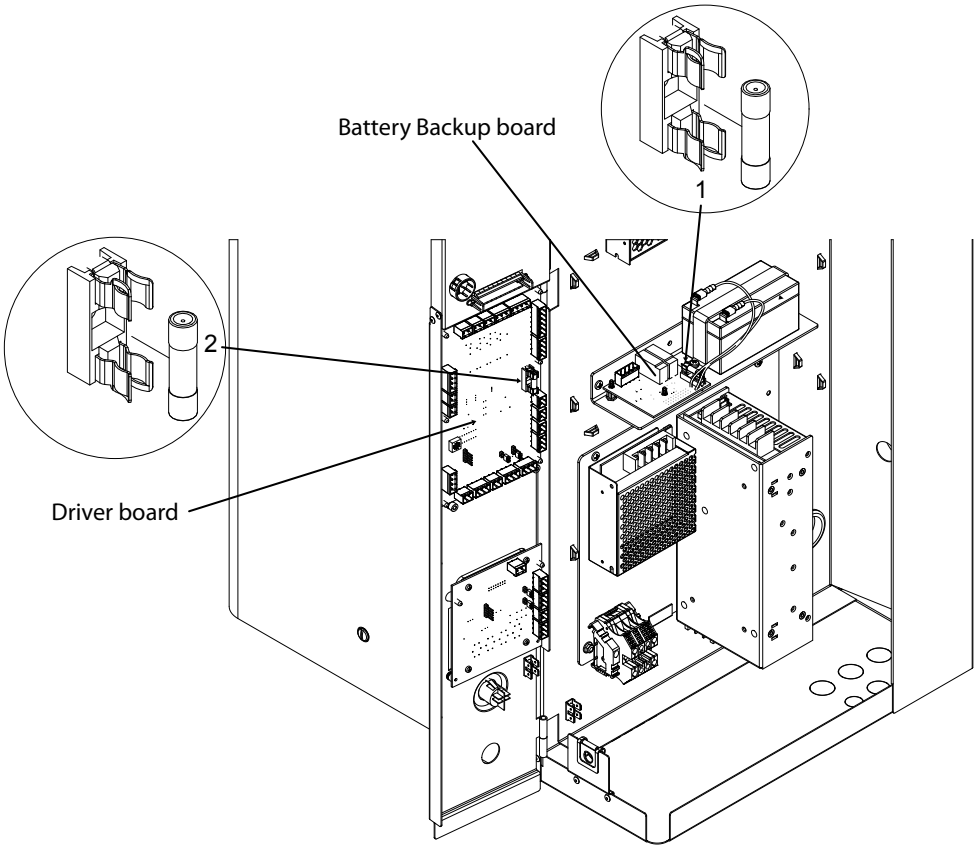


Figure 14: Backup Battery and Fuses Replacement

1 Fuse 4A, slow-acting
2 Fuse 315mA, slow-acting

Replace the ultrasonic driver board fuse as follows. *Figure 14 on page 30*.

1. Remove the door panel on the plumbing cabinet. Remove the locking screw and swing the front panel open.
2. Replace the fuse “F1”, located on the Piezo driver board, with a new 3.15A slow-acting fuse.
3. Close the front panel and install the locking screw to secure it. Install the door panel, making sure that it is fastened securely.

