

OPERATION MANUAL

Adiabatic air humidification/air cooling system
Nortec ME Direct Feed

Thank you for choosing Nortec

Installation date (MM/DD/YYYY):

Commissioning date (MM/DD/YYYY):

Location ref.:

Model:

Serial number:

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1 Introduction

1.1 General

We thank you for having purchased the **Nortec ME Direct Feed Evaporative Humidifier and Cooler** (Nortec ME Direct Feed for short).

To ensure a safe, proper, and economical operation of the Nortec ME Direct Feed, please observe and comply with all information and safety instructions contained in the present documentation as well as in the separate documentations of the components installed in the humidification system. Improper use of the Nortec ME Direct Feed may result in danger to the user or third parties and/or impairment of material assets.

If you have questions after reading this documentation, please contact your Nortec representative. They will be glad to assist you.

1.2 Notes on the operation manual

Limitation

The subject of this operation manual is the Nortec ME Direct Feed Evaporative Humidifier and Cooler. The various options and accessories are only described insofar as is necessary for proper operation of the equipment. Further information on options and accessories can be obtained in the respective instructions.

This operation manual is restricted to the **commissioning**, the **operation**, the **maintenance** and **troubleshooting** of the Nortec ME Direct Feed and is meant for **well trained personnel being sufficiently qualified for their respective work**.

Please note, some illustrations in this manual may show options and accessories which may not be supplied as standard or available in your country. Please check availability and specification details with your Nortec representative.

The operation manual is supplemented by various separate items of documentation (such as the installation manual), which are included in the delivery as well. Where necessary, appropriate cross-references are made to these publications in the operation manual.

Symbols used in this manual



CAUTION!

The catchword "CAUTION" used in conjunction with the caution symbol in the circle designates notes in this operation manual that, if neglected, may cause **damage and/or malfunction of the unit or other material assets**.



WARNING!

The catchword "WARNING" used in conjunction with the general caution symbol designates safety and danger notes in this operation manual that, if neglected, may cause **injury to persons**.



DANGER!

The catchword "DANGER" used in conjunction with the general caution symbol designates safety and danger notes in this operation manual that, if neglected, may lead to **severe injury or even death of persons**.

Safekeeping

Please safeguard this operation manual in a safe place, where it can be immediately accessed. If the equipment changes hands, the operation manual must be passed on to the new operator.

If the operation manual gets mislaid, please contact your Nortec representative.

Language versions

This operation manual is available in various languages. Please contact your Nortec representative for information.

2 For your safety

General

Every person working with the Nortec ME Direct Feed must have read and understood the operation manual of the Nortec ME Direct Feed before carrying out any work.

Knowing and understanding the contents of the operation manual is a basic requirement for protecting the personnel against any kind of danger, to prevent faulty operation, and to operate the unit safely and correctly.

All ideograms, signs and markings applied to the components of the Nortec ME Direct Feed must be observed and kept in readable state.

Qualification of personnel

All work described in this operation manual **may only be carried out by specialists who are well trained and adequately qualified and are authorized by the customer.**

For safety and warranty reasons any action beyond the scope of this manual must only be carried out by personnel with appropriate industry recognised qualifications or training.

It is assumed that all persons working with the Nortec ME Direct Feed are familiar and comply with the appropriate local regulations on work safety and the prevention of accidents.

The Nortec ME Direct Feed may not be used by persons (including children) with reduced physical, sensory or mental abilities or persons with lacking experience and/or knowledge, unless they are supervised by a person responsible for their safety or they received instructions on how to operate the system. Children must be supervised to make sure that they do not play with the Nortec ME Direct Feed.

Intended use

The Nortec ME Direct Feed is intended exclusively for **air humidification and air cooling in AHU's or air ducts** within the specified operating conditions. Any other type of application, without the written consent of the manufacturer, is considered as not conforming with the intended purpose and may lead to the Nortec ME Direct Feed becoming dangerous.

Operation of the equipment in the intended manner requires **that all the information contained in this operation manual are observed (in particular the safety instructions).**

Danger that may arise from the Nortec ME Direct Feed



DANGER!
Risk of electric shock!

The optional Nortec ME Direct Feed control units contain live mains voltage. Live parts may be exposed when the control unit is open. Touching live parts may cause severe injury or danger to life.

Prevention: Before carrying out any work on the Nortec ME Direct Feed switch off the control unit, disconnect it from the mains via the electrical isolator and secure the electrical isolator in “Off” position against inadvertent power-up.



DANGER!
Health risk because of inadequate hygiene!

Inadequately operated and/or poorly maintained evaporative humidification/cooling systems may endanger health. When inadequately operated and/or poorly maintained micro-organisms (including the bacterium which causes Legionnaire’s disease) may grow in the evaporative module, the water tank and the water system of the Nortec ME Direct Feed and may affect the air in the AHU/air duct.

Prevention: the Nortec ME Direct Feed must strictly be operated and maintained in accordance with this manual



WARNING!

Some types of evaporative material are manufactured from glass fibre. Though this material is not classified as hazardous, it is recommended that Personal Protection Equipment such as gloves, protective clothing and eye protection are used during handling to protect the user from fibres or dust. If dust is generated during handling it is recommended that respiratory protection is worn.

Correct lifting and handling

Lifting or handling of components always carries an element of risk, and therefore must only be carried out by trained and qualified personnel. Ensure that any lifting operations have been fully planned and risk assessed. All equipment should be checked by a skilled and competent health & safety representative.

It is the customer’s responsibility to ensure that operators are trained in handling heavy goods and to enforce the relevant lifting regulations.

Preventing unsafe operation

If it is suspected that **safe and hygienic operation is no longer possible**, then the Nortec ME Direct Feed should immediately **be shut down and secured against accidental power-up according to chapter 4.6 – Decommissioning the system**. This can be the case under the following circumstances:

- if the Nortec ME Direct Feed is damaged
- if the Nortec ME Direct Feed is contaminated
- if the electrical installations are damaged
- if the Nortec ME Direct Feed is no longer operating correctly
- if connections and/or piping are leaking

All persons working with the Nortec ME Direct Feed must report any alterations to the system that may affect safety to the owner without delay.

Prohibited modifications to the unit

No modifications must be undertaken on the Nortec ME Direct Feed without the express written consent of the manufacturer.

For the replacement of defective components use exclusively **original accessories and spare parts** available from your Nortec representative.

3 Product Overview

3.1 Model overview

The **standard version** includes the **evaporative module** (75%, 85 % or 95 % efficiency depending on the cassette type) and a **hydraulic manifold without valves** (for internal or external installation).

To run the standard version with a **On/Off control**, the system must be equipped with an On/Off control unit, the hydraulic manifold must be equipped with a drain valve and a supply valve, and a purge valve must be installed in the supply line to hydraulic manifold as minimum. All components for extending the standard version to an On/Off control system are available as options (see table below) or must be supplied by the customer.

To run the standard version with a **stage control**, the system must be equipped with a stage control unit, the hydraulic manifold must be equipped with a drain valve, a supply valve and the appropriate number of stage valves, and a purge valve must be installed in the supply line to hydraulic manifold as minimum. All components for extending the standard version to a stage control system are available as options (see table below) or must be supplied by the customer.

Options	On/Off control	Stage control
Glass Fibre Media Composite non particle-releasing glass fibre media with anti-microbial impregnation and A2, S2, d0 (UL Class 1) fire rating. Available in 75%, 85% and 95% efficiencies.	•	•
Polyester Media Robust patented synthetic media with hygroscopic impregnation and DIN EN53483 Class F1 fire rating. Available in 85% and 95% efficiencies.	•	•
Droplet Separator Droplet catching matrix increasing maximum face velocity limit without droplet carry-over to 4.5 m/s (886 fpm).	•	•
Evaporative module Blanking Kit to secure Nortec ME and prevent air-bypass within the duct / AHU.	•	•
Stage valves Valve kit which facilitates stage control of direct feed systems using customer controls or the ME Direct Feed Stage Control Unit. Available in 2, 3, 4 and 5 stage versions.	—	•
Inlet, drain and purge valve Valve kit for customers who wish to create their own basic on/off direct feed control system.	•	•
On/Off control unit On/Off control unit for simple control of direct feed systems which includes timed purge function to enhance system hygiene.	•	—
Stage control unit Stage control unit for simple analogue control of direct feed systems which includes timed purge function to enhance system hygiene.	—	•

3.2 Product designation / Which model do you have

The product designation and the most important unit data (e.g. serial number, evaporative module product key, etc.) are found on the rating plates fixed on the left side of the evaporative module and on the right side of the control unit (if applicable).

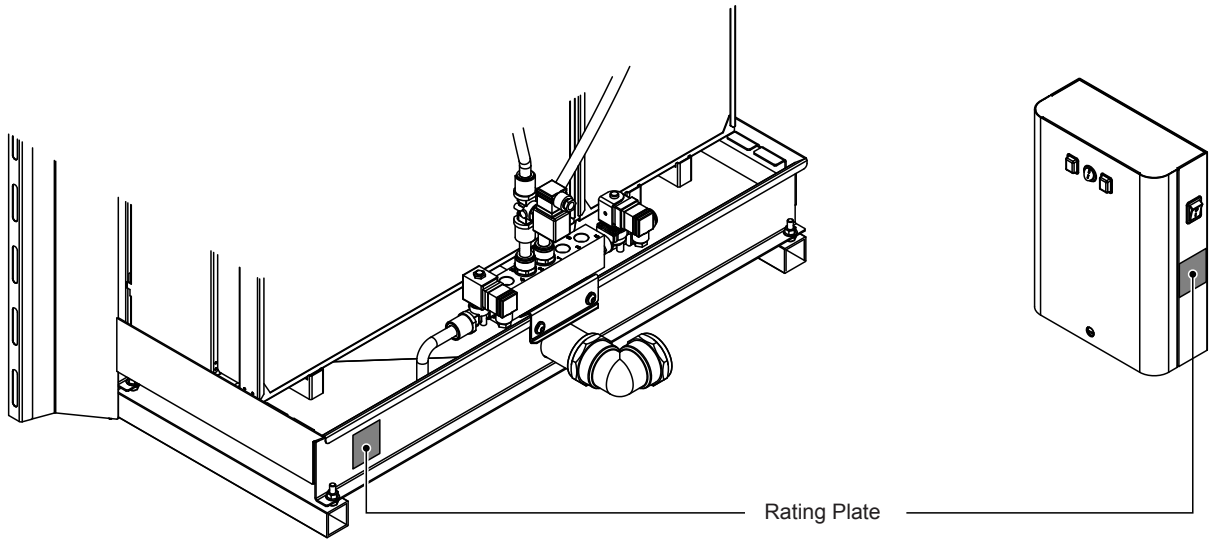


Fig. 1: Position of rating plate

Evaporative module product key

Example:

ME-CL0900S-1125-F95X

Product identification _____

ME (media evaporator)

