

Operating instructions

Steam humidifiers of the AT 3000 series

- Installation
- Connecting the water and the electrics
- Putting into operation
- Servicing and system signals
- Spare parts
- Technical specifications



NORDMANN
ENGINEERING

Introduction

You have purchased a NORDMANN steam humidifier which, provided you observe the operating instructions, will ensure fully automatic operation and reliable, low-maintenance service. Therefore, read these operating instructions carefully and pay particular attention to the safety instructions and warnings.

Should you have any queries that go beyond the scope of these operating instructions, please contact the company from which you purchased the humidifier. As the manufacturers, we are, of course, always ready to be of assistance, since we want all of our customers to be completely satisfied with our products.

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Safety instructions

Please read and observe the operating instructions before fitting and putting into operation.

Very important!

The operating instructions should always be readily available and kept in the immediate vicinity of the humidifier.

All work must be done only by persons who are familiar with the product and are sufficiently qualified to perform the work.

The AT 3000 steam humidifiers have been designed and constructed in accordance with the latest technology and the accepted safety regulations. However, if misused, the humidifier can present a danger to both the user and third parties.

Apart from these safety instructions, you should observe all national and local regulations.

Proper use

The AT 3000 steam humidifiers are intended solely for indirect (via a steam-distribution pipe in a ventilation duct) or direct (with either a separate or a humidifier-mounted fan) humidification. Used in any other way, or in a way that goes above and beyond the one described above, is contrary to its intended usage. The manufacturer/supplier cannot be held responsible for any damage resulting therefrom. The user shall bear the risk.

Alterations to the humidifier

Without NORDMANN's written approval, no alterations may be made to the humidifier itself, the components or the accessories.

The use of non-original spare parts may lead to our refusal to accept responsibility for any damage arising therefrom.

Safety instructions

Whenever you see either of these signs, particular care must be taken.



1. Installation

1.1 Dimensions

Dimensions of the AT 3000 humidifiers

Type	Fig.	mm A	mm B	mm C	Steam outlet	Drainage
4	1	390	585	230	1 x Ø 22	1 x Ø 22
8	1	390	585	230	1 x Ø 22	1 x Ø 22
15	1	470	645	305	1 x Ø 35	1 x Ø 22
23	1	470	645	305	1 x Ø 35	1 x Ø 22
32	1	525	715	360	1 x Ø 35	1 x Ø 22
45 & 65	1	525	715	360	2 x Ø 35	1 x Ø 22
64	2	975	730	385	2 x Ø 35	2 x Ø 22
90 & 130	2	975	730	385	4 x Ø 35	2 x Ø 22

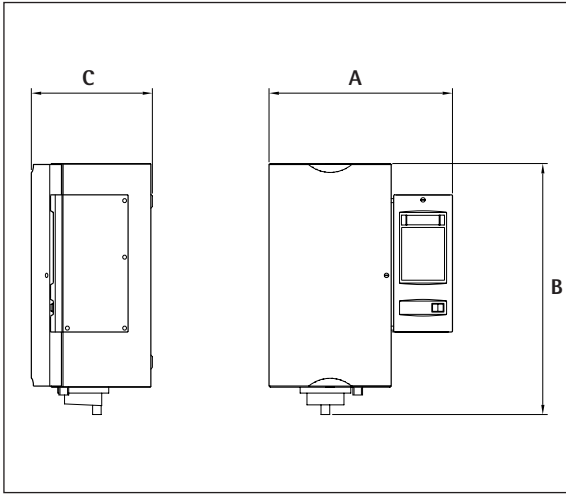


Fig. 1

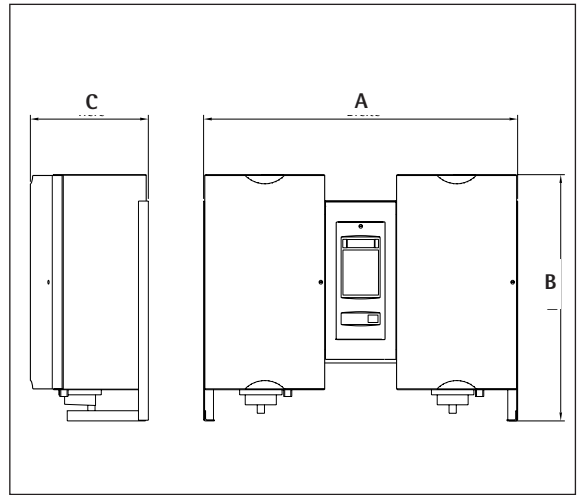


Fig. 2

Fixing holes for type 64, 90 & 130 kg/h (mm)

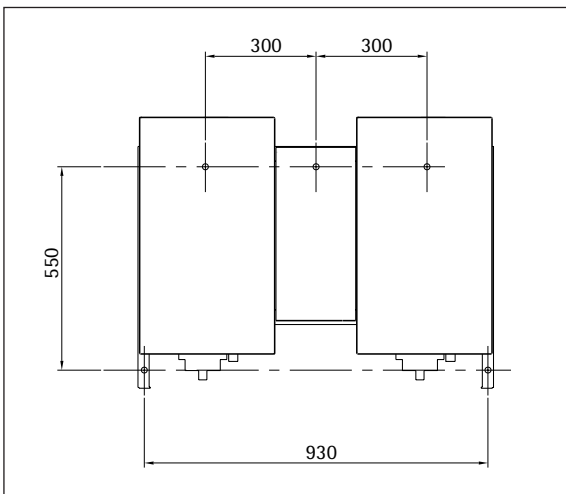


Fig. 3

Fixing holes for type 4-65 kg/h

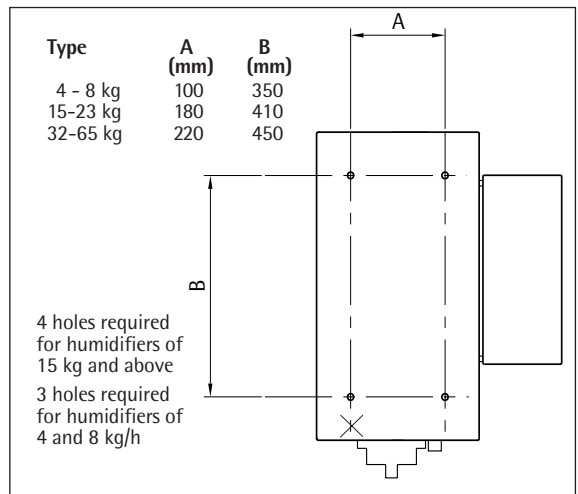


Fig. 4

Dimensions of the steam-distribution pipes

Type/mm	A	B	C	D	Fig.	Art no.
22-300	300	Ø 22	176	60	5	902 00 00
22-450	450	Ø 22	300	70	5	902 00 01
22-650	650	Ø 22	504	70	5	902 00 02
22-850	850	Ø 22	696	70	5	902 00 03
35-300	300	Ø 35	200	55	5	902 00 04
35-450	450	Ø 35	300	80	5	902 00 05
35-600	600	Ø 35	425	90	5	902 00 06
35-900	900	Ø 35	680	110	6	902 00 07
35-1200	1200	Ø 35	935	110	6	902 00 08
35-1500	1500	Ø 35	1275	110	6	902 00 09

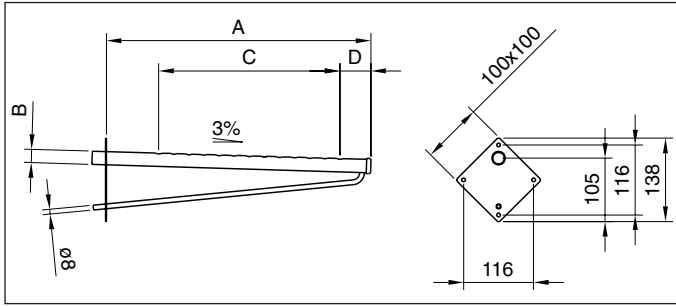


Fig. 5

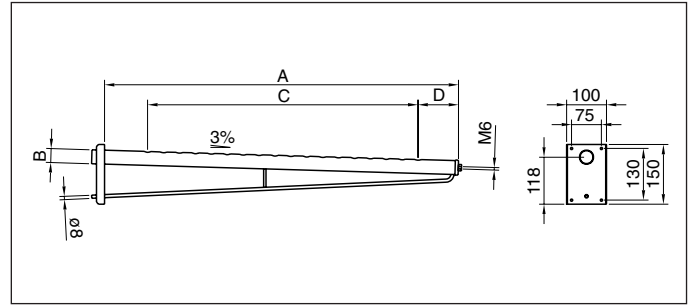


Fig. 6

Dimensions of the
4-23 kg/h steam blowers

Fig.	Type	A mm	B mm	C mm	D mm	E mm	F mm	G mm
8	4 - 8 kg/h	230	205	220	145	165	Ø 22	Ø 8
9	15-23 kg/h	310	275	295	255	285	Ø 35	Ø 8