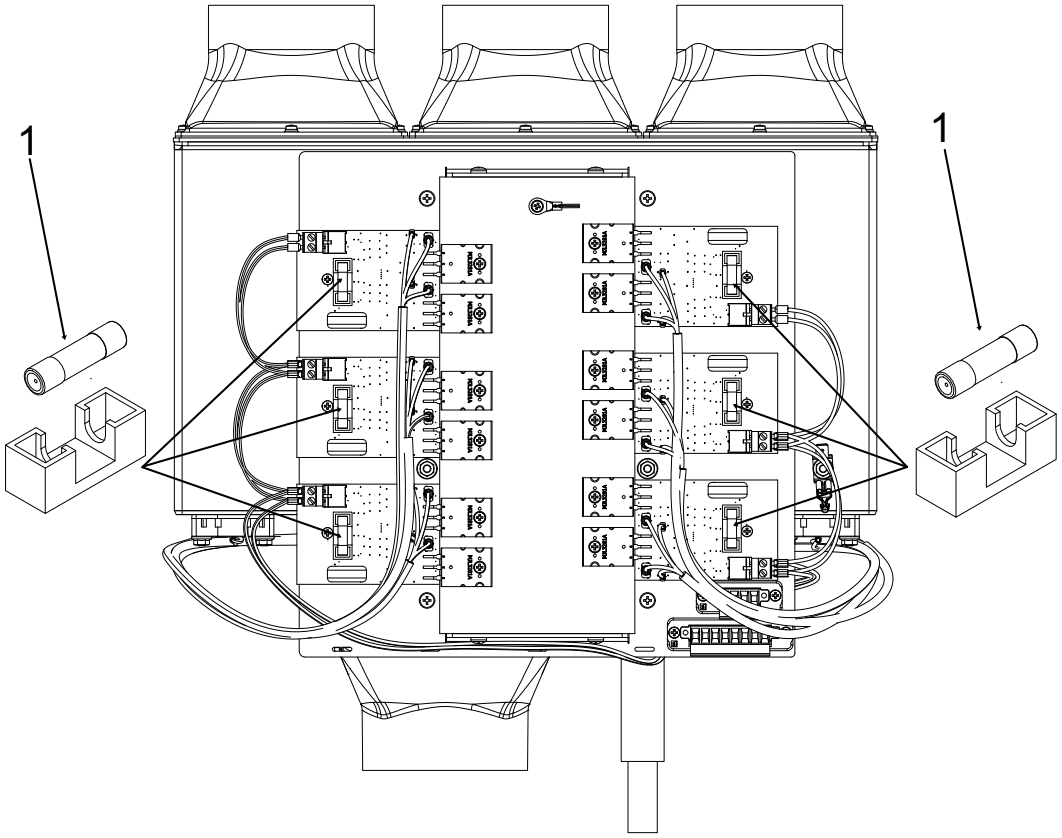


Figure 15: Fuse Replacement on Piezo Boards

1 Fuse 3,15A, slow acting

6.3.5 Replacement of piezo transducers

Replace piezo transducers on the water reservoir as follows.

Removal

1. Remove the water reservoir from the humidifier as described in *"Removal and Installation of Water Reservoir" on page 26*.
2. Position the reservoir upside down on a flat surface to access the piezo transducers.
3. Remove the two screws that secure the fan assembly to the water reservoir. *Figure 10 on page 25*.
4. Remove the two nuts that secure the transducer holder to the water reservoir. Lift the transducer holder upward to remove it from the reservoir. *Figure 17 on page 33*.
5. Disconnect the two transducer wires from the transducer driver board.

Installation

1. Position the new transducer over the threaded studs and slide it downward. Make sure the transducer is mounted in the right direction. The contacts on the transducer holder should point to the center of the water tank. *Figure 17 on page 33*.
2. Secure the transducer holder with the two nuts to the water reservoir.
3. Connect the two wires of the transducer to the transducer driver board.
4. Install the fan assembly and secure it to the water reservoir with the two screws. *Figure 16 on page 32*.
5. Install the water reservoir into the humidifier as described in *"Removal and Installation of Water Reservoir" on page 26*.

