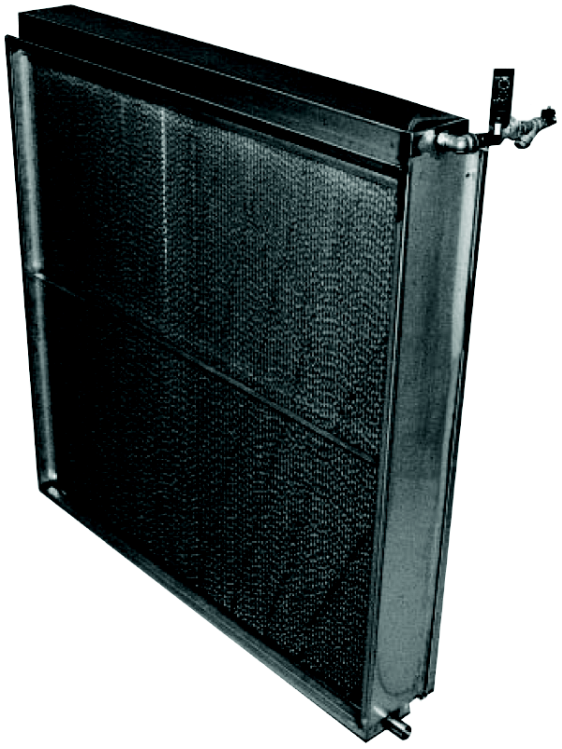
Original instructions

User manual

HP2 Humipaint™



Evaporative humidifier

For paint spraying and industrial applications

TEN-HP2-A1706

© Munters Europe AB 2017

Munters

Table of contents

Table of contents ii
1 Introduction 1
1.1 About this manual 1
1.2 Intended use 1
1.3 Warranty 1
1.4 Inspection of delivery 2
1.5 Conformity with directives and standards 2
1.6 Marking 2
2 Product design 3
2.1 Product description 3
2.2 Principle of operation 3
2.3 Design and function 3
3 Dimensioning 5
3.1 Humidifier capacity example 6
3.2 Required humidifier capacity 6
3.3 Required pre-heater power 6
3.4 Water consumption 6
4 Technical specification 7
5 Safety 9
5.1 Warnings 9
5.2 Safe installation, operation and maintenance 9
6 Installation 10
6.1 Safety 10
6.2 Moving the equipment 10
6.3 Storing the equipment 10
6.4 Site requirements 10
6.5 Assembly 11
6.6 Water supply and drain 12
6.7 Electrical connections 13
6.8 Control system 13
7 Operation 14
7.1 Pre-start checks 14
7.2 Start the humidifier 14
7.3 Stop the humidifier 14
7.4 Cooling mode 14
8 Service and maintenance 15
8.1 Safety 15
8.2 Inspection 15
8.3 Replace evaporative pads 15
8.4 Clean the distribution tube 16
9 Fault tracing 17
10 Disposal 18
11 Contact Munters 19

1 Introduction

1.1 About this manual

This instruction manual contains important safety information and a product description, as well as installation and maintenance instructions for the delivered humidifier. Please read all relevant parts of this manual before operating or performing any work on the unit. Observance of this information will help you to avoid danger, to minimise repair cost and downtime, and to increase the reliability and the service life of the unit.

This manual should be stored in a permanent location close to the unit.

This manual does not describe in full all the maintenance work required to guarantee the longevity and reliability of this type of equipment. Only the services of a qualified engineer who is a member of a confirmed maintenance company will ensure the safe and long lasting operation of the unit.

The contents of this manual can be changed without prior notice.

NOTE! *This manual contains information which is protected by copyright laws. It is not allowed to reproduce or transmit any part of this manual without written consent from Munters.*

Send any comments regarding this manual to:

Munters Europe AB
Technical Documentation
P.O. Box 1150
SE- 164 26 KISTA Sweden
e-mail: t-doc@munters.se

1.2 Intended use

The unit delivered by Munters must only be used for the treatment of air. This includes cooling and humidifying of the air.

Any other use of the unit, or use which is contrary to the instructions given in this manual, can cause personal injury and damage to the unit and other property.

No modification of the unit is allowed without prior approval by Munters. Attachment or installation of additional devices is only allowed after written agreement by Munters.

1.3 Warranty

The warranty is based on the terms of sale and delivery of Munters. The warranty is not valid if repairs or modifications are carried out without the written agreement of Munters, or if the unit does not operate under the conditions agreed with Munters. Damages resulting from negligence, poor maintenance or failure to comply with the recommendations will not be covered by the warranty.