Tank spigot position: _____

C= Center
L= Left
R= Right

Tank spigot diameter: _____

S = Small = $\varnothing 50$ mm
L = Large = $\varnothing 54$ mm ($\varnothing 2.125$ ")

Width evaporative module in mm _____

Tank type: _____

S = Single spigot tank
D = Double spigot tank (systems >3000 mm wide only)

Height evaporative module in mm _____

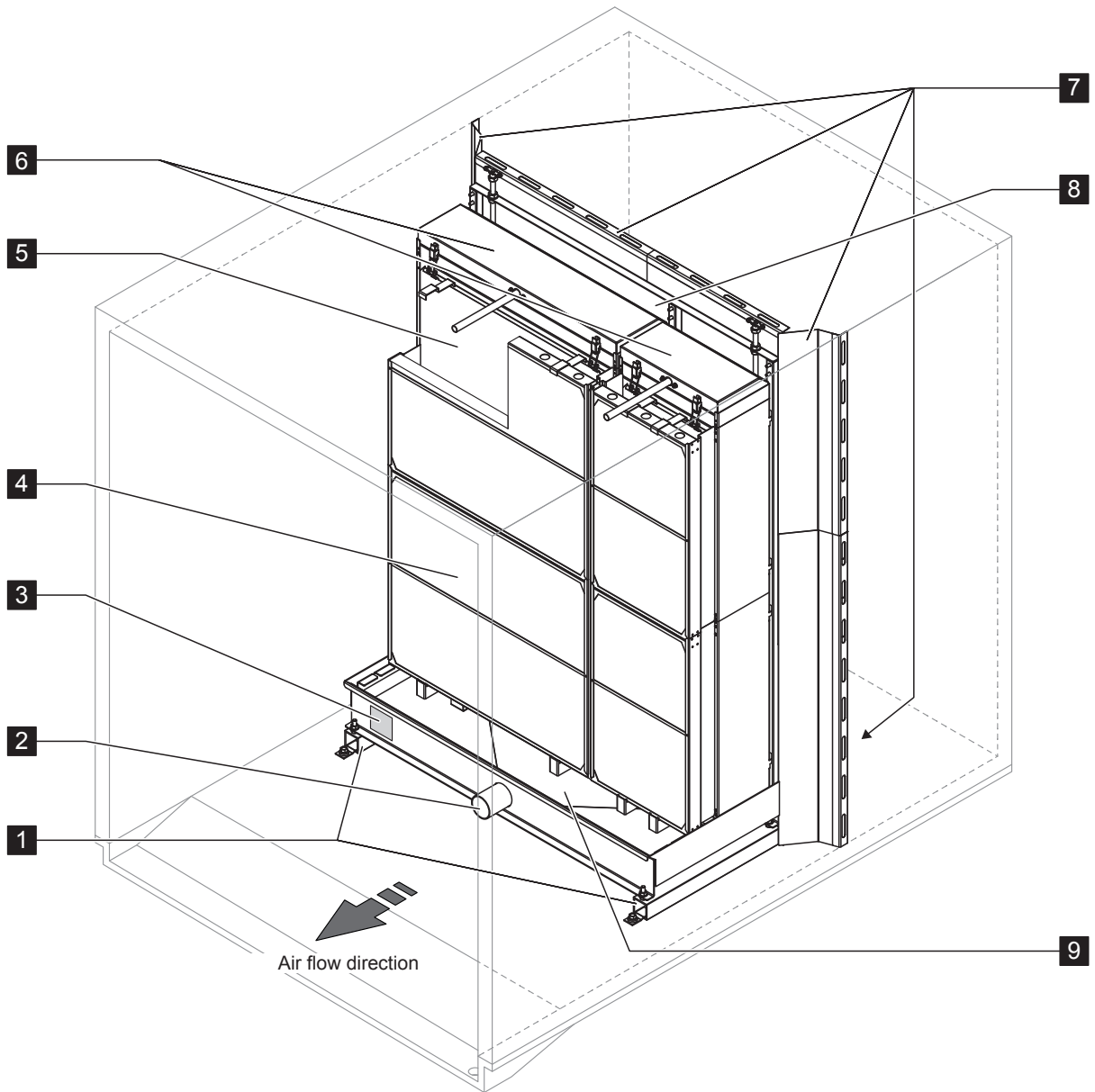
Material type and efficiency evaporative cassettes: _____

F75= F-Type Glass fibre 75 %
F85= F-Type Glass fibre 85 %
F95= F-Type Glass fibre 95 %
P85= Polyester 85 %
P95= Polyester 95 %
C85= C-Type Glass fibre 85 %
C95= C-Type Glass fibre 95 %

Indicates a country specific variation: _____

3.3 Construction of the system components

3.3.1 Construction of the evaporative module



- | | |
|---|---|
| 1 Upstands | 5 Evaporative cassettes (F75, F85, F95, P85, P95, C85 or C95) |
| 2 Tank connector $\varnothing 50$ mm, or $\varnothing 54$ mm (2.125"), as applicable | 6 Distribution heads |
| 3 Rating plate | 7 Blanking plates (option) |
| 4 Droplet separator, mandatory for high face velocities (allows velocities up to 4.5 m/s (886 fpm)) | 8 Mounting frame for evaporative cassettes |
| | 9 Water tank |

Fig. 2: Construction of the evaporative module

3.3.2 Construction of the hydraulic manifold

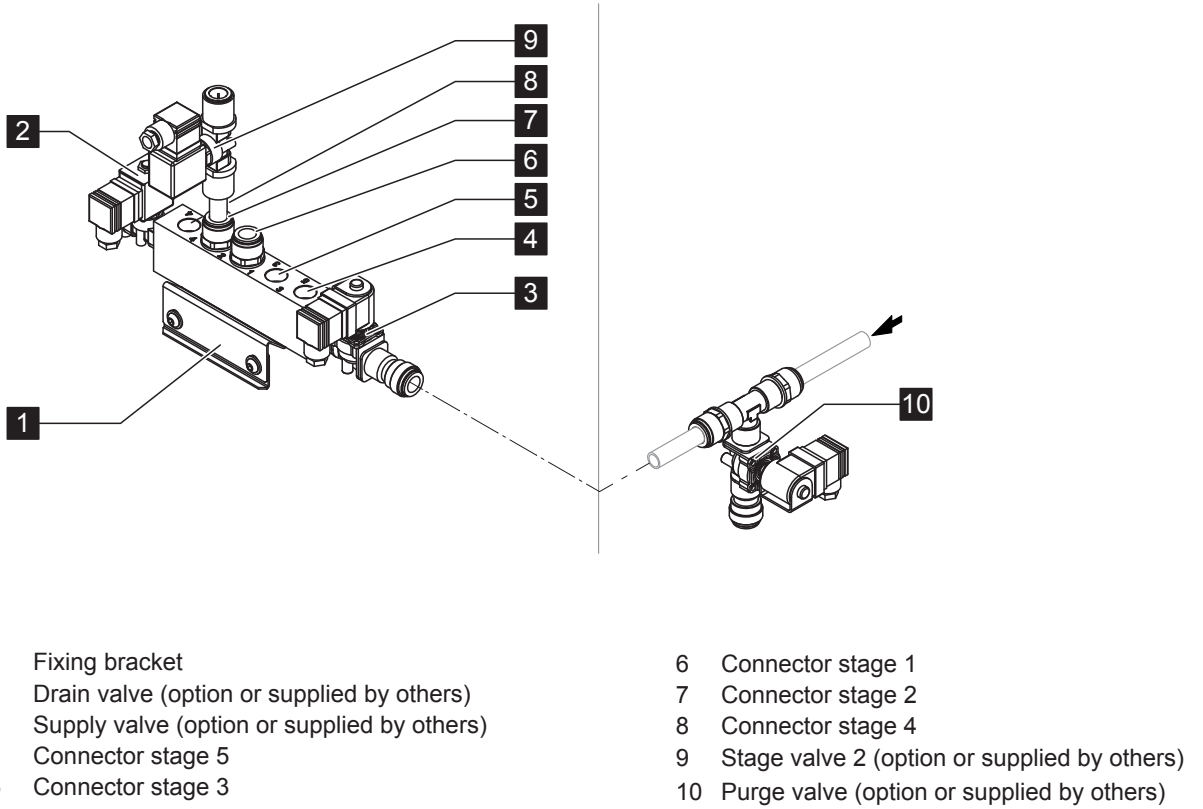


Fig. 3: Construction of the hydraulic manifold (figure shows layout for 2-stage control)

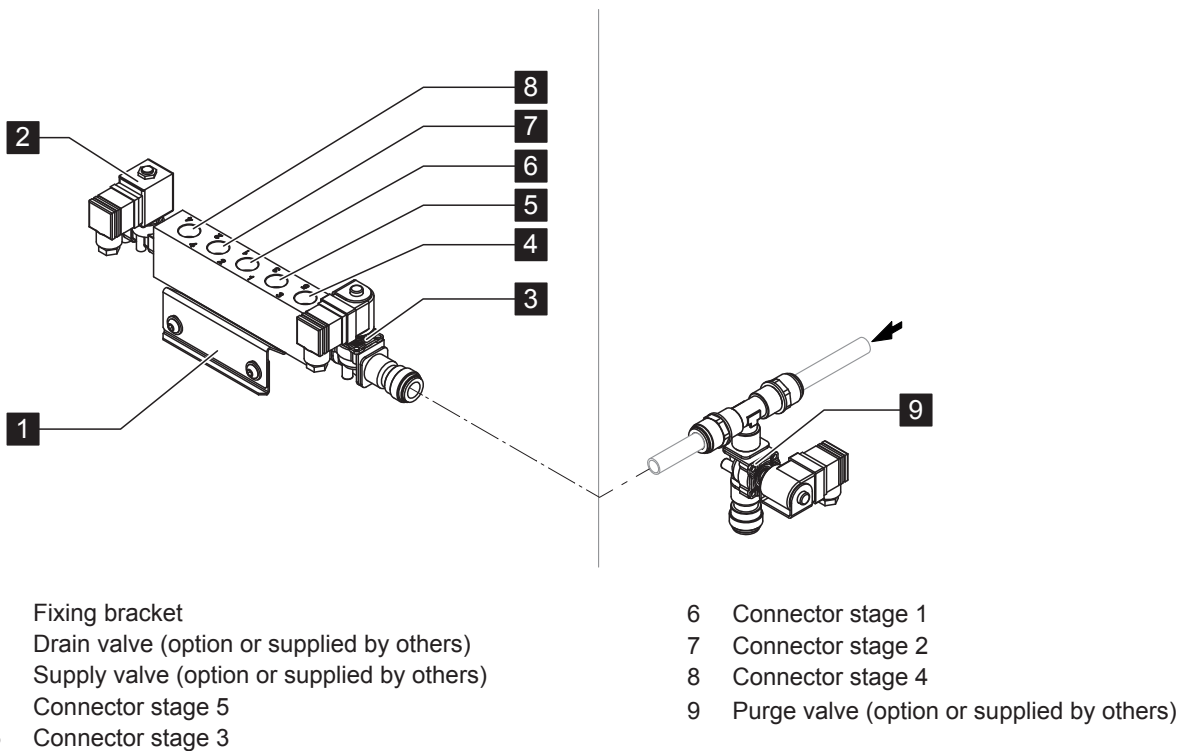


Fig. 4: Construction of the hydraulic manifold (figure shows layout for On/Off control)