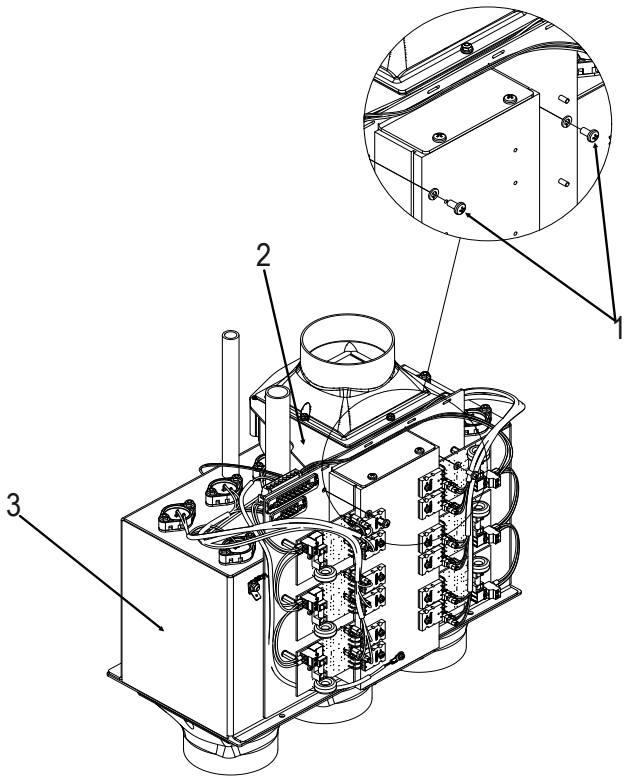


Figure 16: Removal of FAN Assembly

1 Screw
2 Fan assembly
3 Water reservoir

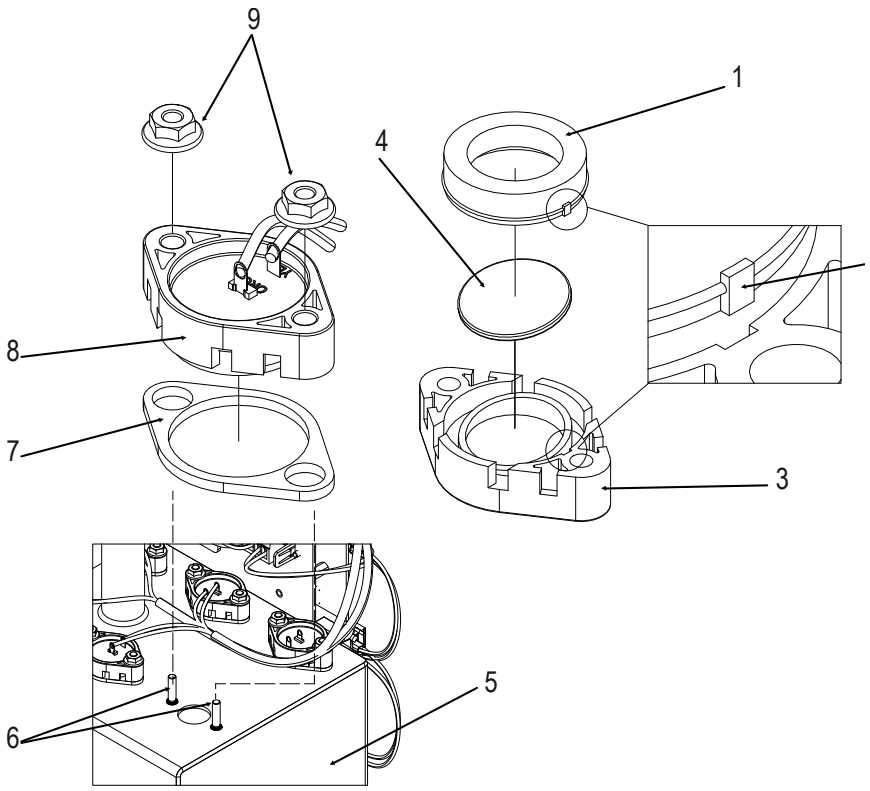


Figure 17: Replacing Piezo Transducers

1 Rubber seal
2 Notch position
3 Empty holder
4 Piezoelectric transducer
5 Water reservoir
6 Threaded studs
7 Transducer spacer
8 Transducer with holder
9 Nut (*2)

6.3.6 Replacing the transducer driver board

Removal

Remove the transducer driver board as follows. *Figure 18 on page 34*.

1. Unplug the power connector
2. Unplug the transducer connections
3. Remove the 3 screws, that secure the driver board to the water reservoir
4. Remove the driver board

Installation

Install the transducer driver board as follows. *Figure 18 on page 34* and *Figure 19 on page 34*

1. Apply thermal paste on the transistors, as shown in *Figure 17*. Start with a dot of thermal paste and evenly spread the paste on the transistors.
2. Secure the transistors to the water reservoir with two screws.
3. Secure the board to the water reservoir with one screw.
4. Connect the transducer wires (2*orange and 2*yellow) to the driver board,
5. Connect the power wire to the board.

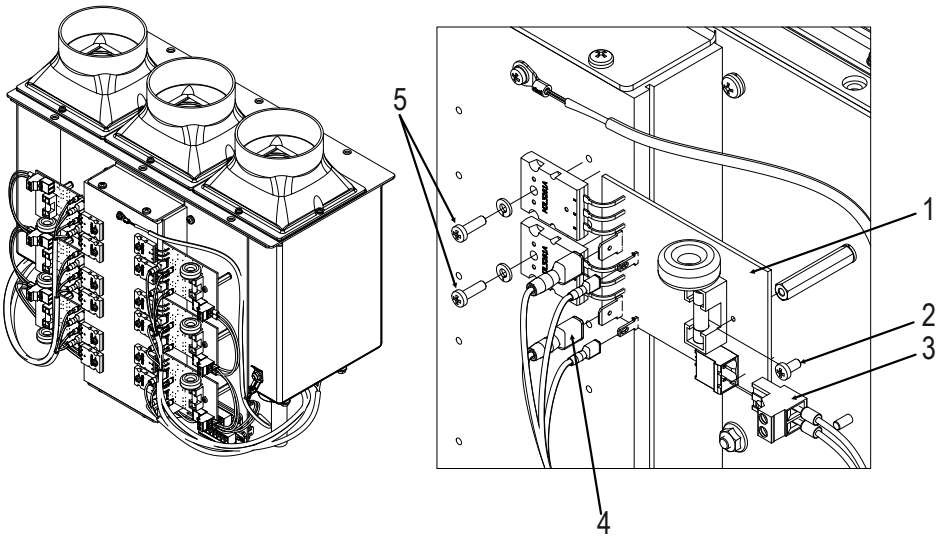


Figure 18: Replacing the transducer driver board

1 Transducer driver board
2 Screw
3 Power connector
4 Transducer wires
5 Screw (*2)

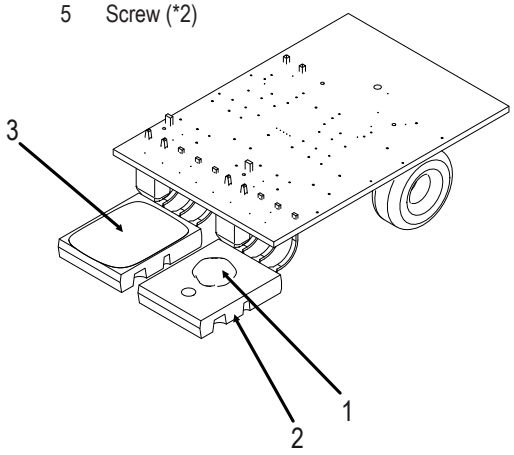


Figure 19: Applying Thermal Paste to the Driver Board

1 Dot of thermal paste
2 Transistor
3 Thin layer of thermal paste

6.3.7 Removal and installation of the UV assembly

Removal

1. Remove the water reservoir from the humidifier – refer to *"Removal and Installation of Water Reservoir" on page 26*
2. Disconnect both water hoses.
3. Remove the two screws that secure the UV assembly to the cabinet.
4. Disconnect the electrical connectors from the ballast if necessary.