Fixing holes for 4-23 kg/h
steam blowers

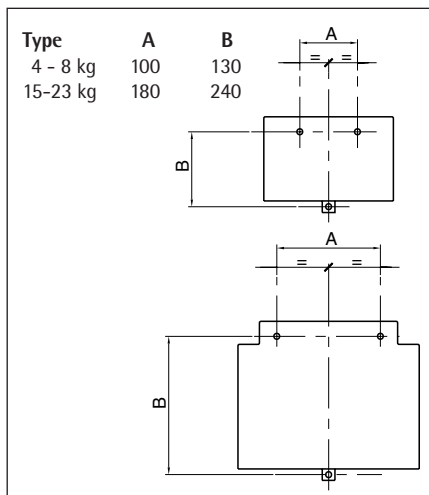


Fig. 7

Dimensions of the 4-23 kg/h steam blowers
Type 4-8 kg/h Type 15-23 kg/h

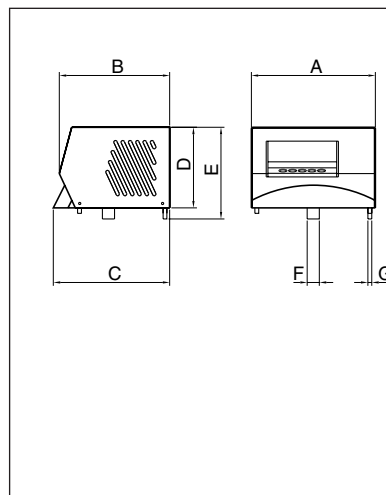


Fig. 8

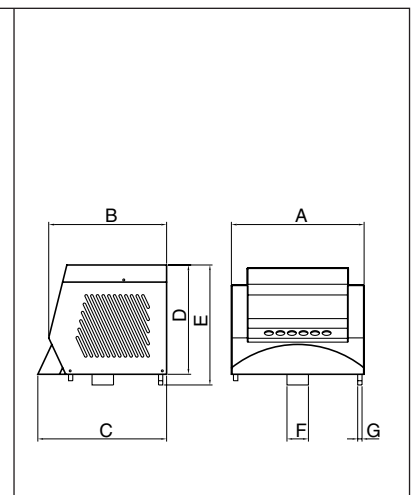


Fig. 9

Dimensions of the Turbo 32, 45 & 65 kg/h
steam blowers

Fig.	Type	A	B	C	D	E	F	G	H	I
10	32 kg/h	Ø	505	255	Ø	M10	185	235	Ø 35	Ø 8
11	45 & 65 kg/h	200	505	255	350	M10	185	235	Ø 2 x 35	Ø 8

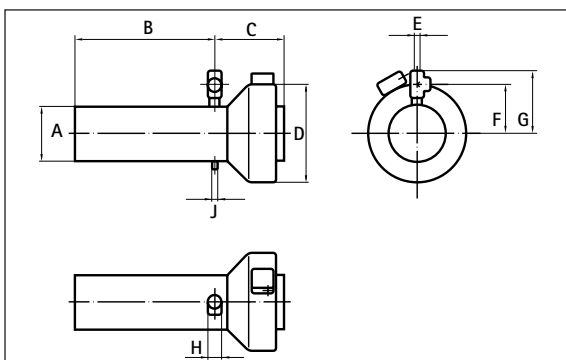


Fig. 10

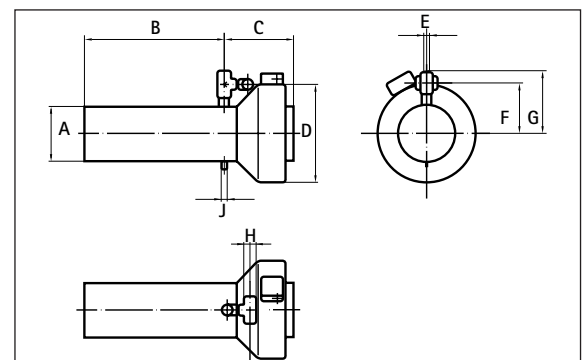


Fig. 11

1.2 Steam nozzle

For smaller outputs of up to 4 kg/h, we offer a steam nozzle which can be either fitted in air ducts, for instance, or used for direct room humidification. The rules for the humidification distance (distance needed to mix the steam adequately with air) must be observed here, too.

When the steam nozzle is employed, the length of the steam hose should not exceed 1.5 metres.

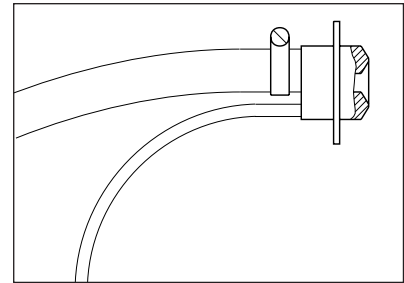


Fig. 12

1.3 Fitting the humidifier



All installation work must be performed by trained personnel. The customer himself is responsible for verifying their qualifications.

When fitting the humidifier, use only the material supplied with the unit and observe the various minimum distances that have been stipulated.

To open the humidifier, turn the screw, using the correct screwdriver, in an anti-clockwise direction; the door to the water componentry or the electrics then opens. To close, simply push back into place (no screwing down is necessary).

Positioning the humidifier

Ensure that there is sufficient room to perform servicing and maintenance work, and that the unit is easily accessible. To facilitate such work, mount the unit at eye level.

We recommend that you fit the humidifier as near as possible to the steam-distribution pipes. The highest degree of efficiency is attained when the humidifier is linked to the steam-distribution pipe by the shortest possible steam hose.

When installing the double units (types 64, 90 and 130 kg/h) next to each other, ensure that each drainage pipe is fed to a funnel of adequate size.

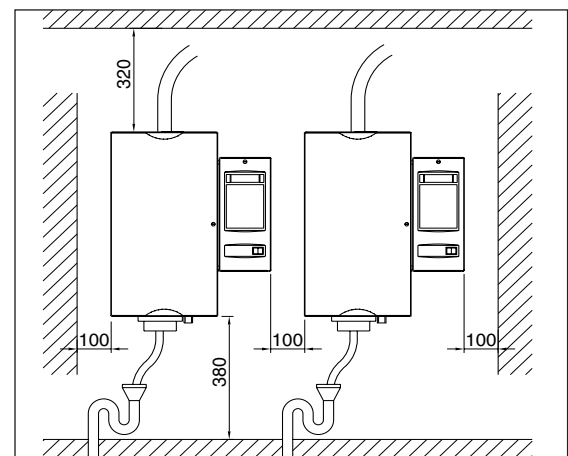


Fig. 13

1.4 Fitting the steam-distribution pipe



All installation work must be performed by trained personnel. The customer himself is responsible for verifying their qualifications.

The visible jet of steam issuing from the steam-distribution pipe dissipates in the air only after a certain distance. In order to prevent condensation, a certain minimum distance to other parts of the installation (such as ventilators, filters or pipe bends) must, therefore, be maintained.

The steam-distribution pipes can be fitted either vertically or horizontally, though you must ensure that the steam outlets are always vertical to the air flow. If fitted horizontally, these apertures must be at the top.

An adhesive template is supplied with each steam-distribution pipe to facilitate installation in, for instance, an air duct. NORDMANN's steam-distribution pipes are designed so that, if fitted straight, there is automatically a slight decline of 3% which ensures that any condensate flows back again.

The ends (reverse side of mounting plate) of the longer steam-distribution pipes (types 35-900, 35-1200 and 35-1500) are equipped with an M6 fixing bolt.