It is a condition of the warranty that the unit for the full warranty period is serviced and maintained by a qualified Munters engineer or Munters approved engineer. Access to specific and calibrated test equipment is necessary. The service and maintenance must be documented for the warranty to be valid.

The warranty is limited to a free exchange of parts or components which have failed as a result of defects in materials or workmanship.

Commissioning/Start-up inspection "S" by Munters is mandatory to validate the full warranty.

Always contact Munters for service or repair. Operating faults can occur if the unit is maintained insufficiently or incorrectly.

1.4 Inspection of delivery

Upon receipt, inspect the equipment before signing the delivery note. Specify any damage or missing parts on the delivery note and send a registered letter of complaint to the last company responsible for transporting the equipment within three days. Inform Munters of this complaint.

The unit must be fully inspected within one week from arrival. If a hidden fault is discovered, send a registered letter of complaint to the haulier within the week following delivery, and notify Munters of this.

1.5 Conformity with directives and standards

We Munters Europe AB declare that the humidifier/cooler is in conformity with the essential health and safety requirements of the Machinery Directive 2006/42/EC, the Low Voltage Directive 2006/95/EC and the EMC Directive 2004/108/EC.

1.6 Marking

The unit identification plate is placed on the front of the tray, left or right side.

2 Product design

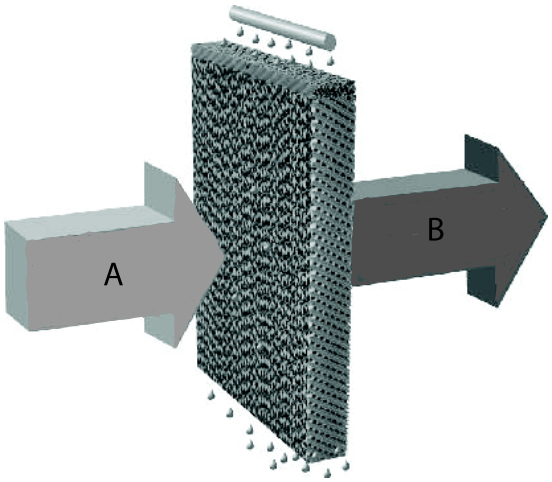
2.1 Product description

The Munters Humipaint is an evaporative humidifier/cooler designed for integration into air handling units (AHU) for industrial buildings, especially for spray painting applications.

The standard product line encompasses a wide range of sizes for airflows from 0.7 to 7.7 m^3/s.

- An adapted control system is optional.
- Compact design.
- Easy to install.
- Simple maintenance.
- No droplets and therefore no minerals escape into the airflow.

2.2 Principle of operation



A. Warm and dry air
B. Cooled and humidified air without aerosols

As the warm and dry air passes through the pad it evaporates part of the water and produces cool, humidified air.

The rest of the water assists in washing the pad, and is drained back to the tray.

The energy that is needed for the evaporation is taken from the air itself. The air that leaves the humidifier is therefore humidified and cooled simultaneously without any external energy supply for the evaporation.

This is in essence the adiabatic cooling process. It is very efficient and the consumption of energy is very low.

It also allows the use of water straight from the tap with no need for water treatment.

2.3 Design and function

The Humipaint unit consists of a stainless steel frame, evaporative pads and optionally the Munters humidity control system including sensor.

The unit is prepared for installation in an air duct.

The evaporative pads can be replaced after removing the side panel.

The water supply is controlled by a solenoid valve and a constant flow valve.

The unit is controlled to the relative humidity setpoint with pulse control of the water supply. The open and closed time intervals for the valve controls the humidity.

The control system consists of the sensor placed in the duct or in the room, and the control unit with a display showing the current humidity.

The setpoint can be adjusted on the control unit.