Installation

1. Connect the electrical connectors to the ballast
2. Install the UV assembly and secure it to the cabinet with the two screws
3. Connect both water hoses.
4. Install the water reservoir – refer to *"Removal and Installation of Water Reservoir" on page 26*.

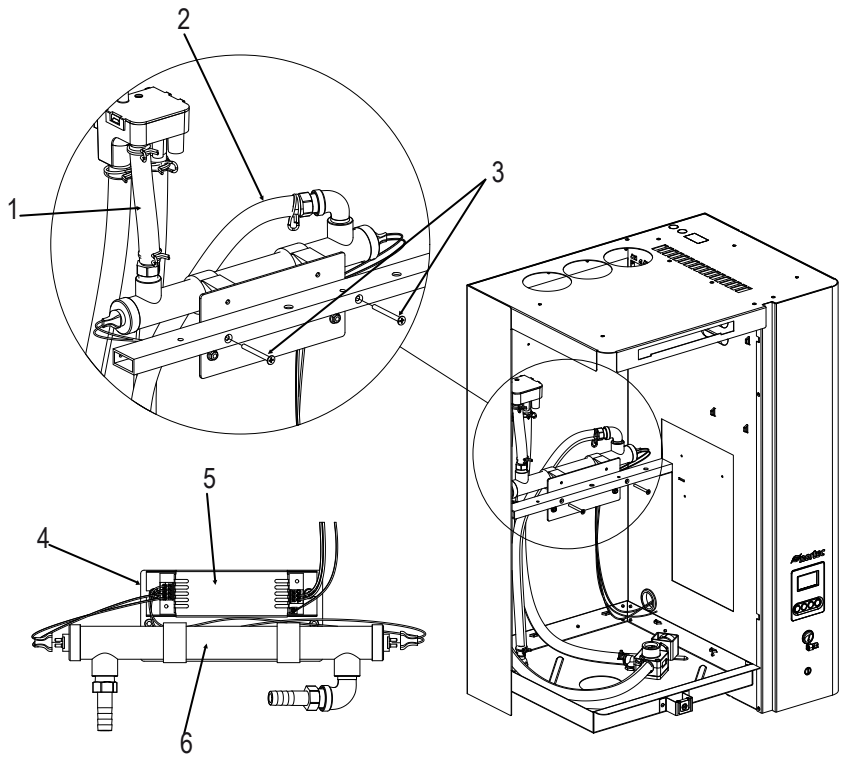


Figure 20: Removal and installation of the UV assembly

1 Water connection to fill cup
2 Water connection from fill valve
3 Screws (*2)
4 UV assembly
5 Electronic ballast
6 UV reactor

6.4 Cleaning

6.4.1 Cleaning Agents

Use only the cleaning agents described in the procedures below. Disinfectants may only be used if they do not leave behind toxic residue. Rinse all parts thoroughly with clean tap water after cleaning.

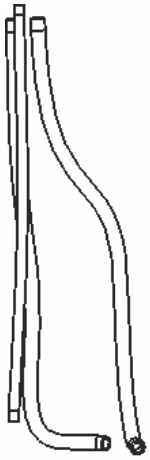
Follow all instructions, and observe the safety precautions stated below.

CAUTION!
Risk of damage to the humidifier components!

Do not use solvents, aromatized or halogenized hydrocarbons, or other harsh chemicals for cleaning.

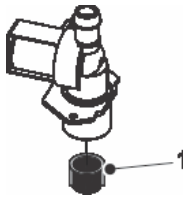
6.4.2 Cleaning Procedures

Water Hoses



Use a rubber mallet to knock out any scale buildup in the hoses. Rinse the hoses thoroughly with hot tap water.

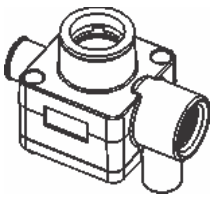
Fill valve



1 Strainer

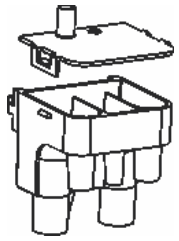
Use a soft-bristled brush (not wire brush) to carefully remove any scale buildup inside the fill valve and in the strainer.

Drain Valve - Valve Body



Use a soft-bristled brush (not wire brush) to remove any scale buildup inside the valve body of the drain valve.

Fill Cup

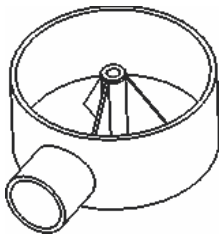


Release the two tabs and remove the cover on the fill cup.

Use a soft-bristled brush (not wire brush) to remove any scale buildup inside the fill cup.

Reinstall the cover on the fill cup.