Guidelines on fitting the steam-distribution pipes

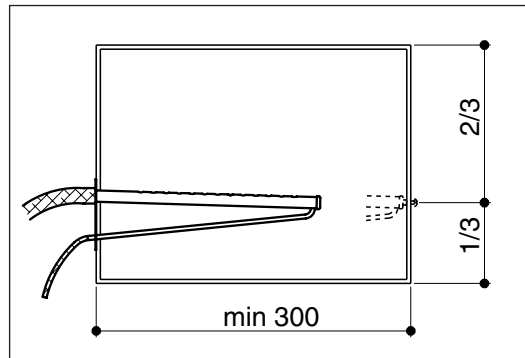


Fig. 14

Various fitting methods

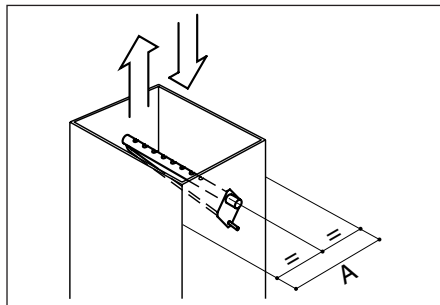


Fig. 15

A = min. 200

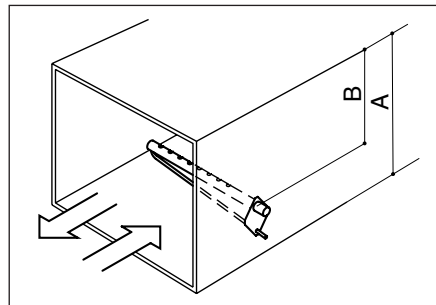


Fig. 16

A = min. 250
B = min. 150

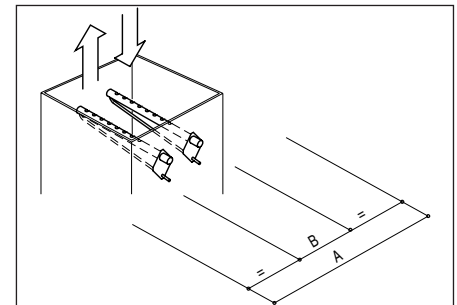


Fig. 17

A > 300
B = 0.5 A

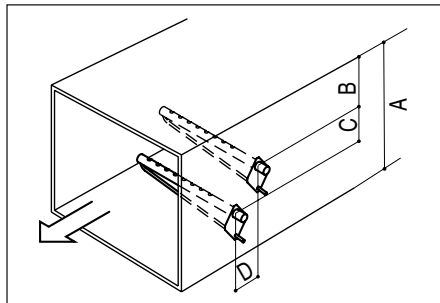


Fig. 18

A > 350
B = min. 150
C = 0.3 A
D = min. 100

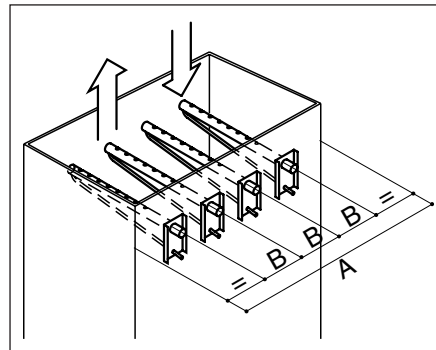


Fig. 19

A > 500
B = min. 100

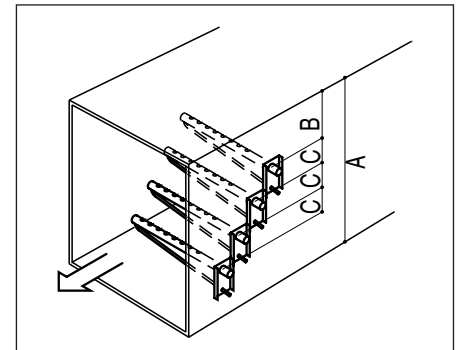


Fig. 20

A > 500
B = min. 150
C = min. 0.15 A

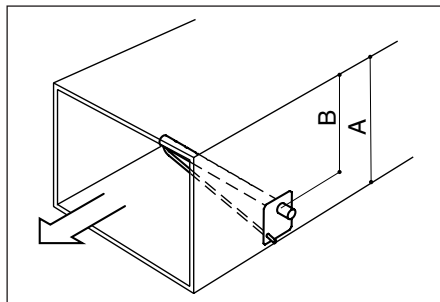


Fig. 21

A = min. 175
B = min. 100

Steam-distribution pipe fitted on suction side

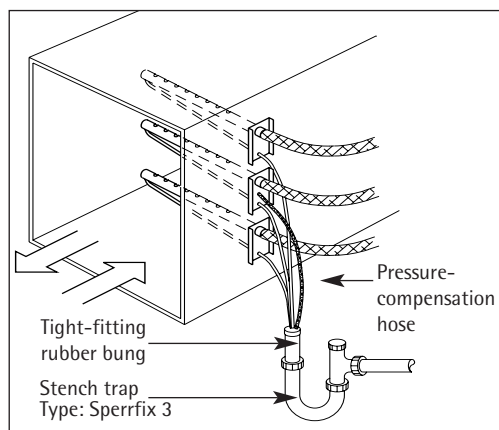


Fig. 22

Because of the under-pressure in the appliance or duct part, condensate may be trapped in the steam-distribution pipe. If there is an outlet in the empty part (intended for the distribution pipes) of the humidifier, the condensate can be bled off in the immediate vicinity. An alternative method of bleeding off the condensate can be seen in the diagram.

1.5 Fitting the steam blowers



All installation work must be performed by trained personnel.
The customer himself is responsible for verifying their qualifications.

The steam blower for distributing the steam in the room can be fitted either directly onto the humidifier itself (excepting types 32 to 130 kg/h) or onto a wall.

For the humidifier to work best, correct steam distribution is essential. For this reason, you must observe the minimum distances when installing the equipment.

Minimum distances for steam blowers of type 4–23 kg/h

Type	A min.	B min.
4 kg	600 mm	3 m
8 kg	900 mm	5 m
15 kg	1000 mm	7 m
23 kg	1000 mm	10 m

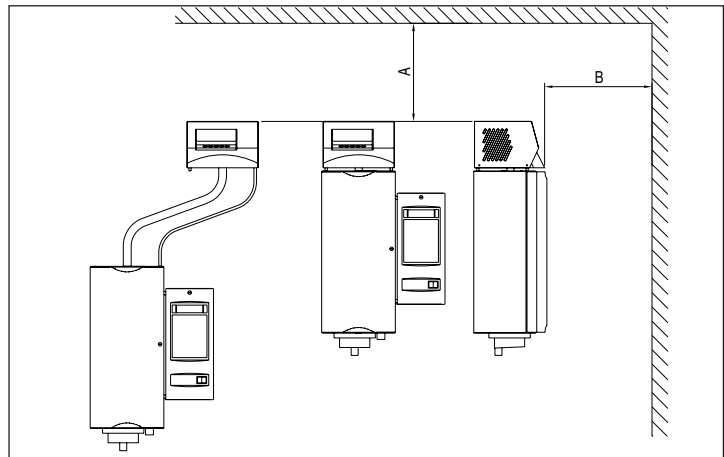


Fig. 23

Minimum distances for steam blowers of type 32–65 kg/h

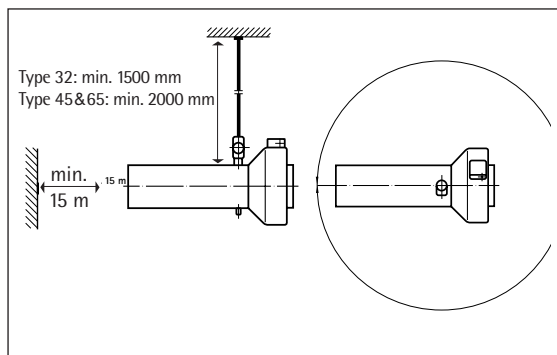


Fig. 24

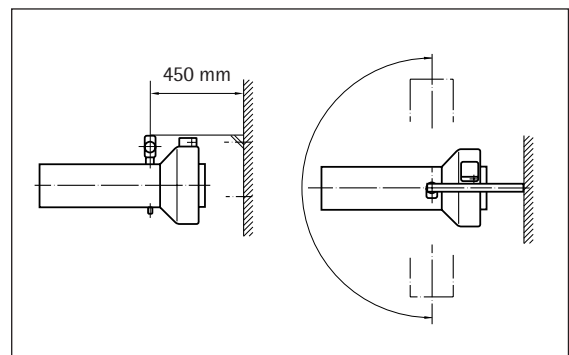


Fig. 25

Technical specifications for steam blowers

Max. steam output	Air flow m ³ /h	Power supply	Nominal power	Weight kg	Steam pipe H	Condensate pipe G	Noise level (1m)
4 kg/h–8 kg/h	110	200/240 V	25 W	5	Ø 22 mm	Ø 8 mm	46 dB (A)
15 kg/h–23 kg/h	650	50/60 Hz	170 W	15	Ø 35 mm	Ø 8 mm	54 dB (A)
32 kg/h	800	220/240 V	110 W	8	Ø 35 mm	Ø 8 mm	72 dB (A)
45 & 65 kg/h	800	50/60 Hz	110 W	8	2 x Ø 35 mm	Ø 8 mm	72 dB (A)

1.6 Laying the steam hose

The steam hose should be kept as short as possible. It should not be possible to block or obstruct the steam supply lines in any way. Furthermore, they must be protected from outside interference (e.g. deformities, kinking etc.). After the hose has been laid, it is advisable to re-check everything when the hose is warm. It is equally important to avoid condensation pockets in the hose. Any curves should have as large a radius as possible.

Installation material

If a hose is used for the steam line, it must be the original one supplied by NORDMANN. If other hoses are utilised, NORDMANN cannot be held responsible for any damage that may occur. A hose clamp should be used to link the hose to the steam-distribution pipe.