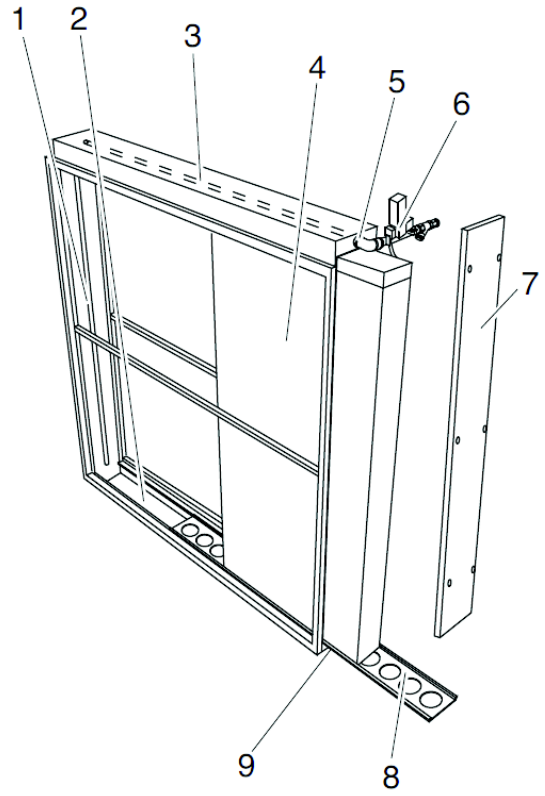


Figure 2.1 Design

1. Seal
2. Bottom tray
3. Diffusor tube
4. Evaporative pad
5. Rubber connection
6. Solenoid valve
7. Side panel
8. Bottom plate
9. Drain