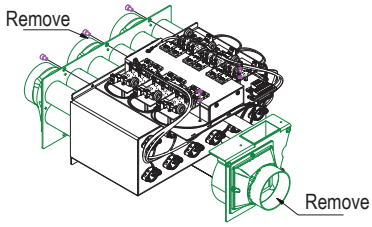
Drain Cup



Use a soft-bristled brush (not wire brush) to carefully remove any scale buildup inside the drain cup.

Wash the drain cup with lukewarm soap solution, and rinse thoroughly with tap water.

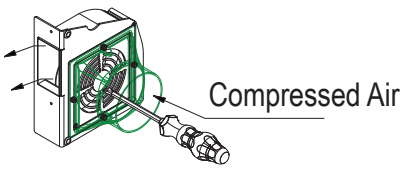
Reservoir



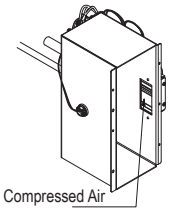
Remove the two screws that secure the fan assembly to the water reservoir.

Remove the four screws that secure the outlet flange to the water reservoir.

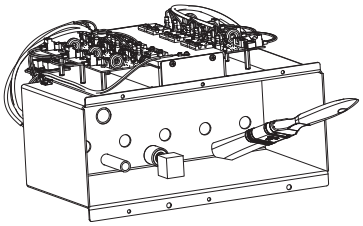
Clean the outlet flange with hot water and dish soap.



Lock the fan rotor by inserting a screwdriver and blow compressed air into the fan assembly to remove dust.



Blow compressed air through the heat sink to remove build-up dust.



Clean the inside of the reservoir with warm

water and soap. Use a brush or sponge to remove dirt from the reservoir.

7 Fault Isolation

7.1 General

Troubleshooting of the Nortec US Ultrasonic humidifier must only be performed by well qualified and well trained personnel. Electrical repairs must only be performed by a licensed electrician authorized by the customer or by Nortec service technicians.

Troubleshooting the Nortec US Ultrasonic humidifier may require the user to access the inside of the control and plumbing cabinets in the humidifier which may expose the user and equipment to the hazards described below.

DANGER!
Risk of electric shock!

The Nortec US Ultrasonic 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: Shut down the unit as described in*"Shutting Down" on page 22* before performing any work inside the humidifier.

CAUTION!
Electrostatic discharge (ESD)!

The electronic components inside the control cabinet in 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.

7.2 Fault Indication

When a condition that is not normally expected occurs, it is detected by the control software and a warning or fault message is displayed in the Service/Warning/Fault status area of the Home screen (refer to *Figure 5 on page 15*).

7.3 General Troubleshooting

Most operational warning/fault conditions are caused by improper installation, or by not adhering to the suggested best practices for installation of the humidifier and system components. Hence, a full fault diagnosis always requires a thorough examination of the entire system (hose connections, control systems, etc.).

Table 6 to *Table 8* provide general guidelines for troubleshooting the US humidifier and other auxiliary system components. For detailed troubleshooting information of the auxiliary system components, refer to their product manuals.

The list of US warning and fault messages, and corrective actions are shown in *Table 8 on page 41*.

Humidifier

Table 6: General Troubleshooting –US Humidifier

Problem	Probable Cause	Corrective Action(s)
Nothing happens when the On/Off switch is turned On.	Blown fuse(s).	– Check the fuses ("F1" and "F3") on the driver board. Replace, if necessary.
	Incorrect voltage, or no voltage.	– Check the disconnect switch in the supply line.
	Step-down transformer not outputting 24VAC.	– Replace the transformer. Verify primary wiring.
Humidifier will not produce mist or does not reach RH setpoint value.	Safety loop is open.	– Check if the message "Safety Loop" is displayed in the operating status area of the Home screen. – Check if there is 24DC supply at low voltage terminal strip contact "2". – Check that all On/Off devices connected to low voltage terminal strip contacts "1" and "2" are wired properly, and their contacts are closed when they should be.
	Output is limited by the high limit humidistat signal.	– Check if the high limit humidistat is installed too close to the humidifier, and if it is operating correctly.
	No signal on Channel 1.	– Check voltage between low voltage terminal strip contacts "3" and "4". For a demand signal configuration, the signal must be 10% of full scale signal for the humidifier to start. For a transducer signal configuration, the signal must be lower than the setpoint value for the humidifier to start.
	No signal on Channel 2 (on units with *Control Configuration* set to "Dual").	– Check voltage between low voltage terminal strip contacts "3" and "5". For a demand signal configuration, the signal must be 10% of full scale signal for the humidifier to start. For a transducer signal configuration, the signal must be lower than the setpoint value for the humidifier to start.
	Capacity has been manually limited.	– Check/adjust *Manual Capacity*, if necessary.
Humidifier displays warning or fault message.	The control software has detected an abnormal condition.	– Refer to *"Nortec US Warning and Fault List" on page 41*.
Humidifier will not produce mist, or does not reach RH setpoint value	Grease in water reservoir	– Check if the transducers operate and add a droplet of dish soap to the water reservoir. – Clean water reservoir

Digital Humidistats

Table 7: General Troubleshooting – Digital Humidistats

Problem	Probable Cause	Corrective Action(s)
Humidistat reading humidity levels incorrectly.	Sensor out of calibration.	– Calibrate the sensor – refer to humidistat manual.
	Improper sensor location.	– Check that the humidistat is installed at a location which correctly represents the humidity in the room. Relocate, if necessary.
	Exposed to draft or heat source.	– Check that heat/cold fluctuations, drafts, sunlight, doors, or vents do not are affect the humidity reading. Relocate, if necessary.
	No vapor barrier.	– Make sure that the vapor barrier is in place and working, so that drafts cannot affect the humidity reading.