When laying the steam hose in pipes, cable ducts etc., you must verify their resistance to high temperature (min. 100 °C). All insulation material must also be checked for its resistance to high temperature.

If the steam line installed is of copper, small radii should be avoided wherever possible. Every bend causes an additional resistance. A steam line of copper must have the same diameter as the hose.

If the steam lines are long with a lot of bends and a relatively high internal duct pressure, water may be continuously forced out of the steam cylinder, which impairs performance.

Correctly installed

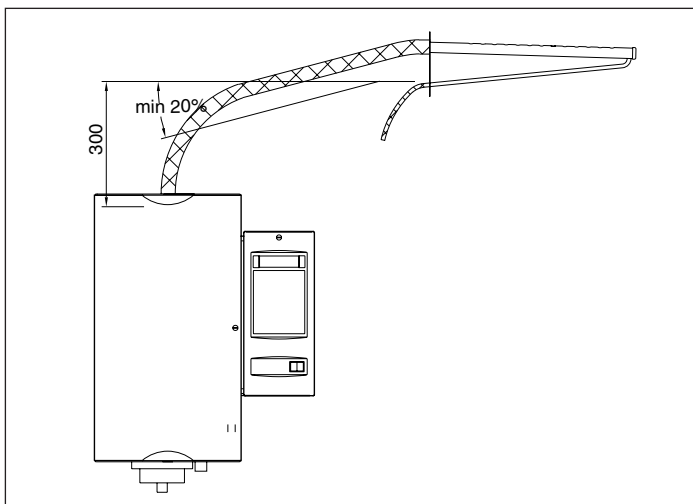


Fig. 26

Possible

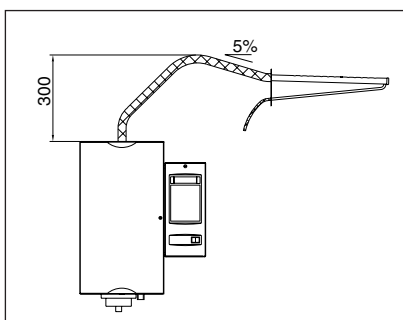


Fig. 27

Wrongly installed

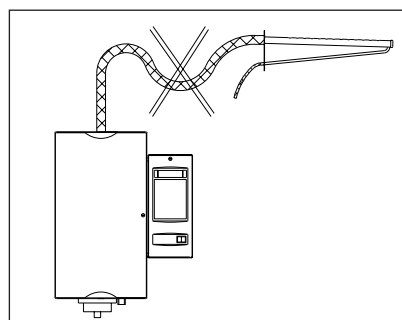


Fig. 28

Possible

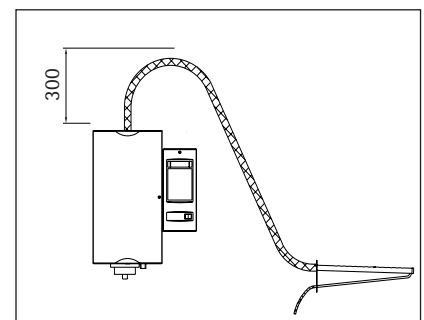


Fig. 29

1.7 Laying the condensate hose

It is advisable to lay the condensate hose as near to the vertical as possible and to feed the condensate either directly into an open funnel or below the siphon.

If the steam-distribution pipe is fitted above the humidifier, the condensate can be fed back to the unit by placing the end of the hose in the filling cup. In this instance, a small siphon should be formed with the condensate hose.

If the condensate is drained off directly, it is advisable to feed back the condensate hose separately. The end of the condensate hose should be in the open air. If the end of the hose is submerged in water, the condensate is prevented from draining away.

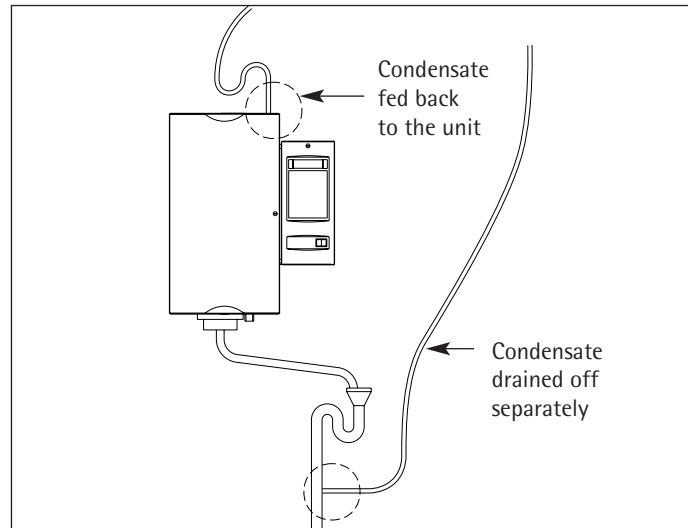


Fig. 30

2. Water connections

2.1 Quality of the water

NORDMANN humidifiers use ordinary tap water for the production of pure steam. The electrical conductivity should be between 125 and 1250 microsiemens per cm. The hardness of water is measured in accordance with the international unit millimol, calcium and magnesium ions per litre (mmol/l), previously the degree of German hardness (DH):

Soft water	up to 1.3 mmol/l; up to 7°DH
Fairly hard water	1.3 to 2.5 mmol/l; 7 to 14°DH
Hard water	2.5 to 3.8 mmol/l; 14 to 21°DH
Very hard water	over 3.8 mmol/l; over 21°DH

Other international units:	1°DH = 1.79° French hardness
	1°DH = 1.25° English hardness
	1°DH = 1.05° American hardness
	1°DH = 10 mg/l CaO
	1°DH = 17.9 mg/l CaCO ₃ (ppm)

NORDMANN's electrode steam humidifiers allow you to use water ranging from soft to very hard, without the need for prior treatment. However, for fairly hard water and above, we recommend the use of the SC-System (NORDMANN's self-cleaning system), since this greatly reduces the amount of maintenance required for the cylinder.

2.2 Water intake and drainage



All installation work must be performed by trained personnel. The customer himself is responsible for verifying their qualifications.

Please observe local regulations concerning the connection of appliances to the pressure and drainage systems.

The humidifiers are designed to operate on ordinary tap water. If you intend using treated or de-mineralised water, consult your NORDMANN representative beforehand.

Connecting to the cold-water supply, with stop cock

Where the water pressure is between 1 and 10 bar (0.1 to 1 MPa), the unit can be connected directly to the water supply. If it is over 10 bar (1 MPa), connection must be via a pressure-reduction valve (set to 4–6 bar = 0.4–0.6 MPa).

In any case, the water feed pipes that you have laid must be flushed thoroughly before connecting them to the humidifier. You should use copper piping only.

Note that the drainage facility should provide the possibility of performing cleaning and maintenance. The drainage pipe should have a decline to the drainage system of at least 5%.

A fine filter should be fitted at the water intake to the humidifier; this prevents the rapid build-up of impediments in the inlet filter of the inlet valve.

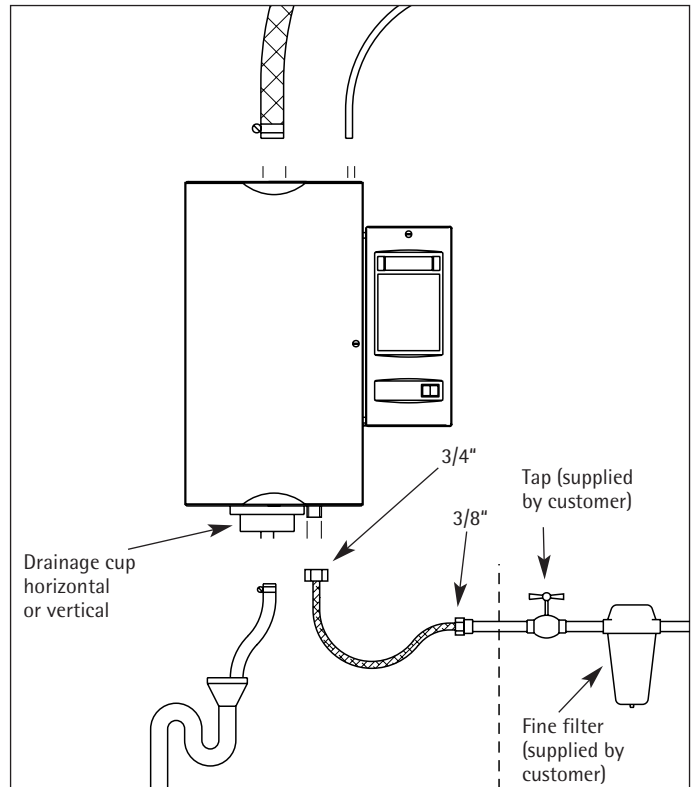


Fig. 31

3. Electrical connections

3.1 Safety instructions



All work pertaining to the electrical installation must be carried out by qualified personnel only. The customer is responsible for verifying the qualifications of the technicians concerned.