3.4 System overviews

3.4.1 Typical system Nortec ME Direct Feed (internally mounted)

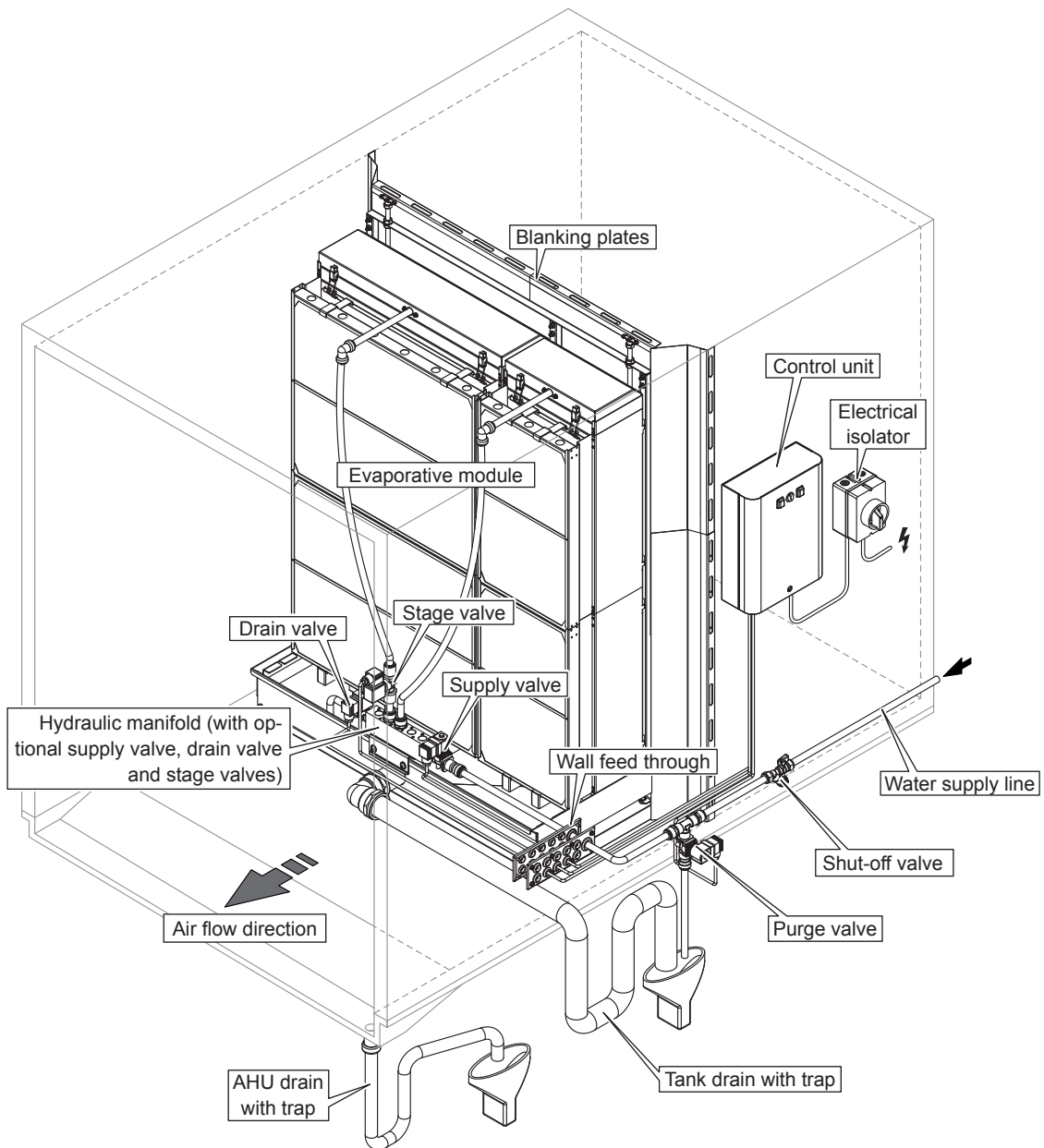


Fig. 5: Typical system Nortec ME Direct Feed (internal installation with optional valves)

3.4.2 Typical system Nortec ME Direct Feed (externally mounted)

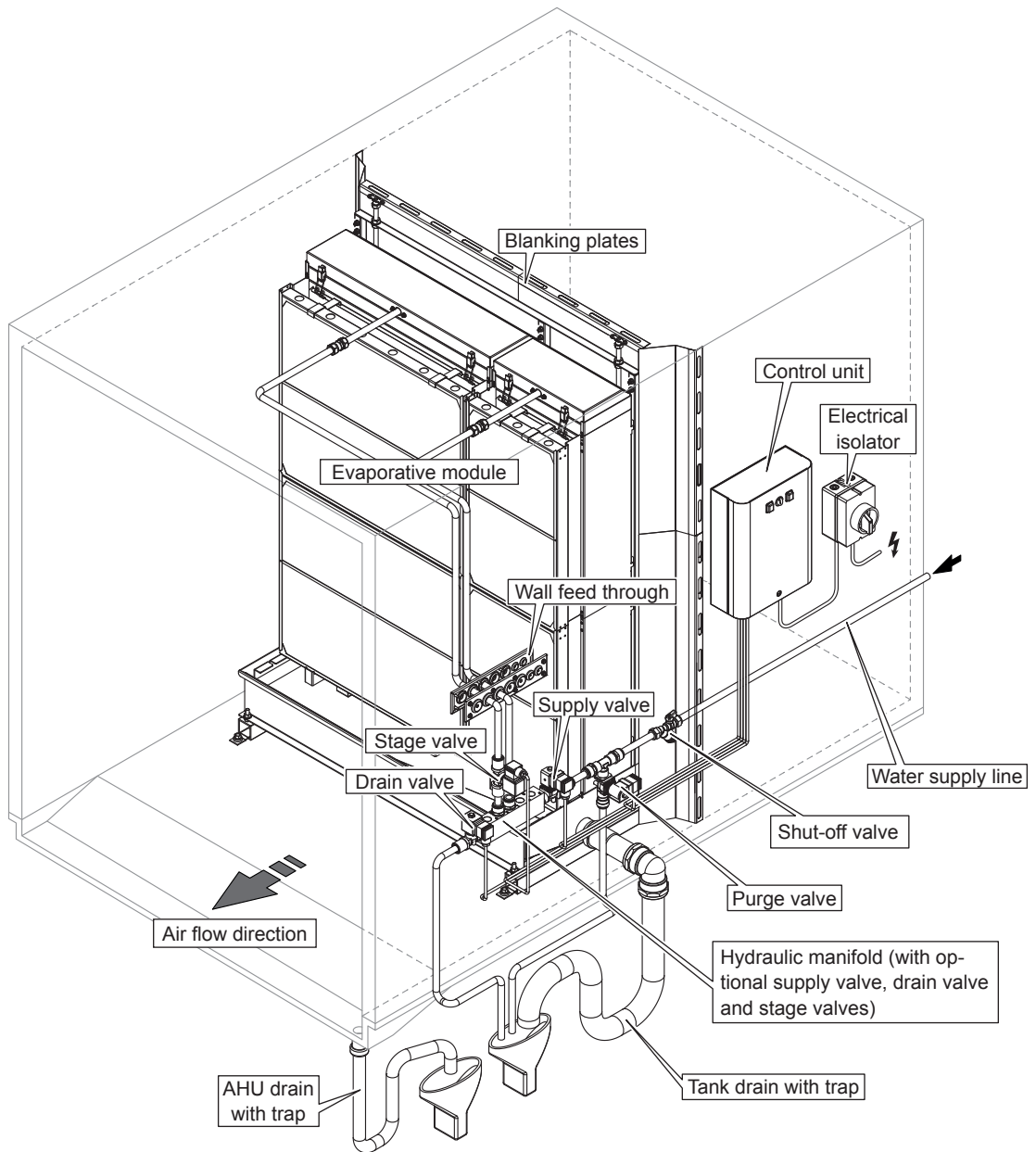


Fig. 6: Typical installation Nortec ME Direct Feed (external installation with optional valves)

Schematic flow diagram

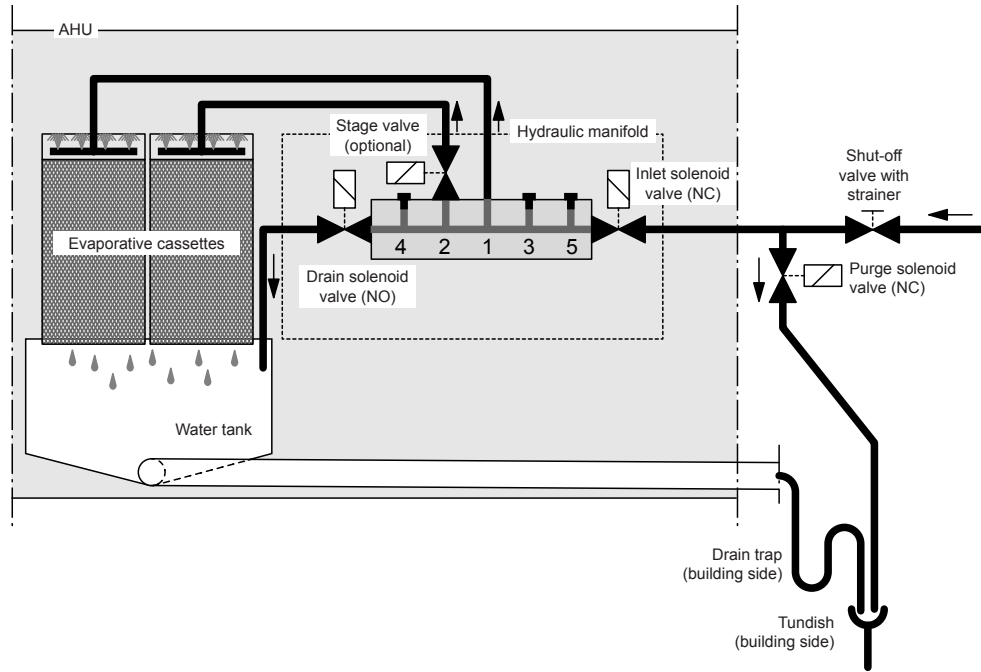


Fig. 7: Schematic flow diagram Nortec ME Direct Feed System (internally mounted)

