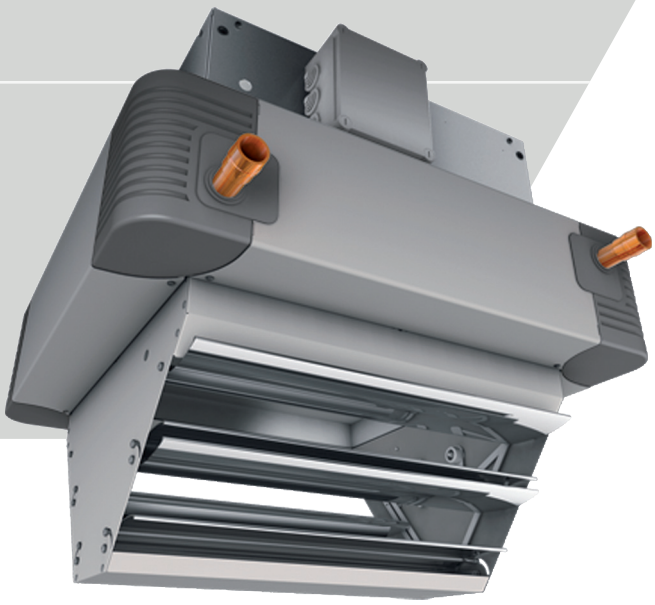
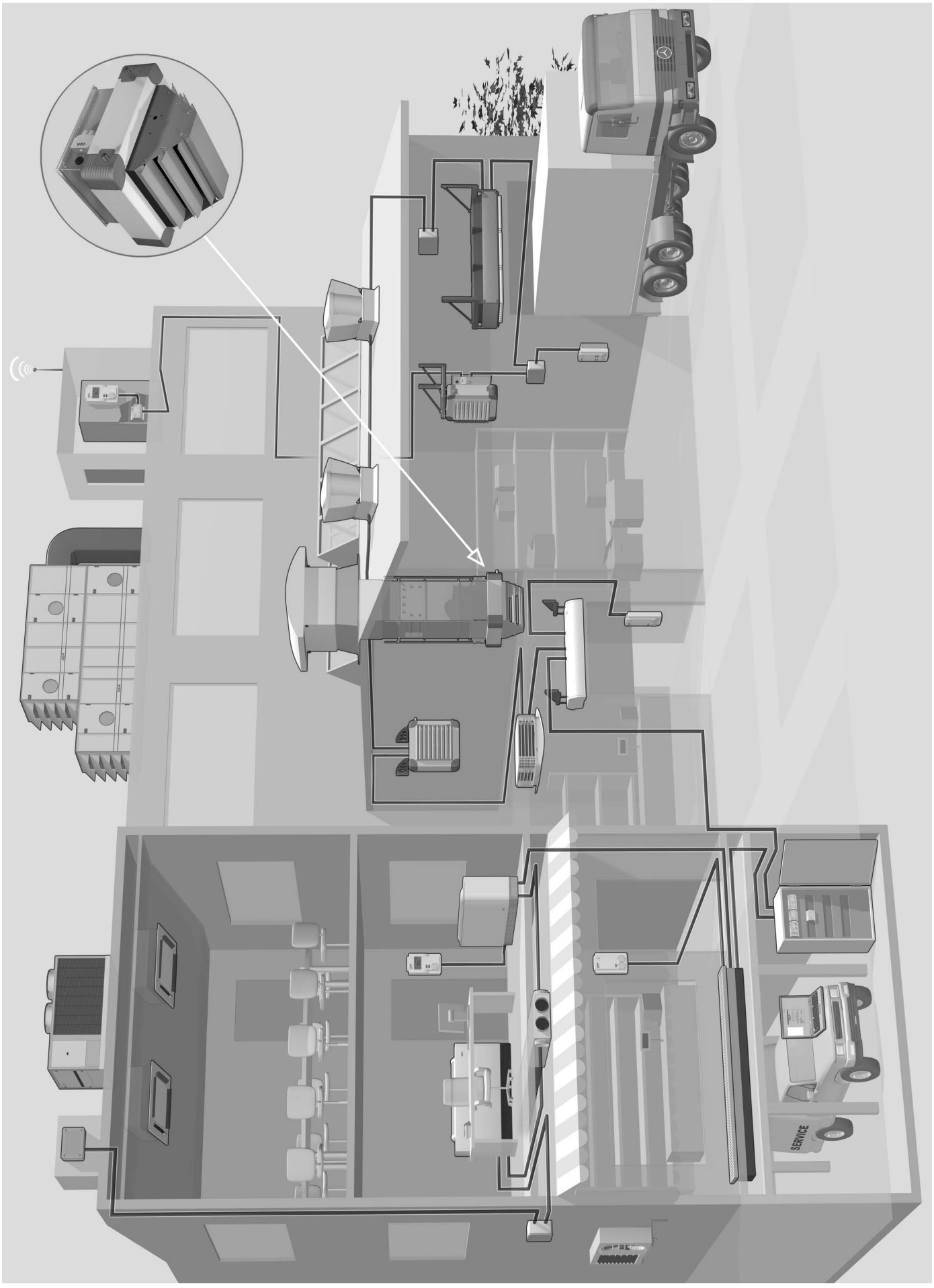
FläktGroup