7.4 Nortec US Warning and Fault List

Table 8 shows the list of warning and fault messages triggered by the control software in the US humidifier, and the corrective actions.

Table 8: Nortec US Warning and Fault List

Message	Probable Cause	Corrective Action(s)
Filling timeout	Permissible filling time exceeded.	– Wait 3 minutes and the unit will start filling again.
	Water supply line clogged, shutoff valve closed, or a clogged filter.	– Check supply line, shutoff valve, filter and water pressure.
	Leaks in the water supply.	– Clean the strainer in the inlet valve. Replace the inlet valve, if necessary.
Drain fault	Permissible draining time exceeded.	
	Drain line clogged.	– Clean the drain line.
	Clogged or defective drain valve.	– Clean the drain valve. Replace the drain valve if necessary.
	Water level sensor stuck.	– Clean the water level sensor inside the reservoir.
Blower pack fault	Blower pack not connected or installed	– Disable blower pack in the Features Menu - refer to “Features Menu” *on page 18*
	Blower pack defective	– Consult the blower pack manual for further instructions.
High temperature	Ambient temperature too high.	– Check if the ambient temperature is within operating range.
Fan failure	Blower fan blocked.	– Clean fan - refer to “Cleaning Reservoir” *on page 37*
	Blower fan defective.	– Replace the blower fan.
UV fault)	UV tube defective.	– Check connections on the UV tube and if necessary replace the UV tube.
	UV ballast defective..	– Check connections on the UV ballast and if necessary replace the ballast or UV assembly.
Service stop	A service interval is overdue.	– Perform the needed service on the humidifier and reset the service interval.
Driver board (A/B) disconnected.	No communication between the controller and driver board.	
	Communication cable between the driver board and the control board not connected properly.	– Make sure the RS485 cable is connected to RS485 on the driver board and SAB on the control board.
	S2 switch on the driver board may not be set correctly.	– Set the S2 switch to “0” on driver board A, and “1” on driver board B, and power cycle the humidifier.
	Unexpected driver board fault..	– Contact your Nortec representative.

1.

7.5 Resetting Fault Status

Reset a condition in the humidifier with a "Fault" status as follows:

1. Set the On/Off button to the Off position.
2. Wait approximately for 5 seconds, then set the On/Off button to the On position.

   If the alarm condition has been eliminated, the fault message is automatically reset; otherwise the fault message reappears after a short while.