Before performing any electrical work, all power to the humidifier must be disconnected. Please observe local regulations concerning electrical installations. The installation must be fitted with a device which disconnects the unit (with a contact opening of at least 3 mm) on all phases from the mains power supply. NORDMANN humidifiers are designed to be connected to the earth lead and are categorised as belonging to Protection class 1 for electrical equipment. The connection details are provided in the wiring diagrams for each type of unit. Each unit is supplied with the appropriate wiring diagram.

3.2 Control voltage



The standard control voltage of 220–240 V must be applied to terminals L1 and N. A 6.3A spare fuse (F1), located in the terminals of the fuse holder, is incorporated in the humidifier. The electronics and the accessories have a 24 V power supply which is protected by a fuse (F2). A spare fuse is situated in the terminals of the fuse holder.

N.B.: When performing cleaning and maintenance work on the unit, all power to the humidifier, including the control voltage, must be disconnected.

3.3 Heating voltage

The cross-section of the electrical wires and the minimum fuse size should be chosen in accordance with the connection requirements (cf. technical specifications) of the type of humidifier employed. The electric supply cables must be connected to the unit's terminals correctly. We recommend to re-tighten the screw terminals after a few days.

3.4 Proportional adaptor (option)

The proportional adaptor can be either factory fitted or fitted subsequently by the customer simply by inserting it onto the electronics unit.

The following control signals from humidity controllers can be processed:

0-2 V	0-5 V	0-10 V	0-16 V
0-20 V (SCS)	1-5 V	2-10 V	0-20 mA
4-20 mA	potentiometer min. 135 Ohm		

3.5 RS 485 interface

The standard RS 485 interface provides a data transmission system in accordance with the American EIA (Electronic Industries' Association) standard, permitting high-speed transmissions free of disturbance. Data are transmitted in series via two wires. To supply the accessories with power, there is a 24 V d.c. system with two other wires.

The bus structure enables both closed and open lines with stub cables and branches (tree system).

Transmission is performed on a twisted and screened two-wire cable, at distances of up to 1.2 km without amplifiers, and with up to 32 subscribers.

4. Putting into operation

4.1 How the humidifier works

NORDMANN humidifiers use ordinary tap water to produce steam. The water is converted directly into steam in a steam cylinder by electrode heating using electrical energy. In so doing, the water acts as the electrical resistance. Vaporisation occurs at atmospheric pressure (non-pressurised).

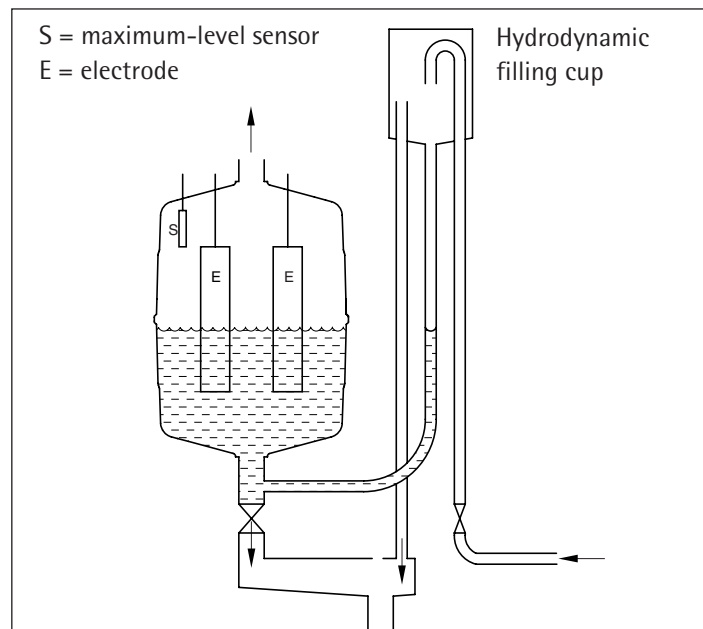


Fig. 32

The electronic control system, with its highly-integrated microcontroller, regulates the vaporisation process in accordance with a new principle developed by NORDMANN which allows rapid output changes to be made. The humidifier adapts itself fully automatically to the quality of the water used. Due to this ability to set the optimum water concentration in the steam cylinder, the smallest of adjustments to the water level can effect a change in the steam output. Therefore, the unit reacts quickly and accurately to any setpoint changes. Because of its ultimate degree of efficiency, this new type of control system ensures perfect drainage, i.e. the process of water deconcentration in the cylinder. The use of fuzzy logic technology improves the controllability. The microcontroller of the AT 3000 series works with fuzzy-logic algorithms. This regulates the conductivity or mineral concentration in the steam cylinder and achieves ideal operating conditions while, at the same time, maximising the operational reliability. Furthermore, the output fluctuations which occur during normal operation are kept to a manageable minimum by the automatic water-intake and drainage functions.

4.2 The steam cylinder and the SC-System

The SC-System is a patented self-cleaning system developed by NORDMANN for its electrode steam humidifiers. Because the minerals are kept in suspension, there is little accumulation of deposits on the floor of the cylinder. The loose minerals are flushed away during normal drainage operations. The steam cylinder's service life is considerably lengthened and the time spent on maintenance is reduced.

The serviceable life of a steam cylinder is dependent on both the quality of the water supply and the unit's actual operating hours.

Lifetime of a steam cylinder at 100% steam output

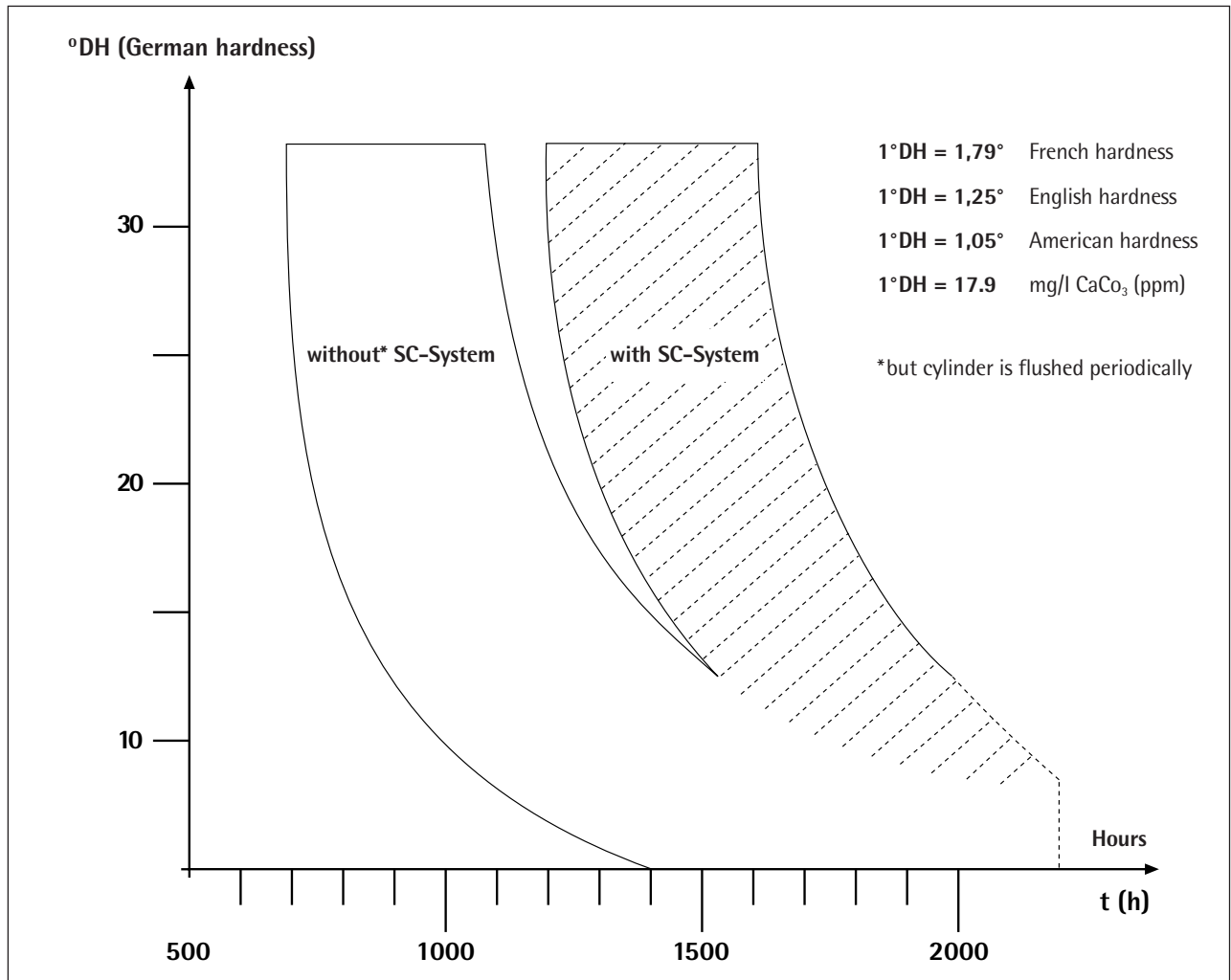


Fig. 33

A regular check of the steam cylinder ensures trouble-free operation.