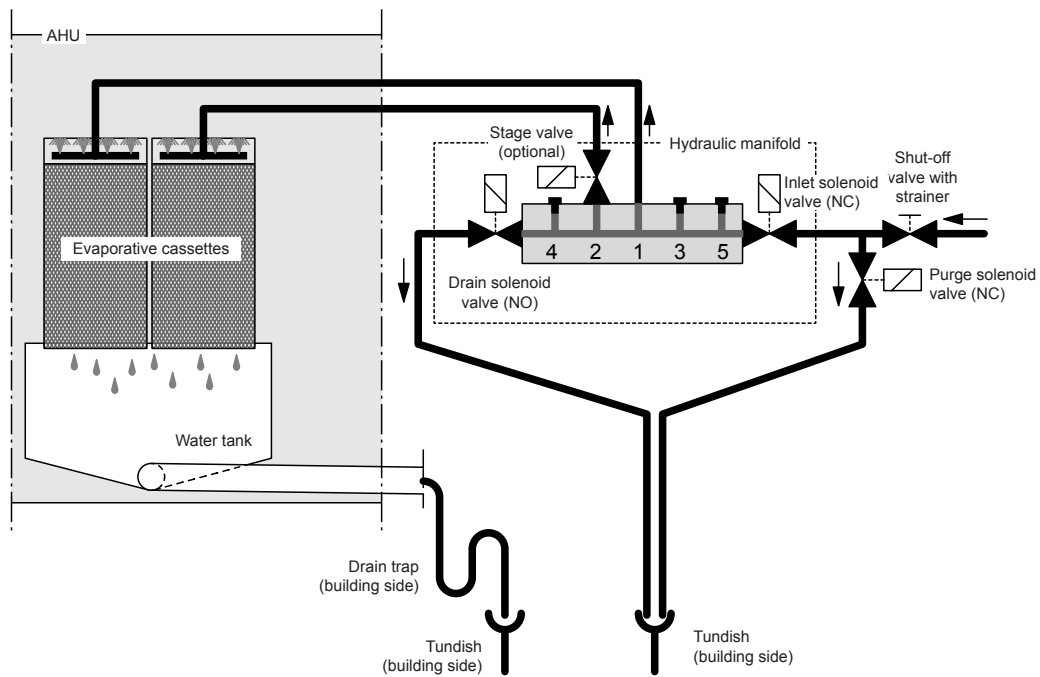


Fig. 8: Schematic flow diagram Nortec ME Direct Feed System (externally mounted)

Functional description

As standard the Nortec ME Direct Feed is operated with On/Off control (requires a drain and a supply valve fitted to the hydraulic manifold (both valves available as options) and a customer supplied On/Off control or the optional direct feed On/Off control unit).

Equipped with the optional stage valves and the optional direct feed stage control unit, stage control can be established.

In case of a humidification/cooling request with **standard On/Off control** the drain solenoid valve (NO) closes and the inlet solenoid valve (NC) opens and the water flows to the distribution header above the evaporative cassettes.

In case of a humidification/cooling request with **optional stage control unit** the drain solenoid valve (NO) closes and the inlet solenoid valve (NC) opens (stage 1 is active). Depending on the demand signal and the evaporative module size, up to 4 additional stage valves open to supply water to the distribution header of the corresponding evaporative cassette bank.

The distribution pipes inside the distribution header evenly supply the water to the entire surface of the evaporative cassettes where it flows down and humidifies the air flowing through the evaporative cassette matrix. The excess water not used for humidification flows to the water tank and then directly to the drain.

Both optional direct feed control units (On/Off control unit and stage control unit) support time based flushing of the water supply line once the purge valve is fitted in the supply line. Every 20 hours the water supply line is flushed via the purge valve to prevent water stagnation in the water supply line which can lead to the growth of micro-organisms in the water supply line. Additionally the optional stage control unit will drain the stage pipework every 20 hours to prevent water stagnation in the stage pipes if the stages are not in use.

4 Operation

4.1 Important notes on operation

Qualification of personnel

The Nortec ME Direct Feed must be commissioned and operated only by personnel familiar with the system and adequately qualified for the respective tasks. It is the owner's responsibility to verify proper qualification of the operating personnel.

General notes

The instructions and details regarding commissioning and operation must be followed and upheld.

The initial commissioning of the Nortec ME Direct Feed requires appropriately trained technical personnel. It is strongly recommended that your Nortec representative commissions your system. Part of this initial commissioning process may include a disinfection of the water tank and the evaporative cassettes. Please read this document in full before commencing any work.

Please pay attention to local regulations regarding working at heights and electrical work.

Safety and hygiene



DANGER!

The Nortec ME Direct Feed must be operated in accordance with this manual. Failure to do so could result in contamination that might cause Legionnaires' disease, which can be fatal



WARNING!

The Nortec ME Direct Feed system equipped with an optional Nortec ME Direct Feed control unit should not be electrically isolated for periods exceeding 24 hours as automatic drain and purge cycles will be disabled.

4.2 Initial commissioning

The initial commissioning of the Nortec ME Direct Feed requires appropriately trained technical personnel. We strongly recommend that your Nortec representative commissions your system.

Inspections

Prior to initial commissioning the complete system must be inspected for correct execution of the installations. Proceed as follows:

1. Switch off AHU, and lock off to prevent AHU from starting.
2. **Evaporative module installation:** Check correct selection of evaporative module on rating plate if multiple units on site. Check that the evaporative module has been installed level in all planes with secure blanking plates to prevent air bypass. Check that there is sufficient access for cassette removal during maintenance. Ensure assembly is securely fixed, and that there is no visible damage. Check that the evaporative module is installed in a waterproof section. Check evaporative module (including tank) is free of dirt/ debris and clean as necessary.
3. **Control unit installation:** Check that the control unit is mounted in a convenient dry location
4. **Supply water Installation:** Ensure the water system in the building has been subject to a Risk Assessment. The Nortec ME Direct Feed **must be connected to a clean, wholesome mains water supply**. It is the responsibility of the user to ensure that the water system complies with local regulations and bylaws, particularly those for the control of Legionella microbes. The use of mains water fed tanks and reservoirs is only permitted as part of a managed water treatment system. Check that the evaporative module has a feed water supply between 2 bar (29 psi) and 5 bar (73 psi). Ensure that any hygiene options have been correctly installed. Check all joints and fittings for leaks.
5. **Drain installation:** Check that the drain line is made according to the corresponding instructions given in the installation manual. Ensure the drain line is connected to the main building drain and that drain pipework is trapped to a suitable level for the applicable working duct pressure. Check all joints and fittings. Ensure that the drain connection includes an air gap.
6. **Distribution pipework:** Check all water distribution pipework between the hydraulic manifold and the distribution headers are securely fitted.
7. **Electrical wiring:** Check all electrical connections with reference to the corresponding wiring diagram in this manual. Check that a 100...240V / 10A single phase supply is connected to the control unit. Ensure that this power supply is isolated with an electrical isolator within 1 m (39") of the control unit. Note: For systems equipped with a custom control unit please refer to the corresponding manual.
8. **Optional controls:** Check that appropriate controls connections have been made to the control unit. Refer to the controls wiring section of the installation manual.
9. **Flush water supply and test supply water quality:** Disconnect water supply pipe from connector on the hydraulic manifold. Fix hose to free end of supply pipe and lead hose to a drain. Carefully flush supply pipe a suitable amount of time without creating splashing or aerosols.

Take a water quality sample to ensure that supply water meets the requirements specified in the water quality guide. The sample should be tested using a dip slide to indicate the total number of colony forming units per ml (cfu/ml). Generally, levels of 1×10^3 cfu/ml may be considered acceptable for this type of humidifier provided the species of microbes and/or fungi involved are themselves not considered to be harmful. If you are unsure of the quality of your water please consult your Nortec distributor for advice.

Then reconnect the water supply pipe to the supply connector on the hydraulic manifold.

10. **Perform pressure test:** Turn on water supply and check for leaks. Ensure shut off valve is installed correctly.

After the system has been inspected and found correct proceed with the initial commissioning:

1. Ensure AHU is switched off, and locked off to prevent starting.
2. Ensure the water supply pipe is flushed and reconnected to the hydraulic manifold.



WARNING!

If the water supply pipe was flushed more than 24 hours ago, repeat flushing procedure as described in [step 9](#) in the previous section) before proceeding with the commissioning.

3. If the evaporative cassettes have become dirty or damp prior to commissioning, follow the disinfection procedure described in chapters [5.8](#) and [5.9](#) of this manual.
4. Validate the system controls and enable a full demand to unit. If the Condair control unit is used, check for correct connections and operation when switched on.
5. If using a Condair control unit the system should purge the water supply line when first switched on. Normal operation will commence after three minutes.
6. Flush water through all cassettes (ensure all stages are operating if stage control option).
7. Check water is flowing to drain with no leakage.
8. If the system is equipped with fibre media evaporative cassettes (F75, F85, F95, C85, C95) allow system to flush with full demand until the water runs clean.
9. Check all components are operating correctly (including any option kits i.e. inlet valve, drain valve, purge valve, stage valves).
10. Measure the flow of water to the distribution headers, and compare with the design conditions.
11. Switch on fan of AHU and test operation with fans running and validate air conditions against the design data.
12. Test controls set up and ensure correct set points. If automatic flush or drain options are installed, check suitable flush timings are programmed to ensure that the water supply line and all stage pipes are flushed at least once every 24 hours.
13. Switch off AHU.
14. Wipe tank clean (including section under cassettes).
15. If commissioning has not been completed by an approved Nortec representative, it is recommended that records are kept of commissioning date and what was done.
16. Demonstrate system to customer and highlight hygiene and maintenance requirements.
17. Raise any installation concerns.
18. Issue commissioning documentation.

The system is now ready for normal operation.