This page intentionally left blank

8 Wiring Diagrams

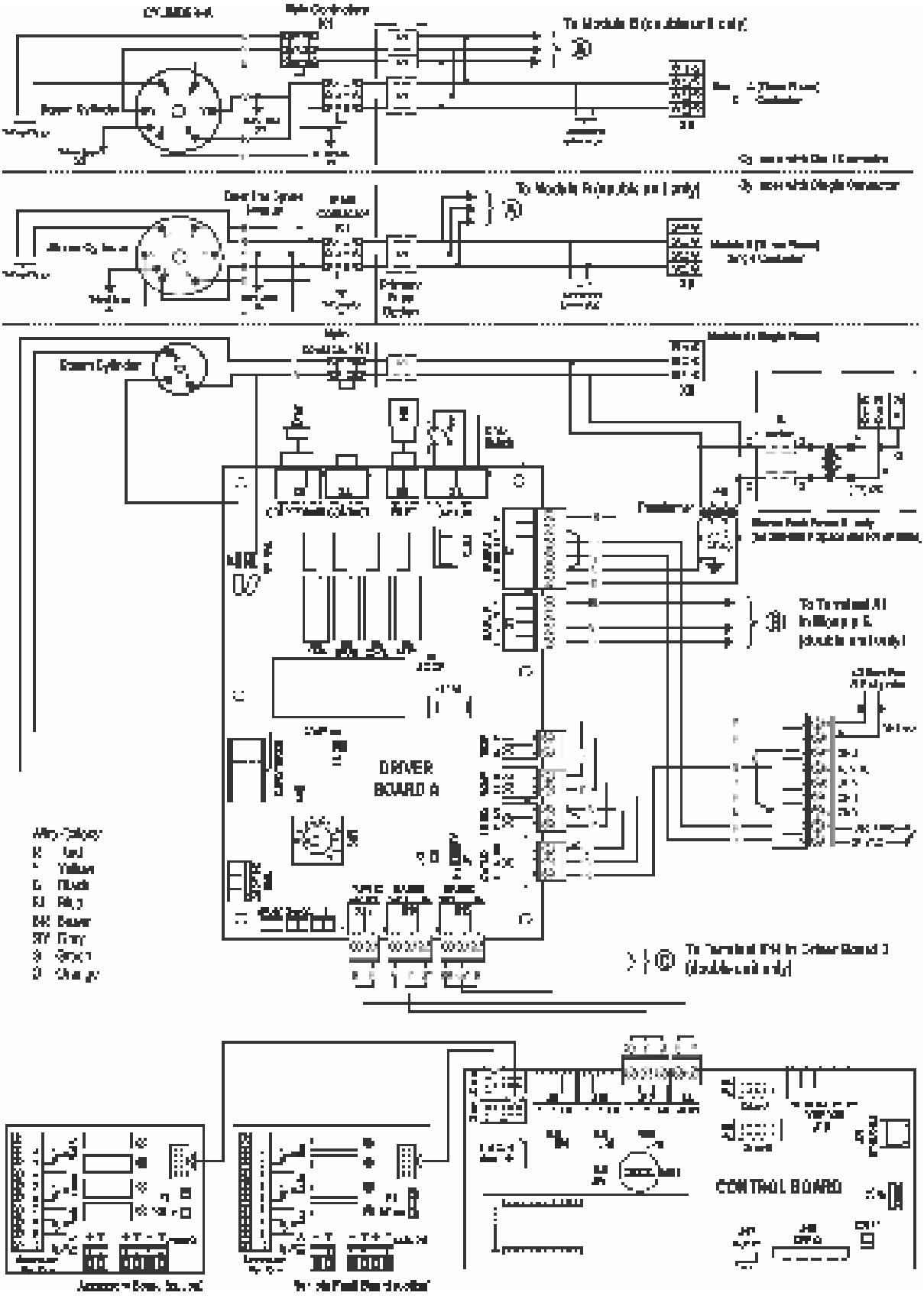


Figure 21: Wiring Diagram - Nortec EL Humidifier, Steam Cylinder A (Module A)

Legend: (Figure 16)
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

Figure 22 shows the wiring diagram for large humidifiers with a second steam cylinder (usually referred to as Cylinder B). Connections carried over from *Figure 21 on page 43*.