MultiMAXX ® HN

OPERATION MANUAL



Product overview



Type code

H N 2 2 . U W A R A P . B K D

Size
1 = Size 1
2 = Size 2
3 = Size 3
4 = Size 4
5 = Size 5

Capacity stage *
1 = Capacity stage 1
2 = Capacity stage 2
3 = Capacity stage 3
4 = Capacity stage 4

Unit type
U = Recirculating air unit
M = Air mixing unit

Unit function
S = Only heating/steam
W = Only heating/heating water (PWW, PHW)
V = Heating/cooling with condensate drain
P = Heating/cooling with condensate pump

Heat exchanger
A = Cu/Al max. 130 °C; 1.6 MPa, louvre spacing 2.5 mm
C = Cu/Cu max. 130 °C; 1.6 MPa, louvre spacing 3 mm
R = Fe/Fe Zn, circular pipes, louvre spacing 4 mm **
S = Fe/Fe Zn, elliptical pipes, louvre spacing 3 mm **
T = Fe/Fe Zn, elliptical pipes, louvre spacing 6 mm **

Medium connection (seen against the air flow)
O = From top
R = From right
L = From left

Heat exchanger outlet connections
A = Male thread
O = Without thread

Air outlet louvre
A = Nozzle - heating only
B = Basic louvre
C = Secondary ceiling louvre - manual control
D = Secondary ceiling louvre with actuator, 230 V, open/close
L = Directional louvre - heating only
K = Flange
P = Secondary louvre Basic
T = Gate curtain - heating only
U = Secondary wall louvre - manual control
V = Four-side anemostat (ceiling-mounted)
W = Secondary wall louvre with actuator, 230 V, open/close
Z = Two-side anemostat - heating only
O = Without louvre ***

Electric motor version

AC-motors

A	=	3x400 V 2-stage - low speed, wide-blade fan [5]
B	=	3x400 V 2-stage - high speed, wide-blade fan [5]
C	=	3x400 V 3-stage - low speed, wide-blade fan [3]
D	=	1x230 V low speed, wide-blade fan [4]
E	=	1x230 V high speed, wide-blade fan [5]
R	=	3x400 V 2-stage - high speed, curved-blade fan [2]
S	=	3x400 V 3-stage, curved-blade fan
V	=	3x500 V 3-stage, curved-blade fan
U	=	without motorized fan

EC-motors

Y	=	1x230 V stepless, curved-blade fan
Z	=	3x400 V stepless, curved-blade fan [2]

Electrical components
K = Terminal block (in a plastic box)
S = Fan switch
R = MATRIX®

Heat exchanger casing types

A	=	Comfort - painted steel in RAL 9002, plastic corner guards RAL 7000
B	=	Comfort - RAL shade as requested
D	=	Industry - painted steel RAL 7000