4.3 Display and operating elements of Nortec control units

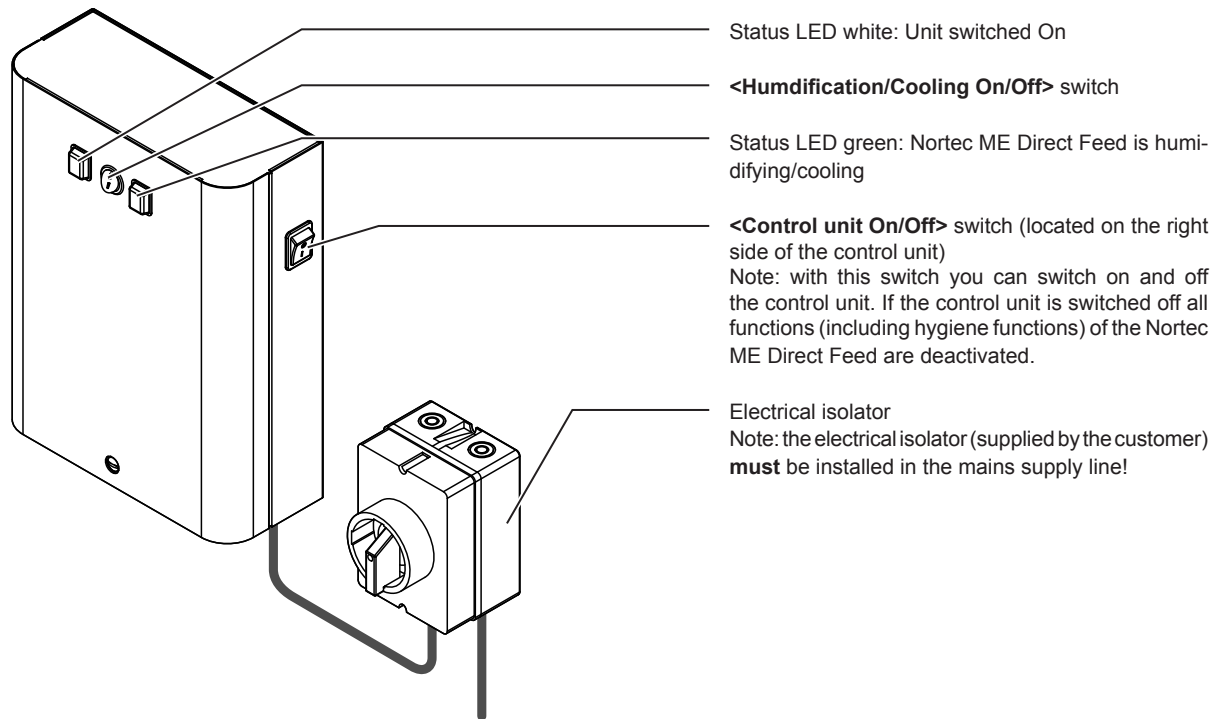


Fig. 9: Display and operating elements Nortec control units (option)



DANGER!
Risk of electric shock!

Mains supply to the control unit is **not** interrupted by switching off the <Humidification/Cooling On/Off> switch or by switching off the <Control unit On/Off> switch. Mains voltage provides a risk of electric shock, therefore the **electrical isolator must be switched off before opening the control unit**. Only qualified personnel should carry out work within the ME control unit.

4.4 Start up for normal operation

It is assumed that initial commissioning has been carried out properly by appropriately trained technical personnel.

The following description outlines the start up procedure for systems equipped with an optional Nortec ME Direct Feed control unit, that have been powered down. For systems equipped with a control unit of another brand please refer to the operating instructions of the corresponding control unit.

Proceed as follows to prepare the Nortec ME Direct Feed for operation:

1. Switch off AHU.
2. Examine the Nortec ME Direct Feed for possible damage. Ensure tank is empty.



DANGER!

Damaged systems or systems with damaged components or faulty installation may present danger to life or cause severe damage to material assets.

Damaged systems and/or systems with damaged or faulty installation must not be operated.

3. If Nortec ME Direct Feed has been disconnected from the mains for more than 48 hours:
 - Close shut-off valve in the water supply line.
 - Disconnect water supply line from the connector on the hydraulic manifold. **Caution should be taken to ensure no splashing is created.**
 - Connect hose to the water supply line and lead the open end into open tundish outside the AHU.
 - Open shut-off valve in the water supply line and flush water supply line an appropriate length of time. Then, close shut-off valve again, remove hose and reconnect supply line to the connector on the hydraulic manifold.
4. Make sure the front panel of the control unit is mounted and fixed with the retaining screw.
5. Close doors of AHU if open, then switch on AHU if switched off.
6. Open shut-off valve in the water supply line.
7. Switch on the electrical isolator in the mains supply to the control unit.
8. Switch **<Control unit On/Off>** and **<Humidification/Cooling On/Off>** switch on the control unit to **“On”** (systems equipped with a Nortec control unit only).

The Nortec ME Direct Feed is now ready for operation.

4.5 Notes on operation

4.5.1 Important notes on operation

If your system is equipped with the optional Nortec control unit and the optional purge valve, the water supply line is purged **every 20 hours for approximately 3 minutes** in order to flush water supply line. The Nortec stage control unit will also drain the hoses that supply water to the distribution header during these 3 minutes.

4.5.2 Recommended regular checks during operation

During operation the Nortec ME Direct Feed has to be checked periodically in accordance with the table below.

Operations Checks	Daily	Weekly	Monthly	Quarterly
Monitor humidity/temperature control	✓	✓	✓	✓
Check for any low humidity/temperature concerns	✓	✓	✓	✓
Check any alarms on BMS	✓	✓	✓	✓
Visible check for: – No water leakage (air on and air off side) – system components for correct fixing and any damage – electric installation for any damage.	✓	✓	✓	✓
Matrix media is saturated (relative to demand signal)			✓	✓
Condition of tanks and air on matrix is clean			✓	✓
Inspect and determine replacement frequency of sediment filter			✓	✓
Condition of tanks are clean (clean as required)				✓

If the checks reveal any irregularities (e.g. leakage, error indication) or any damaged components take the Nortec ME Direct Feed out of operation as described in chapter [4.6 – Decommissioning the system](#). Then, have the malfunction eliminated or the damaged component replaced by a well trained specialist or a service technician from your Nortec representative.

4.6 Decommissioning the system

In order to decommission the Nortec ME Direct Feed (e.g. to perform maintenance works, to eliminate a malfunction, etc.) perform the following steps:

1. Close the shut-off valve in the water supply line.
2. Switch off control unit: switch off **<Humidification/Cooling On/Off>** and **<Control unit On/Off>** switch on the control unit (only with Nortec control units).
Note: if your system is equipped with a control unit other than Nortec, please refer to the corresponding manual for switching off the control unit.
3. **Disconnect control unit from the mains:** switch off the electrical isolator in the mains supply to the control unit and secure switch in “Off” position against accidentally being switched on.
4. **Let the fan of the ventilation system run** until the evaporative module is dry.
5. If work has to be carried out on the evaporative module or the hydraulic manifold mounted inside the duct, switch off the AHU and secure the system against accidentally being switched on.

Important Notes!

- This applies only for systems equipped with the optional Condair control unit and the optional purge valve: for reasons of hygiene, we recommend that the control unit should be left powered on even if the Condair ME Direct Feed is not being used for a prolonged period of time. Only the **<Humidification/Cooling On/Off>** switch should be switched off. This keeps the hygiene functions (e.g. periodical flushing of water supply pipe) active and hence the build-up of germs is opposed.



DANGER!

If the Condair ME system is isolated from the mains power for a prolonged period, water stagnation might occur in the supply pipework, and microbial contamination of the supply pipework and Condair ME system could result.

- **If the Condair ME Direct Feed is isolated from the mains for a prolonged period**, then the ME system, including any storage tanks or vessels should be drained and left dry. Before putting the system back into operation, a full risk assessment should be undertaken to ensure safe operation, with particular attention paid to water supply quality. **Additionally a complete system service has to be performed prior to putting the system back in operation.**

5 Maintenance

5.1 Important notes on maintenance

Qualification of personnel

All maintenance work must be carried out only by **well qualified and trained personnel authorised by the owner**. It is the owner's responsibility to verify proper qualification of the personnel.

General notes


The instructions and details for maintenance work must be followed and upheld. Only carry out the maintenance work described in this documentation.

The Nortec ME Direct Feed must be maintained in the prescribed intervals, the cleaning work must be carried out correctly.


For safety and warranty reasons, only use original spare parts from your Nortec representative to replace defective parts or parts which have elapsed their lifetime.

Safety and hygiene

Some maintenance work requires removal of the unit cover. Please note the following:

 **DANGER!**
Danger of electric hazard!

Before carrying out any maintenance work take the Nortec ME Direct Feed out of operation as described in chapter 4.6 – *Decommissioning the system* and secure the system against inadvertent power-up. In addition take AHU out of operation as described in the operations instructions of the AHU and secure the AHU against inadvertent power-up.

 **CAUTION!**

The electronic components inside the optional Nortec control unit are very sensitive to electrostatic discharge.

Prevention: Before carrying out any maintenance work to the electrical or electronic equipment of the control unit, appropriate measures must be taken to protect the respective components against damage caused by electrostatic discharge (ESD protection).

 **DANGER!**
Health risk by inadequate maintenance!

Inadequately operated and/or poorly maintained adiabatic humidification/cooling systems may endanger health. When inadequately operated and/or poorly maintained, micro-organisms (including the bacterium which causes Legionnaire's disease) may grow in the water system and in the area of the humidification unit and may affect the air in the AHU/air duct.

Prevention: the adiabatic air humidification /air cooling system Nortec ME must be correctly operated as described in chapter 4 – *Operation*, and must be correctly maintained and cleaned in the prescribed intervals as described in chapter 5 – *Maintenance*.



DANGER!

Damaged systems / components may present a danger to life, or cause damage to material assets. We advise that the customer routinely checks the system and components for damage. It is particularly important that the tank, structural components, and fixings (such as studs) are inspected as damage to these items could affect the structural integrity of the system. Please contact your local Condair representative immediately in the event of discovering damaged components.

5.2 Maintenance Intervals

In order to maintain operational safety and hygienic demands the Nortec ME Direct Feed must be serviced at regular intervals. The time interval for the complete system service is to be adapted to the operating conditions. The hygiene status depends mainly on the quality of the humidifier water but also on the adherence to the exchange intervals of the upstream air filter, the air velocity and the micro-biological and chemical composition of the supply air. Therefore the service intervals must be determined for each system separately.

The interval time for a complete system service is to be determined at commissioning. A typical interval time is **2000 hours of operation**.

Depending on the encountered hygiene status when performing a complete system service the interval time must be decreased or increased.

In any case the Nortec ME Direct Feed should receive a complete service at least once annually.

Note: We recommend to perform a minor service between two complete system service.

5.3 Maintenance guide

The Nortec ME unit will form part of your cold water system and as such require you to undertake certain duties with regards to local regulations and bylaws concerning the control of Legionella microbes in water systems. Your water sampling / testing and disinfection regime must be based on results of a site specific risk assessment.

If any further assistance is required or you are interested in a planned maintenance quote, please contact your Nortec distributor.

Note: routine water sampling and testing is not included as part of a Nortec service contract.

Please note that the information given in the table below is only to act as a guide which shows the work to be carried out on "Minor Service" and "Complete System Service".

Correct maintenance is vital to ensure optimum output, reliability and safety.