If the humidifier indicates U1 (cf. 4.8), it can still be run for a few days before the steam cylinder needs to be replaced. We recommend that you keep a spare cylinder in stock for each unit.

NORDMANN's steam cylinders are so economical that it is usually cheaper to replace the cylinder than to clean it. To clean the cylinder, it should first be emptied (by pressing the button for manual draining) and then removed. After the drainage filter has been taken out, the cylinder can be well flushed with tap water (using no chemical substances).

4.3 Putting the humidifier into operation

After the steam hose, water feed pipe, drainage pipes and electrical cables have all been correctly connected, the AT 3000 humidifier can be switched on using the black power switch. When the T4 key is pressed, the LED for output limitation lights up and the level of output limitation is shown on the display. All humidifiers are set ex works to 100% output. If the SELECT key is pressed, you can choose a different level of output limitation.

As soon as the humidistat or humidity controller demands humidification, the green Humidification LED lights up, the contactor is activated and, soon after, water is fed into the steam cylinder, whereupon fully automatic operation commences.

Of course, the humidifier will operate automatically only if (a) it was installed by a specialist and (b) the shut-off valve in the water feed pipe is open.

After the water in the steam cylinder has been heated up, the production of steam begins.

During the start-up phase, or after a new replacement cylinder has been fitted, the maximum water level, or Niveau max. can be attained. When Niveau max. has been reached, the inlet valve closes briefly; this is a normal occurrence during the steam cylinder's concentration phase. The length of this phase can differ; it lasts until the cylinder has reached the nominal rating. In the first stage of the service level, you can check whether Niveau max. has been attained (see Item 5.6).

4.4 Automatic operation

The AT 3000 series' special electronic controls unit with microcontroller regulates all operations automatically, so that the user does not need to take any action or make any settings during normal running.

4.5 Programming level

The humidifiers of the AT 3000 series have a programming level which has a large array of functions, allowing the unit's characteristics to be matched to a wide variety of conditions or tailored exactly to the customer's particular requirements.

You are not permitted to use the programming level unless authorisation to do so has been granted by a NORDMANN specialist. Your NORDMANN representative will be glad to advise you in this matter.

4.6 Safety functions

NORDMANN humidifiers are protected against running dry, i.e. the power is cut off automatically as soon as the electrodes in the steam cylinder protrude above the water level.

If current consumption becomes excessive (25% above the normal level), the outlet valve is opened automatically. Because the electrodes are then in contact with less water, current consumption falls back to the nominal value.

If current consumption fails to fall below 140% of the nominal level even after several drainage operations, the humidifier soon turns itself off automatically, and «U2» appears in the display.

4.7 Information from the display

The large-scale, four-digit, LED display allows numbers and letters to be indicated. Its size and clarity mean that it can be read easily even when the light is poor.

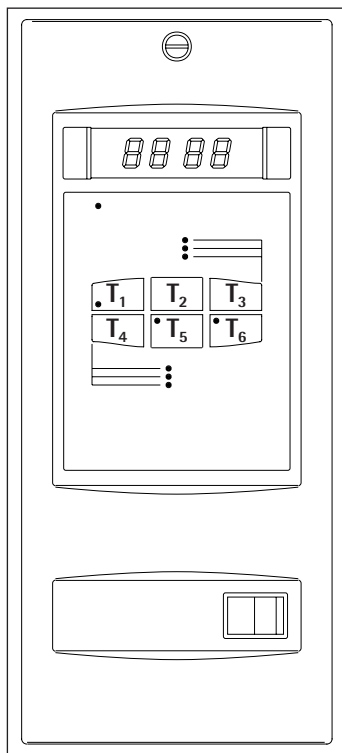


Fig. 34

Key	Function
T1	Allows the steam cylinder to be manually drained. Pressing T1 once causes the drainage valve to open. The red LED flashes. Pressing it again causes the valve to close. If you forget to close the valve, it closes automatically after 30 minutes.
T2	Works on double units only. Pressing T2 allows you to read or set the operating data of either the left- or right-hand steam cylinder (the red LED indicates which one).
T3	Allows you to select and show 3 operating variables: steam output [kg/h]; current [A]; setpoint steam [%]. When T3 is pressed, the relevant LED indicates which variable is being shown on the display.
T4	<p>Allows you to select:</p> <ul style="list-style-type: none"> • humidifier capacity limitation in % • access to the programming level • access to the servicing level <p>The relevant LED shows which option you have selected.</p> <p>1. Humidifier capacity limitation in %. On pressing T4 for the first time, the capacity limitation LED lights up. The limitation value appears in the display and can be set, using the SELECT button, between 20 and 100% (factory setting is 100%). When another key is pressed, the last limitation value is automatically saved.</p> <p>2. Activating the programming level. When T4 is pressed again, you reach the programming level. The LED of the T5 (SELECT) key then flashes, inviting you to select a defined function (cf. Item 4.5). Use the SET key to activate functions or make settings.</p> <p>3. Activating the servicing level. Pressing T4 yet again enables you to reach the servicing level. The LED of the T5 (SELECT) key then flashes, inviting you to check defined elements (cf. Item 5.6). Use the SET key to obtain information or perform the component check.</p>
T5	<p>The SELECT key allows you to:</p> <ul style="list-style-type: none"> • select stored functions in the programming level • select defined checking stages in the servicing level • set the output limitation
T6	<p>The SET key allows you to:</p> <ul style="list-style-type: none"> • activate, de-activate or parameter the special functions in the programming level • switch particular elements on or off in the servicing level
Reset	Key T6 (SET) also serves as a RESET button when «U codes» appear in the display.

4.8 Servicing and system messages

The newly-developed electronic controls unit with microcontroller continuously monitors the operations of the AT 3000 humidifiers. Any deviations from the operating condition (U codes) are shown on the display.

Code U1 Servicing signal

The steam cylinder can no longer attain the nominal output and needs, therefore, to be cleaned or perhaps replaced. A visual inspection of the inside of the cylinder is necessary to be able to decide whether it needs replacing. Code U1 is purely a servicing code; the unit does not switch off automatically. The humidifier continues to function at a reduced output. Acknowledgement is effected by pressing T6 SET button (cf. Item 4.7).

Code U2 Excess current

Whenever there is excess current (140% of the nominal value) during normal operations, the humidifier switches itself off automatically for safety reasons. After the fault has been rectified, the humidifier is put back into operation by pressing T6 SET button (cf. Item 4.7).

Code U3 The humidifier fills continuously

Either there is no heating phase or no water in the cylinder due to the water supply having been cut off. The humidifier switches itself off automatically after 30 minutes and is put back into operation by pressing T6 SET button (cf. Item 4.7).

Code U4 Microcontroller uncoded

This signal appears if a replacement electronic controls unit has been fitted to the humidifier without being coded. The humidifier is prevented from operating. The signal disappears as soon as the electronic controls unit has been coded.

Code U5 Preset number of operating hours attained

This signal can appear only if the number of operating hours for the steam cylinder has been pre-programmed. This is of benefit, for example, if regular servicing periods have been prescribed in accordance with hours run. U5 is purely a servicing code; acknowledgement is effected by pressing T6 SET button (cf. Item 4.7).

The standard, potential-free relay output enables either collective alarms or just one «U» signal (which can be chosen in the programming level) to be displayed remotely.

5. Servicing and maintenance

5.1 Cleaning and replacing the steam cylinder



Before commencing, switch off all power to the humidifier and disconnect the unit from the mains.

The serviceable life of the steam cylinder depends on both the hours run and the hardness of the tap water used.



The cylinder should be replaced when the electrodes have become insulated so much (because of calcification) that the required steam output cannot be reached. At the same time, the water level in the cylinder continuously touches the Niveau max. sensor. In this case, the specially-constructed water filling cup offers additional protection by feeding excess water directly into the overflow facility, allowing it simply to drain away.

Whenever U1 appears in the display, you should proceed as described on this page. However, the humidifier can still be run for some time before you need to replace the steam cylinder.