3 Dimensioning

Humidifier size selection, airflow interval 0.7 to 8.5 m^3/s

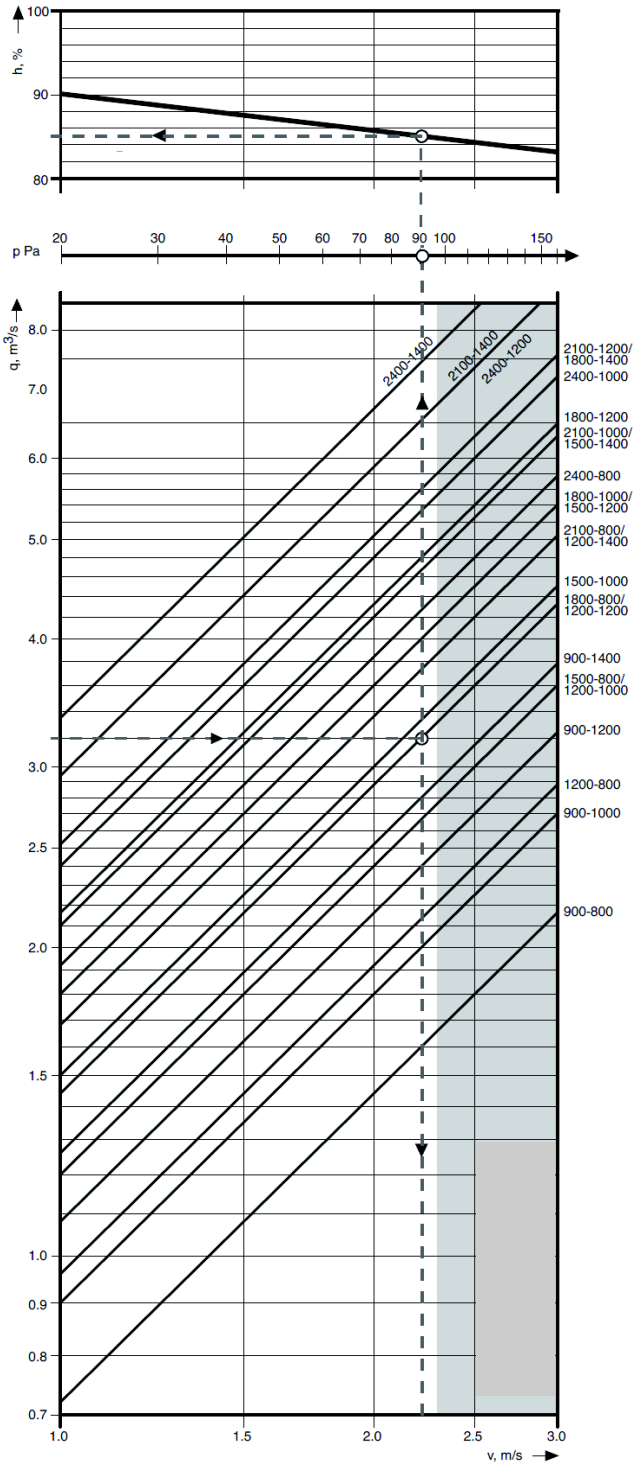


Figure 3.1 Capacity diagram

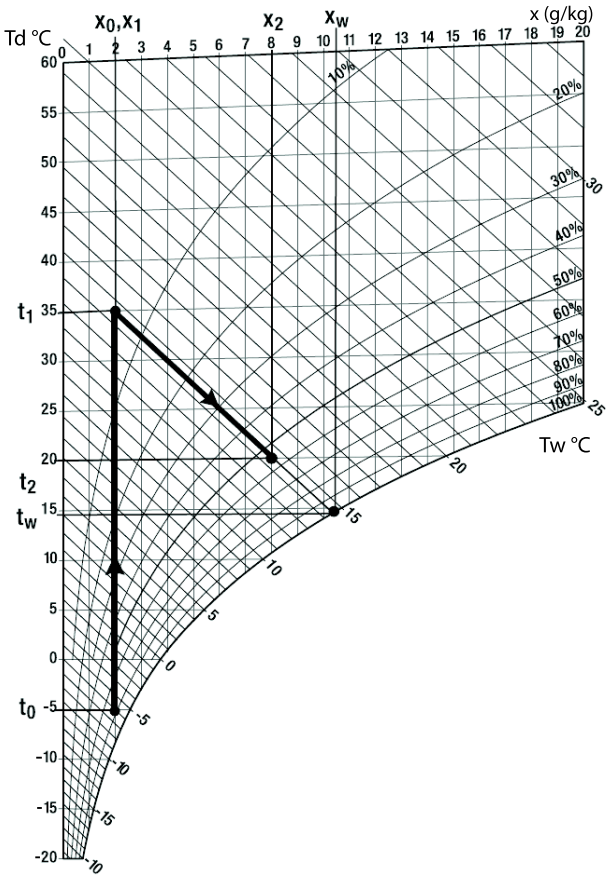


Figure 3.2 hx-diagram

Td °C — Dry-bulb temperature
Tw °C — Wet-bulb temperature
x g/kg — Humidity ratio

3.1 Humidifier capacity example

See *Figure 3.1* .

Airflow q=3.2 m^3/s and selected humidifier HP2–1200–1200.

The capacity diagram gives air speed v=2.2 m/s, pressure drop humidifier Δp=90 Pa and humidification capacity η=85 %.

3.2 Required humidifier capacity

See *Figure 3.2* .

Example data:

Outside air temperature: t_0= –5 °C and x_0= 2 g/kg.

Condition after humidifier: t_2= 20 °C and x_2= 8 g/kg.

Condition after pre-heater: t_1= 35 °C and x_1= 2 g/kg.

Calculation of required humidifier capacity:

$\eta_{min} = (x_2 - x_1) / (x_w - x_1) \times 100$

$\eta_{min} = (8–2) / (10,5–2) \times 100 = 71$ %

η=85 % in the example above, which in this case is sufficient.

3.3 Required pre-heater power

Airflow q=3.2 m^3/s as above.

Required pre-heater power $P = q \times 1.2 \times (t_1 - t_0)$

$3.2 \times 1.2 \times (35–(-5)) = 154$ kW

3.4 Water consumption

The maximum water consumption $f_{max} = (x_2 - x_1) \times q \times 1.2 \times 3.6$

$f_{max} = (8–2) \times 3.2 \times 1.2 \times 3.6 = 83$ l/h

The yearly consumption can be estimated to (f_{max}/2) x number of operation hours in a year / 1000

f_{year}= (80 / 2) x 1600 / 1000 = 66 m^3/year.

4 Technical specification

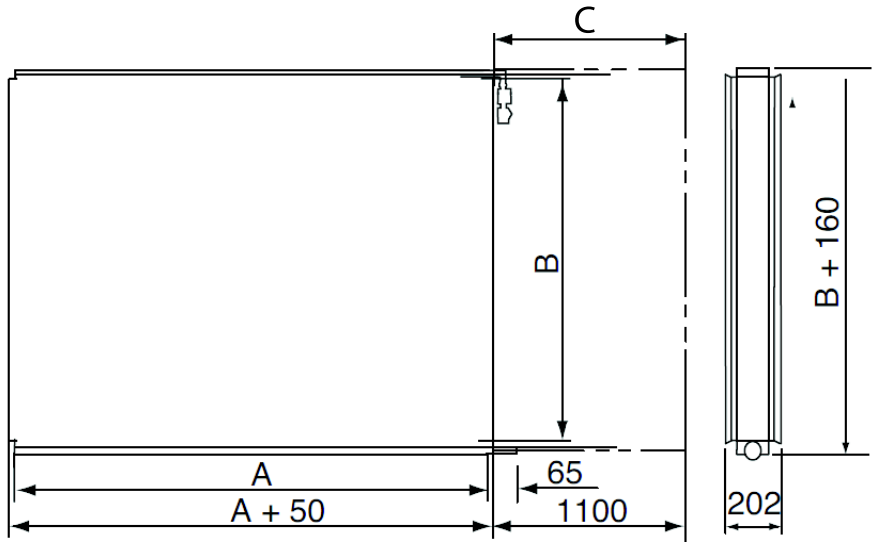


Figure 4.1 Dimensions

Humipaint is available in the standard sizes and corresponding airflows shown in *Table 4.1*.