Operations	Minor Service	Complete System Service
Replace inlet water filter if applicable	Yes	Yes
Check all solenoid valves	Yes	Yes
Clean all solenoid valves	—	Yes
Replace purge valve flow restrictor (if applicable)	—	Yes
Check all hoses and connectors	Yes	Yes
Check flow restrictors in hydraulic manifold	—	Yes
Clean inlet valve strainer	—	Yes
Replace all feed hose	—	Yes

Operations	Minor Service	Complete System Service
Check distribution headers	Yes	Yes
Clean distribution headers	—	Yes
Clean front section of tank	Yes	Yes
Check droplet separator (if applicable) and evaporator cassettes in suitable condition	Yes	Yes
Lightly brush evaporator cassettes if necessary, replace if heavily soiled	—	Yes
Remove evaporator cassettes and clean all sections of tank and frame structure	—	Yes
Check and secure frame structure and seal	—	Yes
Check all media for full saturation	Yes	Yes
Measure flow rates to distribution headers	—	Yes
Check and secure all electrical connections	Yes	Yes
Check overall installation for leaks and damage	Yes	Yes
Check any options as per relevant documentation	Yes	Yes
Complete disinfection as described in this manual	Yes	Yes
Check safety interlock and humidity/temperature control devices (if applicable)	—	Yes
Check air velocity at face of evaporative cassettes matrix	—	Yes
Update service log book	Yes	Yes

5.4 Dismantling and installation of components for maintenance



A full risk assessment must be completed by suitably trained personnel prior to carrying out maintenance of the ME unit. There may be increased risk when carrying out maintenance on systems that necessitate working at height.

The following risks should be considered (this list is not exhaustive, and there may be additional site specific risks that will need to be considered):

- Manual handling
- Musculoskeletal disorders
- Electrical work
- Working at height
- Falling objects & objects dropped from higher levels
- Risks arising from the use of Mobile Elevated Work Platforms
- Risk of contact with ceilings, overhead items or asbestos roofing while using access equipment
- Adverse weather conditions
- Unsuitable surface and ground
- Other equipment, machinery or supply pipework in the vicinity of the work area

Maintenance of the ME unit must only be carried out by trained personnel, and all tools & equipment must be checked by a skilled and competent health & safety representative.



In the event of water carry-over from the evaporative cassettes or a water leak, surfaces near the ME system may have become wet. This could result in a slipping hazard or an increased risk when handling components. If this occurs, risk assess the situation and take suitable precautions before working on the ME system. If carry-over was the cause of any standing water in the AHU/duct, follow the advice in chapter [6.1 – Malfunction list](#) to remedy the problem.

5.4.1 Dismantling and installation of the evaporative module

1. Take the Nortec ME Direct Feed out of operation as described in chapter [4.6 – Decommissioning the system](#) and allow to drain and dry.
2. Switch the AHU off, and isolate the power and water supply to the AHU.
3. Disconnect distribution hoses from the connectors on the distribution heads, the wall feed-throughs (if applicable) and the hydraulic manifold.
4. Remove droplet separator boxes (column by column):
 - Remove upper separator brackets.
 - Remove bank of separator boxes.
 - Remove lower separator brackets.
5. Remove distribution headers assemblies from topmost evaporative cassettes:
 - Undo the clamps securing the distribution header assembly to the evaporative cassette.
 - Carefully lift off the distribution header assembly.
6. Remove evaporative cassettes (column by column):
 - Push box upwards and remove.
7. Remove the tank cross bar and the tank cross bar supports (if applicable). Make a note of the cross bar position and facing.

Clean dismantled components, water tank, frame structure, blanking plates and air duct as described in chapter [5.3 – Maintenance guide](#). If all components have been cleaned and dried, assemble the evaporative module in the reverse dismantling order. Replace any defective components with new ones.

5.5 Consumables Guide

Common consumables

Description	Standard Frequency (month)
Disinfection chemical (sourced locally)	1
Descaling chemical (sourced locally)	as required
Inlet flow restrictor	24
Distribution header feed hose	24
Evaporative matrix cassette	
– Wholesome mains water	36 - 60
– RO water	60 - 84 +

Option consumables

Description	Standard Frequency (month)
PureFlo Ag+ sediment filter	6
PureFlo Ag+ antimicrobial filter	6

Contact your Nortec distributor for consumables list/order codes.

To help us ensure that the correct spares parts are sent, please confirm your unit serial and model number with your order.

5.6 Health and Safety Requirements

In accordance with local regulations, users must take water samples for Legionella analysis. Samples should be taken from the same places as described in chapter 5.7 – *Routine Water Sampling and Testing*, and the analysis carried out by an accredited laboratory which is part of an appropriately certified Legionella testing scheme. In the event that the Legionella content exceeds 10² cfu/l, the humidifier should be switched off and specialist advice sought regarding its disinfection.

1. If biofilm (a slimy or gel-like deposit when wet, which might be dry and crisp in a dry system) is found during any inspection of the humidifier or water system, the humidifier **MUST** be switched off and not put back into operation until the system has been taken apart, scrubbed and thoroughly cleaned with a suitable biocide with biofilm penetrating qualities such as 50 ppm chlorine dioxide solution. This work should only be carried out by fully trained specialist organisations or individuals.
2. The **optional Nortec ME Direct Feed control unit must be left powered on to allow automatic flushing and cleaning cycles to occur**. If the optional Nortec ME Direct Feed control unit is powered off for prolonged periods, water stagnation might occur and contamination result, so the system, including any storage tanks or vessels should be drained and left dry. Before putting the system back into service, the water pipework supplying the Nortec ME Direct Feed should be purged carefully, avoiding the creation of aerosols by splashing, and a water sample should be taken to ensure cleanliness. In the event that the humidifier pipework contains any residual water or has remained damp, and the temperature exceeded 20 °C (68°F), the Nortec ME Direct Feed should be disinfected using an appropriate solution.

Contact your Nortec representative for advice on water sampling and analysis, disinfection of systems, service and maintenance.

5.7 Routine Water Sampling and Testing

Hygiene

Your attention is drawn to local regulations and bylaws regarding the control of Legionellosis in water systems. If inadequately maintained, water systems, of which any humidifier is a part, can support the growth of micro-organisms, including the bacterium that causes Legionnaires' disease. Nortec Nortec has considered all aspects of this equipment to reduce as far as possible the risk of Legionnaires' disease and other similar conditions, but it is important that users are aware of their responsibilities under local regulations in reducing the risk of Legionellosis.

To prevent the growth of Legionella, users are required to:

1. Carry out a risk assessment of the water system using a competent person, and implement an appropriate monitoring and control regime.
2. Avoid water temperatures which favour the growth of Legionella.
3. Avoid water stagnation.
4. Clean and disinfect the system in accordance with local regulations and bylaws, and the instructions in this manual.
5. The Nortec ME Direct Feed system MUST be connected to a clean, wholesome mains water supply and it is recommended that the supply water is chlorinated. It is the responsibility of the user to ensure that the water system complies with local regulations and bylaws, particularly those for the control of Legionella microbes. The use of mains water fed tanks and reservoirs is only permitted as part of a managed water treatment system.

On commissioning and at regular intervals thereafter, test for possible water contamination using Dipslides. Take samples from the water supply, the evaporative cassettes and from the tank. Check for biofilm.

The Dipslides should be incubated for 2 days at 30°C (86°F).

1. If the microbial count from the tank exceeds 10³ cfu/ml, the system should be turned off, any biofilm scrubbed clean and then disinfected using a 50 ppm chlorine solution for one hour before being put back into use.
2. If the microbial count in the water supply to the evaporative module exceeds 10³ cfu/ml, this suggests contamination of the water system within the building. The system should be turned off and you should seek specialist advice on cleaning your water supply.
3. If the water temperature anywhere in the system regularly exceeds 20°C, (68°F) increase the frequency of water sampling. The frequency may be reduced if successive tests show a consistent level below 10³ cfu/ml.

5.8 Cleaning and Disinfection

Before commencing cleaning and disinfection:

For systems in operation or where the water quality or air quality is poor, it is recommended to dismantle and scrub the system clean, and carry out a disinfection of all the evaporative module parts with a minimum of 50ppm chlorine or an appropriate disinfection solution. Please refer to the cleaning and disinfection and method statement section to ensure that the relevant chemicals, equipment and Personal Protective Equipment are available to carry out disinfection.

1. **A qualified person appointed by the customer must risk assess the cleaning and disinfection operation.** This assessment should include but is not limited to observance of local regulations and the use of PPE, working at heights and ensuring a full understanding of the Nortec ME Direct Feed.
2. Coordinate with relevant responsible persons.
3. Check records (i.e sample results of microbiological control) for system history.
4. If possible, disinfection should be carried out when the building is unoccupied, with air flow off.

Evaporative humidifiers must be regularly cleaned and maintained, to prevent contamination especially in industrial environments.

All surfaces requiring disinfection or cleaning must be in contact with the appropriate concentration of disinfection solution for the correct contact period. The method statement for disinfection may need to be adapted depending on the layout of the humidifier pipework. Additional procedures will be required for supply water system pipework or water treatment systems prior to the humidifier.

Nortec recommends that routine disinfection should take place in the following situations:

- At initial commissioning (for brand new systems use a mild disinfection chemical).
- At six monthly intervals as part of the maintenance regime.
- If the system or part of it has been shutdown and/or substantially altered creating a risk of contamination.
- During or following any increase of bacterial activity (as per recommendations in chapter [5.7 – Routine Water Sampling and Testing](#)) or outbreak or suspected outbreak of Legionellosis.

Recommended Disinfection Equipment

- Disinfection solution in accordance with manufacturers guidelines.
- Disinfection neutraliser (only if necessary).
- Disinfection solution test kit (to measure strength).
- Bucket of fresh water.
- Cleaning equipment.
- Mixing vessel / Measuring container.
- Risk assessment / test record sheets. Appropriate report/record
- Standard tools
- Appropriate PPE
- COSHH risk assessment / MSDS

5.9 Cleaning and Disinfection Method Statement



WARNING!

Disinfectants can be corrosive, toxic or irritant. Use of disinfectants may present a risk to health and could harm the environment.

Step 1 - Refer to the cleaning and disinfection risk assessment

- If the unit is already in operation, check for correct operation.
- Ensure the Condair ME system is OFF and isolated.
- If the system has been without power for more than 48 hours, flush the water supply.
- Ensure the area is well ventilated.
- Refer to the manufacturers instructions and safety advice for chosen disinfectant.
- If there are concerns over the level of biofilm or bacteria in the system, disinfect the tank before starting cleaning work.
- **Scrub tank fully.** For more thorough disinfection remove droplet separator banks (if applicable) and the evaporative cassettes to allow better access to the tank (refer to maintenance section)
- Consider appropriate maintenance requirements at this time including parts replacement i.e. replacing distribution hoses to ensure that these are also disinfected.
- Re-assemble the Condair ME system (refer to installation manual).

Step 2 - Mix Disinfection Solution

- Prepare a vessel into which the evaporative cassettes and droplet separator banks can be placed for disinfection
- Mix disinfection solution following the manufacturers instructions and in the required amount.
- **Note:** Solution loses strength over time and the solution may need to be increased throughout the process or the disinfection process may need to be repeated.

Step 3 - Disinfection

- Place evaporative cassettes and droplet separator banks into the vessel with the disinfection solution and leave them in the solution for the correct amount of time.
- Note the strengths of the disinfection solution at 15 minute intervals and adjust solution strength as required.
- Wash tank, tank frame and AHU section with a cloth soaked with disinfection solution.
- After disinfection rinse all parts thoroughly with wholesome water to remove any disinfection chemicals. Then, dry or let dry all components.