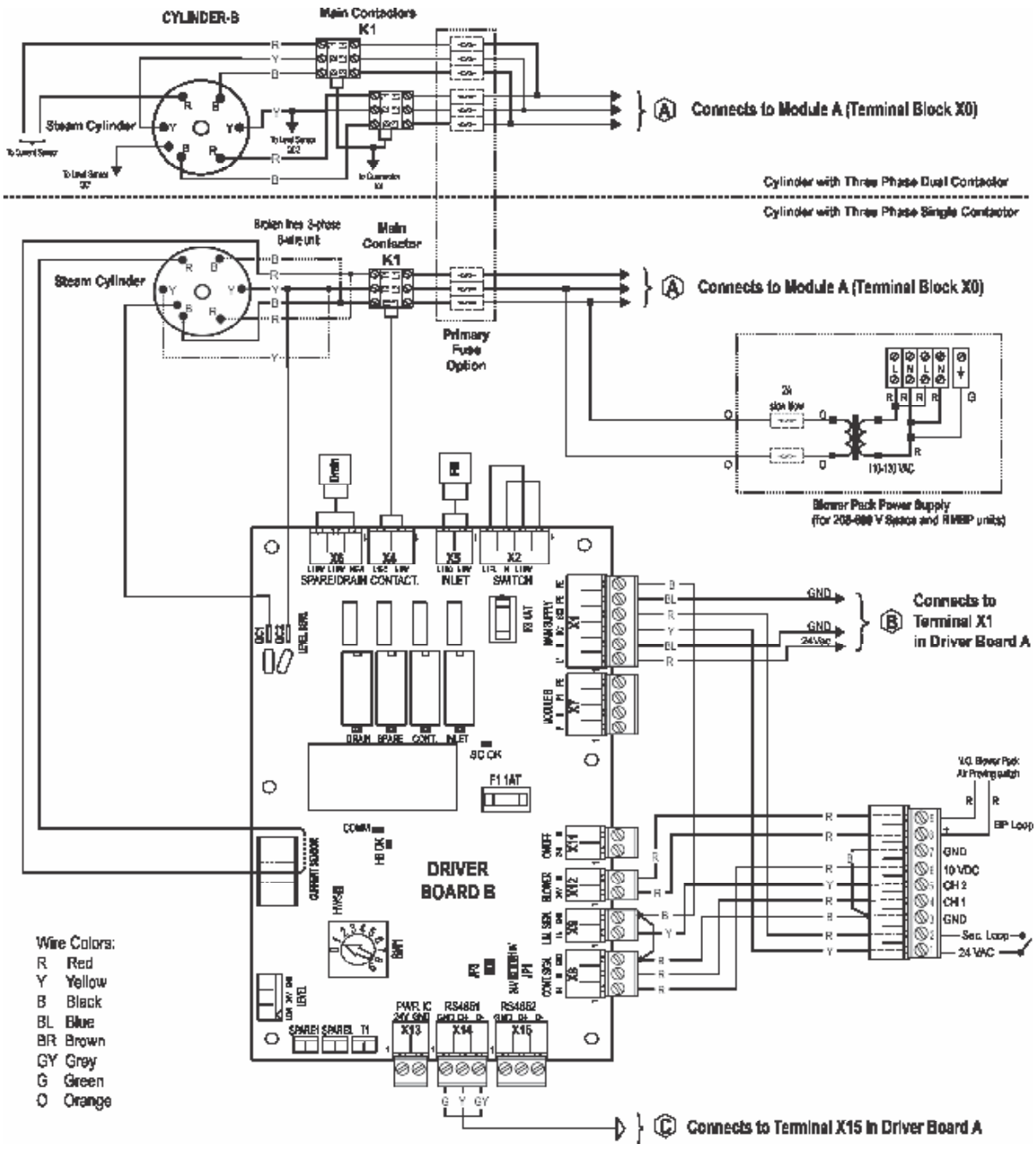


Figure 22: Wiring Diagram - Nortec EL Humidifier, Steam Cylinder B (Module B)

Legend:
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)

This page intentionally left blank

9 Decommissioning

9.1 General

If the Nortec US ultrasonic humidifier needs to be removed from service (for disposal or long-term storage), strictly follow all instructions in this chapter.

Personnel Qualifications

Decommissioning of the Nortec US ultrasonic humidifier must only be performed by a qualified service technician authorized by the customer. It is the customer's responsibility to verify qualifications of the personnel.

Safety

Decommissioning of the Nortec US ultrasonic humidifier may require the user to access the inside of the control and plumbing cabinets in the humidifier which may expose the user and equipment to the hazards described below.

DANGER!
Risk of electric shock!

The Nortec US ultrasonic 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: Shut down the unit as described in *"Shutting Down" on page 22* before proceeding.

CAUTION!
Electrostatic discharge (ESD)!

The electronic components inside the control cabinet in the humidifier are very 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.

9.2 Removal from Service for Disposal or Long-term Storage

Remove the Nortec US ultrasonic humidifier from service (for disposal or long-term storage) as follows:

1. Drain the reservoir, and shut down the humidifier as described in *"Shutting Down" on page 22*.Follow all safety precautions.
2. Disconnect and remove the power supply to the Nortec US ultrasonic humidifier. Refer to *"Wiring Diagrams" on page 43*.
3. Disconnect and remove the control signal inputs to the humidifier.
4. Disconnect the mist and condensate lines, and empty out all fluids.
5. Disconnect the water and drain connections to the humidifier.
6. Remove the humidifier from its mounting surface.
7. If the Nortec US ultrasonic humidifier is to be put into long-term storage, store the humidifier in its original packaging inside a protected area that meets the following requirements:
   - Room temperature: 41 to 104 °F (5 to 40 °C)
   - Room humidity: 10 to 75% RH
8. If the Nortec US ultrasonic humidifier is to be disposed off, refer to *"Disposal/Recycling"*.

9.3 Disposal/Recycling

The Nortec US ultrasonic humidifier should not be disposed off in domestic waste, and should only be disposed off in accordance with local regulations at authorized collection facilities.

If you have any questions, please contact the appropriate local authorities or your local Nortec representative.

10 Product Specifications

10.1 Performance Data

Housing Size	Nortec US Model	120/208/240V/1~	
		lb/h (kg/h)	W
M	07	6.6(3)	250
	13	13.2 (6)	250
	20	19.8 (9)	650
L	40	39.6 (18)	1250

10.2 Operating Data

Control Signal Input Type:	
Active	0-5VDC, 1-5VDC, 0-10VDC, 2-10VDC, 0-20VDC, 0-16VDC, 3.2-16VDC, 0-20mADC, 4-20mADC
Passive	135-10kΩ ohmic humidity sensor
On/Off control	<9.5VDC Off 15-24VDC On

Ambient Conditions:	
Ambient temperature	41-104 °F (5-40 °C)
Relative humidity	5-95% (non-condensing)

Water Supply:	
Water pressure (regulated)	30-80 psig (207-550 kPa)
Flow rate	Minimum 0.9 gpm (3.3 L/min)
Water temperature	34-77 °F (1-25 °C)
Water quality	Clean cold R.O or D.I. water with a conductivity of 0-50 uS/cm.

Drain Water:	
Drainage capacity	Minimum 2.3 gal/min (8.7 L/min) per steam cylinder

Power:	
Maximum current draw	Refer to the specification label on the unit.
Maximum external fuse rating	Refer to the specification label on the unit.

10.3 Size and Weight

10.3.1 Size

Model	Housing Size	Dimensions (W×D×H)
	Medium	20.9 × 15.8 × 30.7 in (530 × 400 × 780 mm)
	Large	39.4 × 15.8 × 30.7 in (1000 × 400 × 780 mm)

10.3.2 Weight

Model	Housing Size	Net Weight	Operating Weight
	Medium	88 lb (40 kg)	93 lb (42 kg)
	Large	161 lb (73 kg)	170 lb (42 kg)

Notes

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