The maximum air speed is 2.3 m/s.

A = width (mm), B = height (mm), C is required service space.

Airflow (m^3/s). Weight dry/wet (kg).

A	900		1200		1500		1800		2100		2400	
B	Airflow	Weight	Airflow	Weight	Airflow	Weight	Airflow	Weight	Airflow	Weight	Airflow	Weight
800	1.7	34/39	2.2	42/48	2.8	50/58	3.3	58/67	3.9	66/77	4.4	74/86
1000	2.1	38/43	2.8	46/54	3.5	54/64	4.1	63/74	4.8	71/84	5.5	79/94
1200	2.5	41/48	3.3	50/59	4.1	58/69	5	67/80	5.8	75/91	6.6	84/102
1400	2.9	44/52	3.9	53/64	4.8	62/75	5.8	71/86	6.8	79/98	7.7	88/109

Table 4.1 Technical data

Voltage	230 V 50 Hz
Connections	*Terminals*
Main fuse	10 A
Water connection	R 1/2" internal, 2 to 10 bar
Drain	External diameter 32 mm
Solenoid valve	24 VAC
Protection class duct sensor	IP65
Protection class solenoid valve	IP65

Ordering code

HP2–XXXX-YYYY

XXXX — Width A (mm)

YYYY — Height B (mm)

5 Safety

5.1 Warnings

Information about dangers are in this manual indicated by the common hazard symbol:

WARNING!

Indicates a possible hazard that can result in severe personal injury or death.

CAUTION!

Indicates a possible hazard that can result in damage to the unit or other property, or cause environmental damage.

NOTE! *Highlights supplementary information for optimal use of the unit.*

5.2 Safe installation, operation and maintenance

The information in this manual shall in no way take precedence over individual responsibilities or local regulations.

During operation and other work with a machine it is always the responsibility of the individual to consider:

- The safety of all persons concerned.
- The safety of the unit and other property.
- The protection of the environment.

Always carry out risk assessments before doing any work on the unit.





WARNING!

Before doing any service or maintenance work on the unit make sure that all electrical equipment has been disconnected from the power supply, and secured against reconnection. The unit is connected to high voltage which can cause serious injury or death.

WARNING!

The unit must never be connected to a voltage or frequency other than that for which it was designed. Refer to the unit identification plate.

WARNING!

Use only approved lifting equipment to avoid accidents.

WARNING!

Water spillage can cause slipping accidents resulting in serious injury.

6 Installation

6.1 Safety

The humidifier may not be put into operation before the product or the system of which the humidifier is a part has been declared to be in conformity with the specifications of the Machinery Directive and its supplements.

WARNING!

All electrical installations must be carried out by a qualified electrician and in accordance with local regulations.

Do not connect the unit to other mains voltage than specified on the identification plate.

CAUTION!

Do not step on the unit or the piping.

Do not use silicone for any purpose. Silicone has a negative effect on paint quality.

6.2 Moving the equipment

WARNING!

The humidifier is heavy. Be careful when lifting or moving the parts. Use lifting equipment to avoid injuries.

The humidifier must always be handled carefully.

Provided that the packing material has not been removed, the humidifier can be lifted by a crane or fork-lift truck.

Dispose of the packaging material according to local regulations.

6.3 Storing the equipment

- Place the humidifier in an upright position on a horizontal surface.
- Re-use the packaging material to provide protection for the unit.
- Protect the humidifier from physical damage.
- Store the humidifier under cover and protect it from dust, frost, rain and aggressive contaminants.
- Evaporative pads must be stored in a dry environment.

6.4 Site requirements

CAUTION!

Make sure that the AHU section where the unit will be placed is designed to carry the weight of the unit.

The humidifier is to be installed level and the floor must withstand water.

The unit space must have a drain for any water spilled during service.

CAUTION!

Do not install the humidifier so that spilled water can damage electrical installations or other equipment.

NOTE! *Make sure access for inspection/service is possible in a safe way through the AHU inspection door.*

The size adaption between the ducts and the unit must be made with a small angle, see *Figure 6.1* . The adaption can be both sideways and up-down.

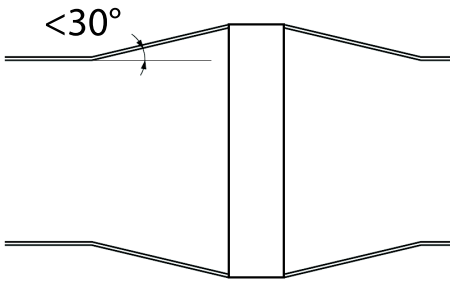


Figure 6.1 Size adaption between ducts and the unit

The unit must not be installed directly after a fan or a bend in the duct to avoid local air speed variations.