Step 4 - Neutralise the disinfection solution – if required based on chemical used



WARNING!

If a neutralising solution is required, always ensure that the neutralising solution is used in accordance with the manufacturer's guidance. Failure to follow the manufacturer's guidance with regard to neutralising the disinfection chemical may present a risk to health.

- Mix neutralising agent as per manufacturers instructions.
- Measure the strength as per MSDS until the disinfection solution is down to desired strength.

Step 5 - Drain neutralised disinfection solution

- Drain neutralised disinfection solution into appropriate drain (depending on Risk Assessment) .
- Always leave work area clean, dry and tidy.

Step 6 - Re-assemble evaporative module and Re-start the Nortec ME system

- Re-assemble evaporative module and restart ME system. Refer to the corresponding section.

If in doubt always contact your Nortec distributor.

6 Fault elimination

Important! Most operational malfunctions are not caused by faulty equipment but rather by improper installation or disregarding of planning guidelines. Therefore, a complete fault diagnosis always involves a thorough examination of the entire system. Often, the installations have not been properly executed, or the fault lies with the humidity control system.

6.1 Malfunction list

Malfunction	Cause	Remedy
Residual water in the section of the duct downstream of the evaporative module.	Face velocity is too high.	Install droplet separator or reduce air velocity in the duct.
	Water tank, water piping or hydraulic manifold is leaking.	Check/seal water tank, water piping and hydraulic manifold.
	Water flow to media too high.	Check/replace flow restrictors in the hydraulic manifold.
	Evaporative cassettes have become blocked with minerals.	Check set up, replace evaporative cassettes, perform system service.
	Uneven or non laminar air flow.	Check design conditions of AHU. Install perforated plate on the air supply side.
	Air on temperature is too low.	Check design conditions of AHU. and increase temperature.
Humidity/cooling demand present however the Nortec ME Direct Feed does not humidify.	Shut-off valve in the water supply line closed.	Open shut-off valve.
	Site control are not correct.	Prove controls and control module.
Maximum humidification/cooling capacity is not reached.	Insufficient water supply capacity.	Check water supply, increase water pressure.
	Evaporative cassettes have become blocked with minerals.	Check set up, replace evaporative cassettes, perform system service.

6.2 Notes on fault elimination

- For the elimination of faults set the Nortec ME Direct Feed out of operation as described in chapter [4.6 – Decommissioning the system](#), disconnect control unit from the mains and close shut-off valve in the water supply line.



DANGER!

Make sure the control unit is separated from the mains (check with voltage detector) and the shut-off valve in the water supply line is closed.

- The elimination of faults must be carried out by qualified and well trained professionals only. Malfunctions relating to the electrical installation must be repaired by authorized personnel (e.g. licensed electrician) or by your Nortec representative's service technician only.



CAUTION!

Electronic components are very sensitive to electrostatic discharge. When carrying out repairs to the control unit, appropriate measures (ESD-protection) must be taken to prevent damage to electronic components.

- Repair work and the replacement of faulty components must be carried out by your Nortec representative's service technician only!

7 Taking out of service/Disposal

7.1 Taking out of service

If the Nortec ME Direct Feed must be replaced or if the humidification system is not needed any more, proceed as follows:

1. Take the Nortec ME Direct Feed out of operation as described in chapter [4.6 – Decommissioning the system](#).
2. Have the system components unmounted by a qualified service technician.

7.2 Disposal/Recycling

Components not used any more must not be disposed of in the domestic waste. Please dispose of the individual components in accordance with local regulations at the authorised collecting point.

If you have any questions, please contact the responsible authority or your local Nortec representative.

Thank you for your contribution to environmental protection.

8 Product specifications

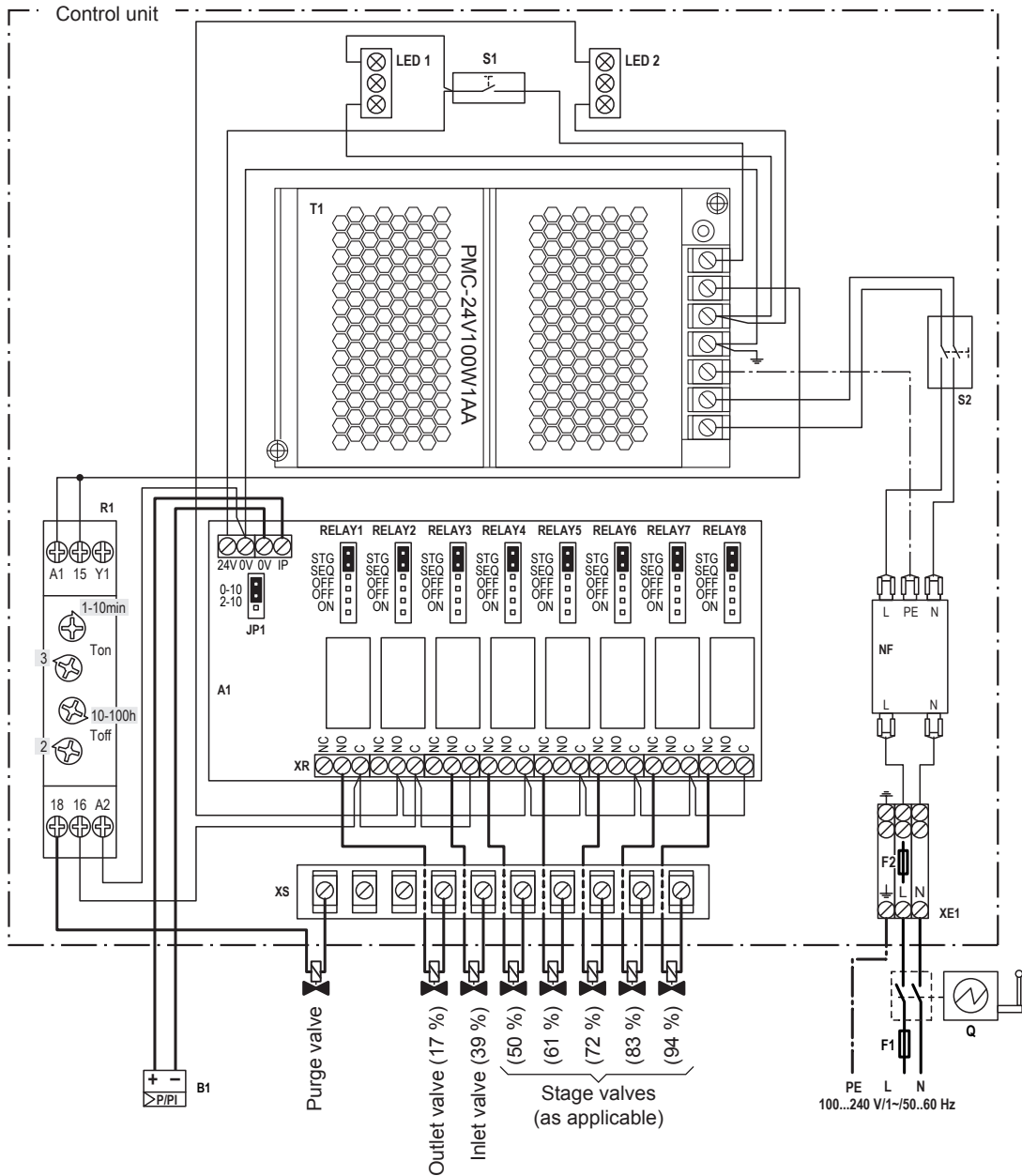
8.1 Technical data

	Nortec ME Direct Feed	
	With optional On/Off control unit	With optional Stage control unit
Supply voltage optional On/Off and stage control unit	100...240 VAC/50...60 Hz	
Power consumption ¹⁾	40 W	100 W
Control signals	On/Off	0..10 VDC 2...10 VDC
Control accuracy	Control accuracy depends on air conditions, control distance, water quality and on the number of On/Off cycles	
Max. admissible matrix face velocity	4.5 m/s (886 fpm) with droplet separator	
Water supply	ø15mm or ø16mm (ø 0.625") connector as applicable	
Water drain (outside diameter)	ø 50 mm or ø 54 mm (ø 2.125") as applicable	
Admissible water supply pressure	2...5 bar (29...72.5 psi)	
Admissible water temperature	5...20 °C (41...68 °F)	
Water quality	Tap water, softened or fully demineralised water with a max. of 100 cfu/ml	
Admissible operating air temperature	10...60 °C (50...140 °F)	
Admissible ambient temperature (optional control unit)	1...40 °C (33.8...104 °F)	
Admissible ambient humidity (optional control unit)	max. 75 %rh	
Degree of protection of optional control unit	IP21	
Degree of protection of optional valves	IP54	
Conformity	CE marking	
Fire classification of evaporative media	glass fibre media: A2-S2,-D0 (UL Class 1) polyester media: DIN EN 53438 Class F1	

¹⁾ Power consumption depending on the number of vertical evaporative cassettes banks and the options fitted

9 Appendix

9.1 Wiring diagram Nortec ME Direct Feed with stage control



- | | | | |
|--------------|---|------------|-------------------------------|
| A1 | I/O board | Q | External electrical isolator |
| B1 | Demand signal 0...10V or 2...10V | R1 | Timer purge valve |
| F1 | External fuse mains supply (10 A, slow acting) | S1 | Humidification On/Off switch |
| F2 | Internal fuse mains supply (6.3 A, fast acting) | S2 | On/Off switch control unit |
| JP1 | Jumper control signal (Jumper fitted on 0..10V) | T1 | 24V power supply |
| LED 1 | LED white (control unit switched ON) | XE1 | Terminal mains supply voltage |
| LED 2 | LED green (humidification ON) | XR | Terminals 24V valves |
| NF | Mains filter | XS | Ground terminals valves |