Procedure for replacing the steam cylinder

- Open the drainage valve using the manual drainage switch (key T1); the cylinder then empties itself completely.
Let the cylinder cool down.
- Before proceeding further, disconnect the unit from the mains.
- Loosen the clamp on the steam hose, pull off the hose and remove the electrical plug from the cylinder; the cylinder itself can now be removed.
- To fit the new unit, reverse the above procedure. It is advisable to wet slightly either the O-ring seal on the drainer or the outside of the cylinder's drainage aperture, since this makes it easier to fit the new cylinder.

The humidifier is re-started in accordance with the recommendations detailed in the chapter entitled «Putting the humidifier into operation».

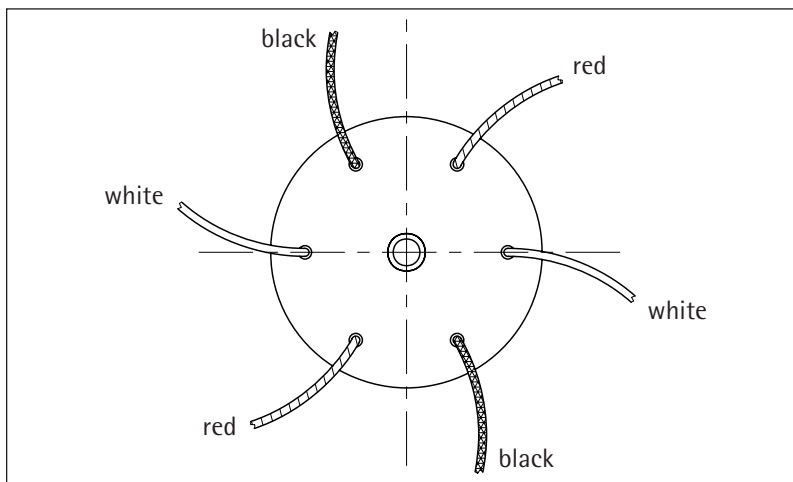


Fig. 35

5.2 Drainage strainer in the steam cylinder



All NORDMANN steam cylinders are fitted with a removable drainage strainer which can be extracted easily for cleaning.

The drainage strainer and the cylinder can then be put back into place and the humidifier put back into operation.

5.3 Removing the electronics unit



All work pertaining to the electrical installation must be carried out by qualified personnel only. The customer is responsible for verifying the qualifications of the technicians concerned.

Before removing the electronics unit, all power to the humidifier must be switched off.



The electronics unit comprises a processor pcb (printed circuit board) and a display pcb. All pcbs have plug-in connections, which facilitates their replacement. After a replacement of the processor pcb make sure that the print is coded according to the type of unit.

5.4 Taking the humidifier out of operation



Should you wish to take the humidifier out of operation for a long period of time (e.g. in summer or when the air-conditioning system is not operated), the steam cylinder must be emptied.

Before proceeding, switch off all power to the humidifier.



5.5 Regular servicing



Regular servicing helps to maintain the operability and reliability of the humidifier.

All work must be carried out by qualified personnel only. The customer is responsible for verifying the qualifications of the technicians concerned.



Before commencing work, all power to the humidifier must be switched off.

The following checks should be carried out on a regular basis:

- **Inspect and clean the steam cylinder.**
If there are any deposits in the steam cylinder, you should remove the drainage strainer and flush the cylinder thoroughly with tap water (using no chemical substances). If the electrodes are worn, it is time to replace the steam cylinder.
- **Inspect the steam, condensate and water hoses.**
Check that they are still correctly laid and that the hose clamps are still tight. Check that the hoses are still in good condition.
- **Inspect and clean the inlet and outlet valves.**
If worn, or covered in scale deposits, replace the valves.
- **Check the drainage cup and, if necessary, clean or replace it.**

5.6 Service program

The service program of the AT 3000 humidifiers provides you with information on operating conditions and allows you to set the defaults for the integrated humidity controller (from software version XP16B or higher). Furthermore it enables you to check the components of the unit. You are advised to check the components on regular basis.

After you have left the service program, the humidifier works in accordance with the operating conditions that were set originally.

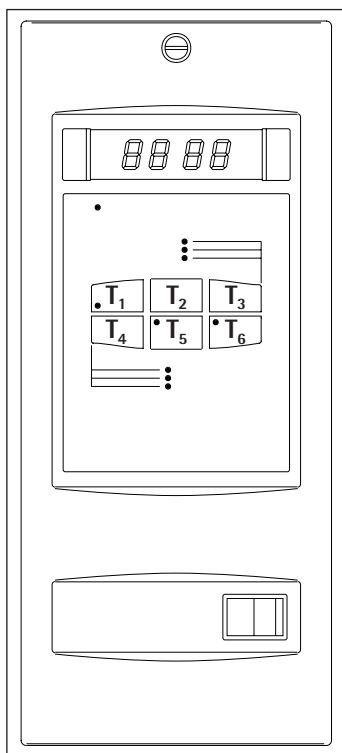





Fig. 36

Checking and setting operations:

- SE:** Check the Niveau max. sensor
 - H:** Check the humidistat or presence of controller signal
 - Hc:** Activate the integrated humidity controller (cf.item 5.7)
 - rH: *** Set the humidity set point of the integrated hum.controller (cf.item 5.7)
 - Pb: *** Set the proportional band of the integrated hum.controller (cf.item 5.7)
 - -:** If you continue, steam production will be interrupted
 - h:** Simulation of the humidification signal
 - I:** Inlet valve
 - O:** Outlet valve
 - C:** Contactor
 - SC:** Self-cleaning system
 - r1:** Relay for remote collective alarm
 - r2:** Option: second relay for remote indication
 - r3:** Option: third relay for remote indication
 - End:** End of service program
- * only visible when **Hc** is activated (**Hc 1** or **Hc 2**)

If you choose **SE**, **H**, **Hc**, **rH**, and **Pb** the humidifier continues to produce steam; for all other functions (after **- -**), steam production is interrupted.

Starting the service program

-  ● Key T4 Select the servicing level
-  ● Key T5 (SELECT) To select the checking operations
-  ● Key T6 (SET) To select either 1 (active) or 0 (inactive), or to switch components on or off

N.B.: On double units (two cylinders), first choose the appropriate cylinder by pressing key 2.

Display indications

- SE 1: Niveau max. in the steam cylinder has been reached
- SE 0: Niveau max. in the steam cylinder has not been reached

- H 1: Humidification signal present
- H 0: No humidification signal present

- Hc oF: *integrated controller switched off, control via external controller
- Hc 1: *integrated controller activated for single units or parallel operation of double units
- Hc 2: *integrated controller activated for sequential operation of double units

- rH xx: *Setting of the humidity set point 30...99%

- Pb xx: *Setting of the proportional band 5...15%

- - : If you continue, steam production will be interrupted

- * cf.item 5.7.2

Checking the components

- h 0 Humidistat/controller is switched off manually (simulation)
- h 1 Humidistat/controller is switched on manually (simulation)

- l 0 Inlet valve is closed
- l 1 Inlet valve is opened manually

- o 0 Outlet valve is closed
- o 1 Outlet valve is opened manually

- c 0 Contactor is off
- c 1 Contactor is switched on manually

- sc 0 Pump for SC system is off
- sc 1 Pump for SC system is starting up

- r1 0 Relay is not energised
- r1 1 Relay cuts in

- r2 0 Relay is not energised
- r2 1 Relay cuts in

- r3 0 Relay is not energised
- r3 1 Relay cuts in
- End: End of service programme

Closing the service program

By pressing any key except SELECT and SET anywhere in the service program. The system returns to the same status as it was in before the service program was activated.




5.7 Integrated Humidity Controller

5.7.1 Function



The integrated humidity controller is a new feature for all AT 3000 units with software version XP 16B or higher. This newly designed and programmable function enables the humidity in the duct or in the ambient to be controlled. For connecting a humidity sensor to the integrated humidity controller the proportional adaptor (Art. 912 10 00) is required.

The controller function is activated in the service level of the AT 3000 unit, afterwards the set point humidity and the proportional band are set in the following menu points of the service level. The microprocessor electronics of the AT 3000 then controls the steam capacity of the AT 3000 as P-controller.