The unit must be installed after the AHU heating coil and before the temperature sensor.

In case the heating coil capacity is not enough to compensate for the evaporative cooling effect under certain conditions, the system can be equipped with a temperature guard to shut down the humidifier if the temperature is too low.

6.5 Assembly

1. Align the unit with the supply duct, see *Figure 6.2* .
2. Install the locking rails (2) over the locking edges (4).
3. Adjust the unit to a level position both horizontally and vertically.
4. Connect the second duct in the same way.

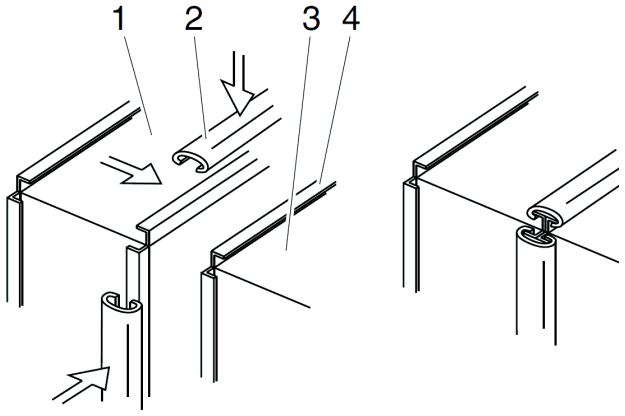


Figure 6.2 Assembly

1. Humipaint
2. Locking rail
3. Supply duct
4. Locking edge

5. Install the evaporative pads. Remove the six screws holding the side panel, see *Figure 2.1* .
6. Install the pads with the distribution section on top, see *Figure 6.3* .

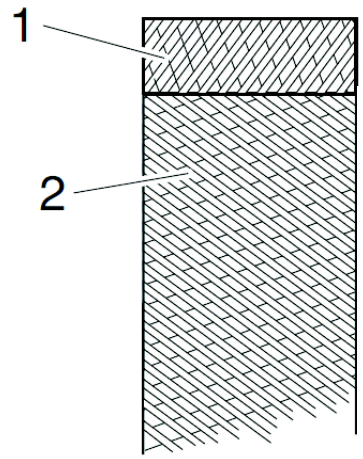


Figure 6.3 Pad

1. Distribution section
2. Evaporative pad

7. Install the side panel and the six screws.
8. Install the valve assembly at the desired angle, but not pointing down as it will block the side panel.
9. Connect the water supply as below.

6.6 Water supply and drain

Connect the supply water to the humidifier shut-off valve.

Connect the humidifier drainage outlet to the drain via a water trap.

The height of the water trap must be H > P+25 mm (P is mm water column).

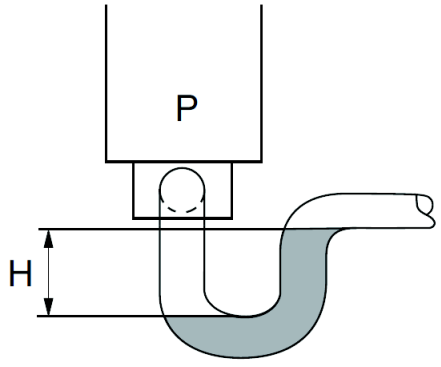


Figure 6.4 Water trap

6.7 Electrical connections

Connect the humidifier according to *Figure 6.5* .

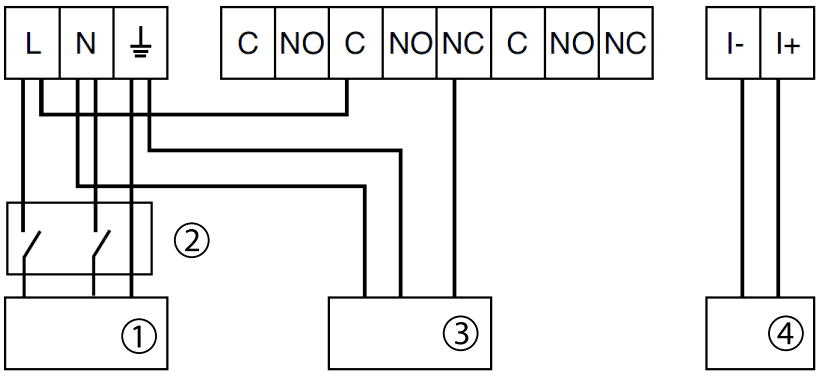


Figure 6.5 Electrical connections

1. Power supply
2. Circuit breaker (not included)
3. Solenoid valve
4. Humidity sensor

6.8 Control system

See the separate control system supplement.