Fig. 10: Wiring diagram Nortec ME Direct Feed with optional stage control unit

9.2 Wiring diagram Nortec ME Direct Feed with optional On/Off control unit

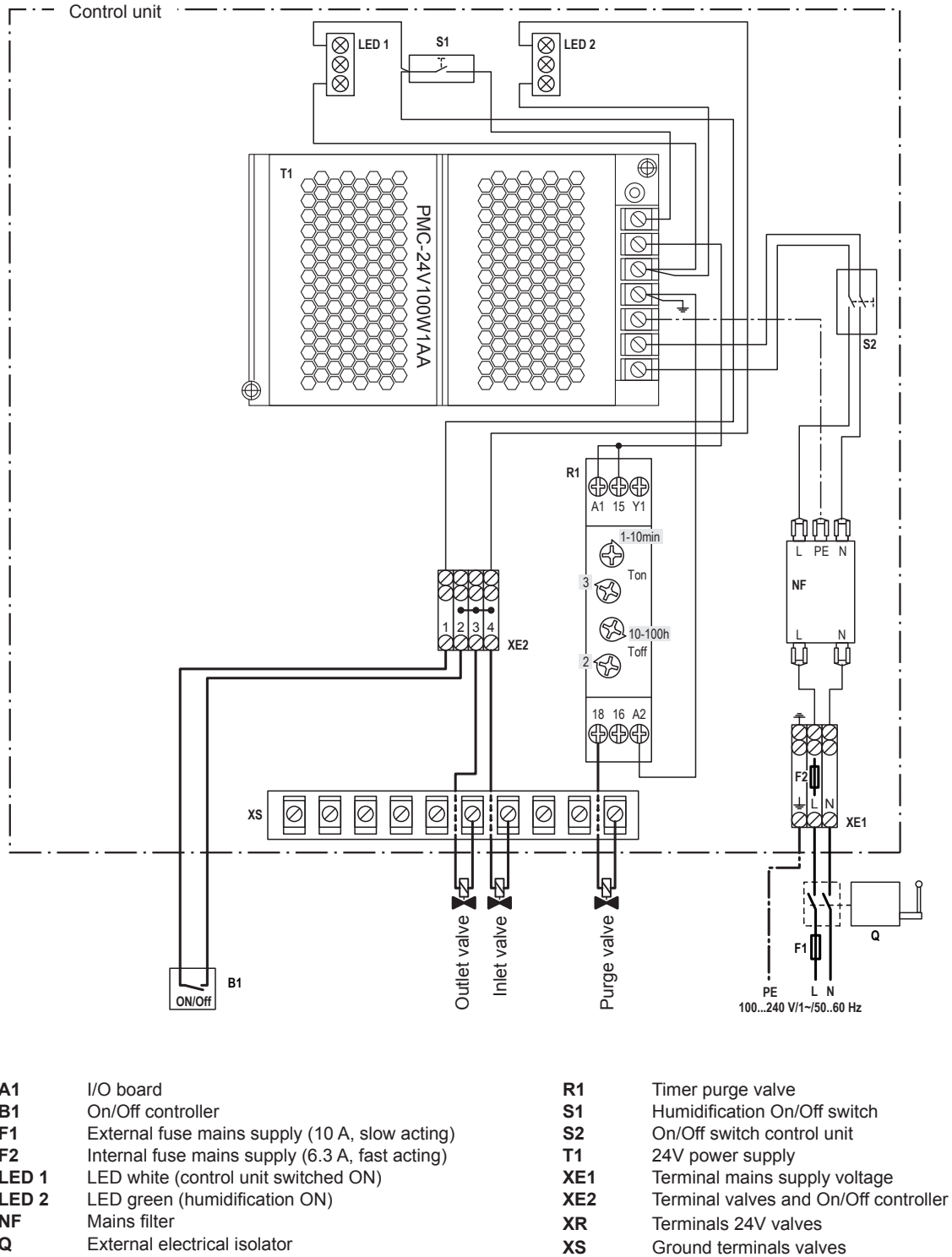
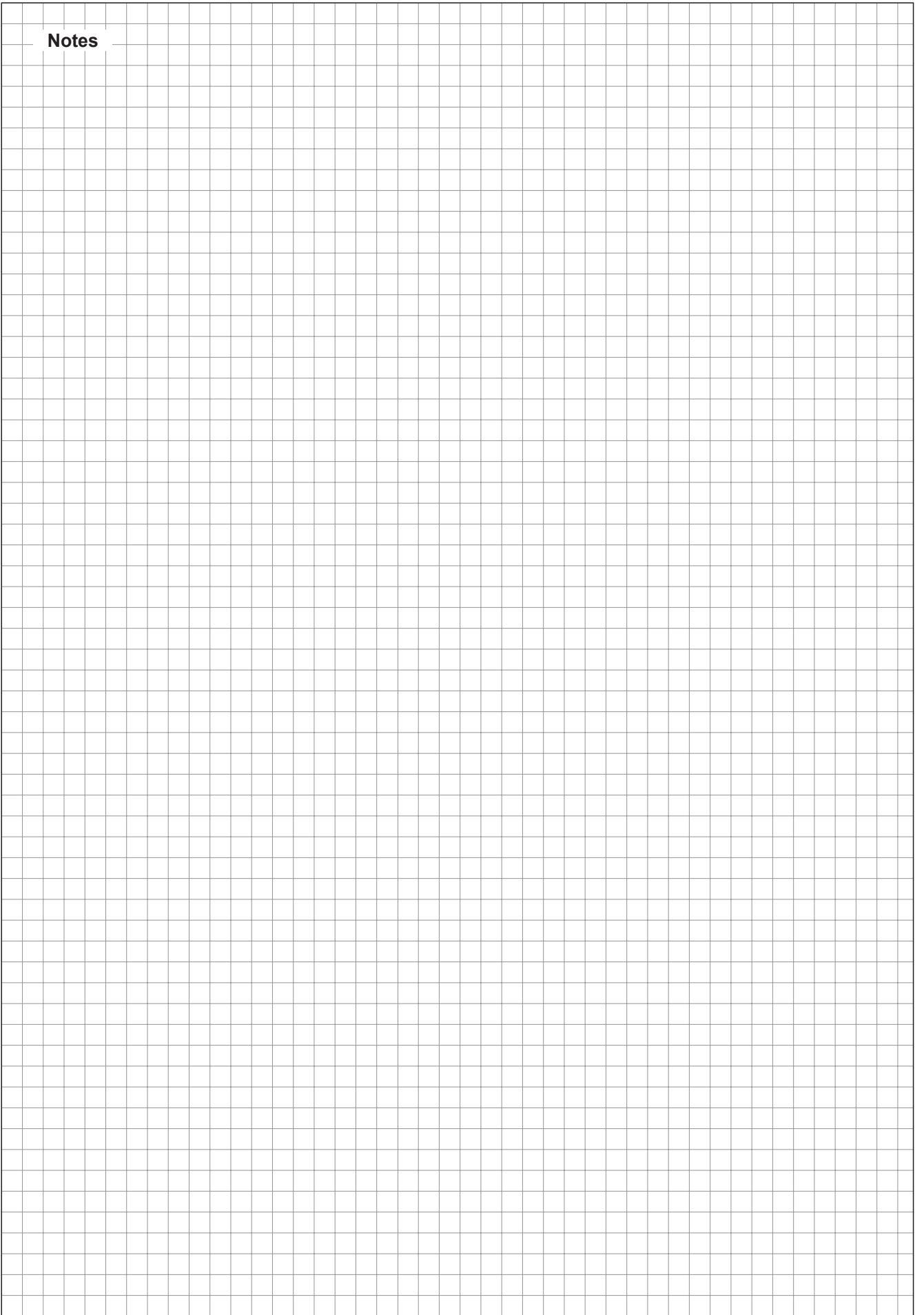
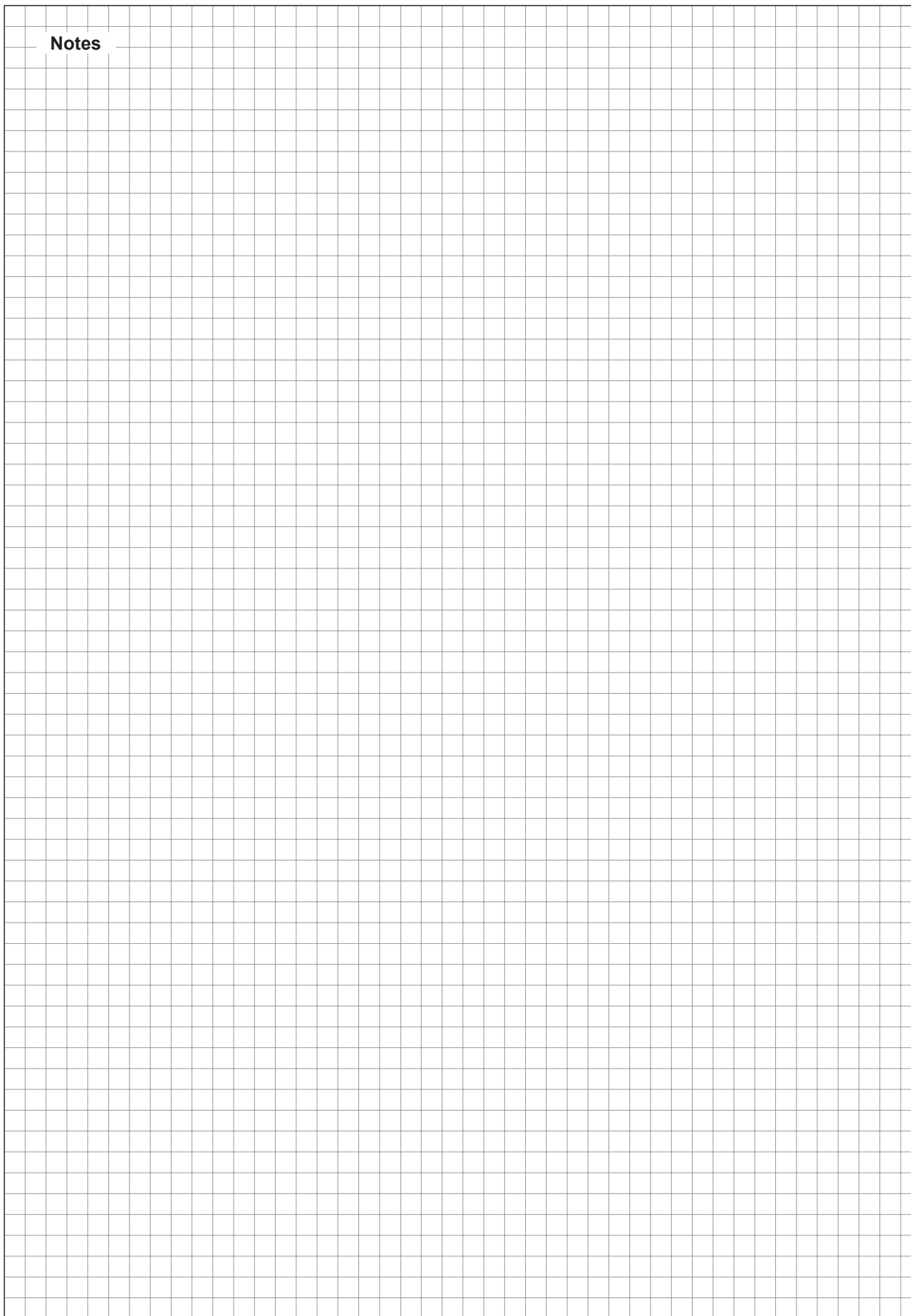


Fig. 11: Wiring diagram Nortec ME Direct Feed with optional On/off control unit

Notes



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, are free from defects in material and workmanship. No warranty is made against corrosion, deterioration, or suitability of substituted materials used as a result of compliance with government regulations.

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

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

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

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

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

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

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

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