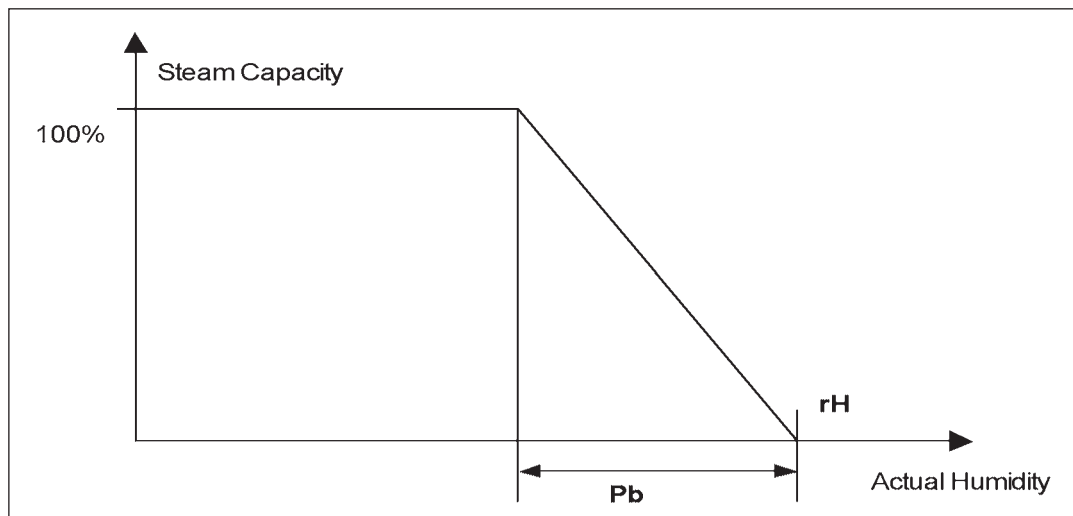
5.7.2 Settings

-  press «T4» until LED lights up at "Service Level"
-  press «T5 SELECT» until display shows **Hc** (Humidity control)
-  chose with «T6 SET» the desired operating mode (**oF**, **1** or **2**)

Hc oF	Integrated humidity controller switched off, control via external controller
Hc 1	Controller activated (for single units or parallel operation of double units)
Hc 2	Controller activated for sequential operation of double units

-  change to **rH** with «T5 SELECT» and enter set point humidity with «T6 SET» (30...99%)
-  change to **Pb** with «T5 SELECT» and enter proportional band with «T6 SET» (5...15%)

After the integrated humidity controller is activated the display shows the measured actual relative humidity (instead of the two horizontal hyphens).



5.7.3 Humidity Sensor

The integrated humidity controller of the AT 3000 operates with active humidity sensors which are connected to our proportional adaptor. All common and codable sensor signals can be processed. A control voltage of 24V DC for the sensor is available from the humidifier, should the sensor need any other supply voltage, this needs to be taken from another source. For the wiring of the sensor please refer to diagram 344 24 38.

5.7.4 Maximum Level Hygrostat (safety device)

Basically a simple on/off hygrostat is used as a maximum hygrostat. As usual it is connected to the safety circuit (terminals L1 + H). Please also refer to the wiring diagram of the AT 3000 unit.

5.7.5 Humidity sensors with double units

The two cylinders of a double unit either can be run together (in parallel) or controlled separately from each other. If both cylinders are controlled in parallel, only one humidity sensor is needed. When the two cylinders are controlled independently, then each side requires a humidity sensor.

In the operating mode 2 a sequential operation can be realised. In this case the first cylinder runs to its full capacity, once it is reached the second cylinder will start.

5.7.6 Upgrade

A later modification of already existing AT 3000 units with the integrated humidity controller is possible. The fitted EPROM on the supply and processor pcb of the unit has to be replaced by the EPROM version XP16B or higher. Before the replacement of the EPROM it is advisable to note down the changed parameters in the program level. Then replace the old EPROM with the version XP 16B or higher. Afterwards do a Master Set (function 99 in the program level) and then, if necessary, reprogram the original settings according to your requirements. This procedure guarantees that no set parameters will be lost.

6. Rectifying faults

6.1 The humidifier produces insufficient or no steam

When a fault occurs, the problem is often sought only on the humidifier, though the fault may have been caused by a problem in the plant.

For successful trouble-shooting, some knowledge of plant technology (air-conditioning, controls) is necessary.

You should proceed in the following order:

- Observe
- Work out the problem
- Take action

The following causes are possible:

- The steam cylinder is new and merely in the start-up phase.
- The humidistat/humidity controller is not demanding any humidity.
- A safety element, such as a maximum humidistat etc., is not allowing humidification to take place.
- The safety link between terminals L1 and H has not been made (if a proportional adaptor is used).
- The control fuse F1 or F2 has blown.
- The heating power is off or the electrode plugs have not been inserted.
- There is no water in the steam cylinder because the water supply has been interrupted (e.g. stop cock is closed etc.).
- The filter or the nozzle in the inlet valve is blocked or damaged.
- An output limitation has been programmed.
- The cylinder needs replacing.
- The humidifier is too small for the job.
- The current transformer is either defective or not connected correctly.
- The contactor coil is defective.
- The steam hose is blocked or has a kink in it.

7. Spare parts list

Detailed drawings of spare parts with their article number are available from your NORDMANN representative.

8. List of options

All options can be fitted either at the factory or subsequently.

Remote indication

Three selective remote-indication relays with potential-free change-over contacts, max. 250 V, 2 A.

Remote control

Display and operating panel (in separate housing); can be mounted away from the AT 3000 humidifier. The remote-control unit needs only four wires and can be fitted at distances of up to 1.2 km.

Proportional adaptor

Allows the steam output of the AT 3000 humidifiers to be set anywhere between 20 and 100%. The proportional adaptor can be simply inserted onto the electronic controls unit.

Step adaptor

Allows the steam output to be regulated in 2, 3 or 4 stages. The adaptor is simply inserted onto the electronic controls unit.

Electrolytic Device

Whenever the conductivity of the supply water is too low, this device doses an electrolytic solution to the filling system of the unit in order that the required heating current can be reached.

Cabinet Heating

Is the unit installed in an environment presenting the risk of frost, then the option "cabinet heating" is used. It prevents the water in the steam cylinder from freezing.

9. Technical specifications

Type mark	Type	424	434	824	834	1534	2364	3264	4564	6464	6564	9064	13064
Heating voltage	V	400 V, 50/60 Hz											
Number of phases	~	1	3	1	3	3	3	3	3	3	3	3	3
Heating current	A	7.6	4.4	15.2	8.8	16.5	25.2	35.1	49.4	2 x 35.1	71.3	2 x 49.4	2 x 71.3
External fuses p. phase	A	16	10	25	16	25	40	50	80	2 x 50	100	2 x 80	2 x 100
Type mark	Type	422	432	822	832	1532	2362	3262		6462			
Heating voltage	V	230 V, 50/60 Hz											
Number of phases	~	1	3	1	3	3	3	3		3			
Heating current	A	13.2	7.6	26.4	15.3	28.6	43.9	61.0		2 x 61.0			
External fuses p. phase	A	20	16	40	25	40	63	100		2 x 100			
Steam output	kg/h	4	4	8	8	15	23	32	45	64	65	90	130
Minimum capacity	kg/h steam	0.8	0.8	1.6	1.6	3	4.6	6.4	9	6.4	13	9	13
Nominal power	kW	3.0	3.0	6.1	6.1	11.4	17.5	24.3	34.2	2 x 24.3	49.4	2 x 34.2	2 x 49.4
Design data													
Dimensions	width mm	390	390	390	390	470	470	525	525	975	525	975	975
	height mm	585	585	585	585	645	645	715	715	730	715	730	730
	depth mm	230	230	230	230	305	305	360	360	385	360	385	385
Steam outlet diameter	mm	1 x 22	1 x 22	1 x 22	1 x 22	1 x 35	1 x 35	1 x 35	2 x 35	2 x 35	2 x 35	4 x 35	4 x 35
Weight (empty)	kg	11	11	12	12	17	18	28	29	62	30	64	66
Operating weight	kg	14.5	14.5	18.5	18.5	32	33	53	54	112	55	114	116
Accessories													
Humidity controller	qty	1	1	1	1	1	1	1	1	2	1	2	2
Steam nozzle	qty	1	1										
Control electronics													
Supply voltage	V	220-240 V, 50/60 Hz, 1~											
Proportional adaptor	qty	1	1	1	1	1	1	1	1	2	1	2	2
Steam distribution pipes for duct use													
22-xxx mm	qty	1	1	1	1								
35-300 mm	qty					1							
35-450 mm	qty					1	1		2				
35-600, 35-900 mm													
35-1200, 35-1500 mm	qty					1	1	1	2	2	2	4	4
Steam hose													
Ø 22/29 mm	qty x mm	1	1	1	1								
Ø 35/43 mm	qty x mm					1	1	1	2	2	2	4	4
Condensate hose													
Ø 6/10 mm	qty x mm	1	1	1	1	1	1	1	2	2	2	4	4
Steam blowers for direct room humidification													
Fitted onto humidifier	qty	1	1	1	1	1	1						
Fitted separately	qty	1	1	1	1	1	1	1	1	2	1	2	2

Manufacturer:

Nordmann Engineering AG

✉ P.O. Box, CH-4143 Dornach 1 / Switzerland

🏠 Bruggfeldweg 11, CH-4147 Aesch / Switzerland

Tel. +41 61 467 76 66

Fax +41 61 467 76 77

E-mail: info@nordmann-engineering.com

Internet: www.nordmann-engineering.com

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