7 Operation

7.1 Pre-start checks

1. Make sure that the humidifier pads are correctly installed.
2. Make sure that the drain system including water trap is correctly installed.
3. Make sure that the shut-off valve is open.
4. Set the pulse regulator to the base settings On = 4 s and Off = 6 s. If the humidity varies more than 10 %, the On-time can be adjusted down. In the dry season, the On-time can be adjusted up as needed to reach the desired humidity.

7.2 Start the humidifier

Set the control system to the desired humidity (RH) setpoint.

The solenoid valve opens and water is distributed until the humidity sensor registers the set value.

7.3 Stop the humidifier

Shut off the water supply to the humidifier and let the AHU fan run for 10 minutes to dry the pads.

7.4 Cooling mode

To achieve cooling when the room temperature is high, set the humidity setpoint to a higher value.

8 Service and maintenance

8.1 Safety





WARNING!

Before doing any service or maintenance work on the unit make sure that all electrical equipment has been disconnected from the power supply, and secured against reconnection. The unit is connected to high voltage which can cause serious injury or death.

WARNING!

Water spillage can cause slipping accidents resulting in serious injury.

CAUTION!

Service and maintenance work should only be carried out by qualified and trained personnel. Operating faults can occur if the unit is maintained insufficiently or incorrectly.

8.2 Inspection

CAUTION!

Shut off the water supply before doing any inspection work.

1. Remove the filter insert from the valve assembly and clean the filter net. Clean the valve assembly.
2. Inspect the locking edges and rails for damage.
3. Remove the side panel. Inspect the seals on the inside of the panel for damage. Replace damaged seals.
4. Remove the pads. Use a portable light to inspect the rear seal for damage. Replace damaged seal.

8.3 Replace evaporative pads

To avoid low humidification capacity and water droplet carry-over the evaporative pads must be replaced 1 to 2 times a year.

1. Stop the humidifier and dry the pads, see *7.3, Stop the humidifier*.
2. Remove the six screws holding the side panel, see *Figure 2.1* .
3. Pull the pads out. It can be easier if the bottom plate is pulled out first.
4. Treat used CELdek pads as burnable industrial waste according to local regulations.
5. Inspect the holes in the distribution tube. If they are clogged, follow the instructions in *8.4, Clean the distribution tube*.
6. Clean the bottom tray and the bottom plate with water and a brush.
7. Install the pads, see *6.5, Assembly*.

8.4 Clean the distribution tube

1. Remove the valve assembly carefully.
2. Pull out the distribution tube with your hands. Tools can damage the tube. If the friction is high, wet the tube with water.
3. Clean the distribution tube holes with a sharp tool or needle.
4. Inspect the rubber bushings for damage. Replace as necessary.
5. Install the distribution tube with the holes pointing up. The end of the tube must fit into the guide hole in the humidifier, see *Figure 8.2* .
6. Install the side panel and the six screws.
7. Install the valve assembly at the desired angle, but not pointing down as it will block the side panel.

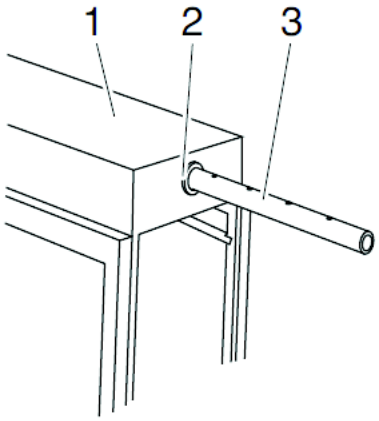


Figure 8.1 Distribution tube

1. Humipaint
2. Rubber bushing
3. Distribution tube

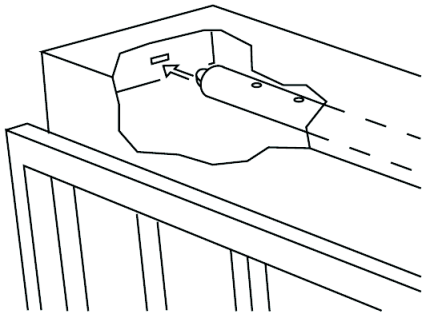


Figure 8.2 Install the distribution tube

9 Fault tracing

- Make sure that the water and electrical supplies functions correctly.
- Make sure that there is no water droplet carry-over from the pads. Replace the pads if necessary, see *8.3, Replace evaporative pads*.
- Make sure that the holes in the distribution tube are not clogged. Clean if necessary, see *8.4, Clean the distribution tube*.
- Do a check of the control system.

10 Disposal

Pads and complete units must be scrapped in accordance with applicable legal requirements and regulations. Contact your local authorities.

11 Contact Munters

AUSTRIA	Munters GmbH Air Treatment Zweigniederlassung Wien	Eduard-Kittenberger-Gasse 56, Obj. 6 A-1235 Wien	Tel: +43 1 616 4298–92 51 luftentfeuchtung@munters.at www.munters.at
BELGIUM	Munters Belgium nv Air Treatment	Blarenberglaan 21c B-2800 Mechelen	Tel: +3215285611 service@muntersbelgium.be www.muntersbelgium.be
CZECH REPUBLIC	Munters CZ, organizacni slozka Air Treatment	Slevacská 2368/68 CZ-615 00 BRNO	Tel: +420 775 569 657 info@munters-odvlhcovani.cz www.munters-odvlhcovani.cz
DENMARK	Munters A/S Air Treatment	Ryttermarken 4 DK-3520 Farum	Tel: +4544953355 info@munters.dk www.munters.dk
FINLAND	Munters Finland Oy Kuivaajamyynti	Hakamäenkuja 3 FI-01510 VANTAA	Tel: +358 207 768 230 laitemyynti@munters.fi www.munters.fi
FRANCE	Munters France SAS Air Treatment	106, Boulevard Héloise F-95815 Argenteuil Cedex	Tel: +33 1 34 11 57 57 dh@munters.fr www.munters.fr
GERMANY	Munters GmbH Air Treatment-Zentrale	Hans-Duncker-Str. 8 D-21035 Hamburg	Tel: +49 (0) 40 879 690 - 0 mgd@munters.de www.munters.de
ITALY	Munters Italy S.p.A Air Treatment	Strada Piani 2 I-18027Chiusavecchia IM	Tel: +39 0183 521377 marketing@munters.it www.munters.it
NETHERLANDS	Munters Vochtbeheersing	Energieweg 69 NL-2404 HE Alphen a/d Rijn	Tel: +31 172 43 32 31 vochtbeheersing@munters.nl www.munters.nl
POLAND	Munters Sp. z o.o. Oddzial w Polsce Air Treatment	ul. Swietojanska 55/11 81-391 Gdynia	Tel.: + 48 58 305 35 17 dh@munters.pl www.munters.com.pl
SPAIN	Munters Spain SA Air Treatment	Europa Epresarial. Edificio Londres. C/Playa de Liencres 2. 28230 Las Matas. Madrid	Tel: +34 91 640 09 02 marketing@munters.es www.munters.es
SWEDEN	Munters Europe AB Air Treatment	P.O. Box 1150 SE-164 26 Kista	Tel: +46 8 626 63 00 avfuktning@munters.se www.munters.se
SWITZERLAND	Munters GmbH Air Treatment Zweigniederlassung Rümlang	Glattalstr. 501 CH-8153 Rümlang	Tel: +41 52 343 88 86 info.dh@munters.ch www.munters.ch
UNITED KINGDOM	Munters Ltd Air Treatment	Knowledge Centre, Wyboston Lakes Great North Road, Wyboston Bedfordshire MK44 3BY	Tel: +44 1480 432 243 info@munters.co.uk www.munters.co.uk

AUSTRALIA	Tel:+61 288431588 dh.info@munters.com.au	**MEXICO**	Tel:+52 722 270 40 29 munters@munters.com.mx
BRAZIL	Tel: +55 11 5054 0150 www.munters.com.br	**SINGAPORE**	Tel:+65 6744 6828 singapore@muntersasia.com
CANADA	Tel: +1-800-843-5360 dhinfo@munters.com	**SOUTH AFRICA**	Tel:+27 11 997 2000 info@munters.co.za
CHINA	Tel: +86 10 804 18000 marketing@munters.cn	**TURKEY**	Tel:+90 216 548 14 44 info@muntersform.com
INDIA	Tel:+91 20 668 18 900 info@munters.in	**UAE (Dubai)**	Tel:+971 4 881 3026 middle.east@munters.com
JAPAN	Tel:+81 3 5970 0021 mkk@munters.jp	**USA**	Tel: +1-800-843-5360 dhinfo@munters.com
KOREA	Tel:+82 2 761 8701 munters@munters.kr		

www.munters.com