I 2 0 0 1 G A

Controller type
2 = MATRIX 2000
3 = MATRIX 3000
4 = MATRIX 4000

Control package 001-999

Controller
IP54; including room temperature sensor 903454
G = MATRIX OP21I
I = MATRIX OP31I
K = MATRIX OP44I
L = MATRIX OP50I
M = MATRIX OP51I
Z = without controller

Controller location
Control unit
A = Stand-alone controller
B = Integrated controller
Slave unit
D = Without controller

or

MC 4 M 3AC ZKF

Unit type
U = Recirculation
M = Air mixing

Electric motor version

AC-motors
1AC = 1-speed, 230 V, 50 Hz
2AC = 2-speed, 400 V, 50 Hz
3AC = 3-speed, 400 V, 50 Hz

EC-motors
1EC = continuous, 230 V, 50 Hz
3EC = stepless, 400 V, 50 Hz

Auxiliary functions

Circulation
000 = Without auxiliary functions
Z00 = Outlet louvre control - actuator 230 V, open/close
00F = Filter clogging indication
Z0F = Outlet louvre control - actuator 230 V, open/close Filter clogging indication

Air mixing (not for 1AC)
0KF = Mixing chamber damper control - actuator 230 V, open/close or return spring actuator 230 V Filter clogging indication
ZKF = Outlet louvre control - actuator 230 V, open/close, Mixing chamber damper control - actuator 230 V, open/close or return spring actuator 230 V Filter clogging indication

Z H 2 . 2 0 0 2

Size
1 = Size 1
2 = Size 2
3 = Size 3
4 = Size 4
5 = Size 5

Air side accessories
20 = Mixed air module, direct
21 = Mixed air module, lateral
23 = Shut-off damper
25 = Flexible connection adapter
26 = Rectangular duct 150
27 = Rectangular duct 1000
28 = Symmetrical elbow 90°
29 = Asymmetrical elbow 90°
31 = Canopy
32 = Rain canopy
33 = Accessory protection grille
34 = Passage duct for slanted roofs
35 = Roof outlet hood
36 = Bag filter - module
37 = Flat filter - module
38 = Spare bag filter for "35"
39 = Spare bag filter for "36"
40 = Spare fleece for flat filters “37”
49 = Roof passage duct with plinth
51 = Wall frame
52 = Flange (for re-circulation units)

Suspension bracket
53 = Kompakt C
54 = Studio
55 = Modular (for wall mounting)
56 = Ceiling suspension bracket

Material/configuration
0 = Normal environment
8 = Ecodesign (only for 25, 26, 36, 38, 39)[6]

Mixing chamber damper actuators
0 = Actuator installation setup
1 = Manual control
2 = Actuator 230 V open / closed
3 = Actuator 230 V open / closed + potentiometer
4 = Actuator 230 V open / closed + end switch
5 = Actuator 230 V + return spring
6 = Actuator 24 V open / closed
7 = Actuator 24 V (0... 10 V)

Filtration class/Electrical components
0 = Without filter, without differential pressure switch
2 = G2/ without differential pressure switch
3 = G3/ without differential pressure switch (only for Flat filter)
4 = G4/ without differential pressure switch
5 = G2/ with differential pressure switch
6 = G3/ with differential pressure switch (only for Flat filter)
7 = G4/ with differential pressure switch
9 = E7/ with differential pressure switch

Ceiling suspension bracket 56

0	= Without threaded rod	2	= Threaded rod 2 m
1	= Threaded rod 1 m	3	= Threaded rod 3 m

Modular with accessories

0	=	Without accessories	8	=	25+36+23+51
1	=	25+20+51	9	=	25+37+23+51
2	=	25+36+20+51	A	=	26+36
3	=	25+37+20+51	B	=	26+37
4	=	25+21+29+51	C	=	
5	=	25+36+21+29+51	E	=	Ecodesign (25(26)+36+20+51)[6]
6	=	25(26)+37+21+29+51	W	=	Without accessories for units with a vertical outlet
7	=	25+23+51			

1) *Control system MC4 is not included with the basic unit model*
2) *Not available for sizes 1 and 2*
3) *Not available for sizes 1 and 5*
4) *Not available for sizes 3, 4, 5*
5) *Not available for size 5*
6) *Only for sizes 2 and 4*
* *Matches the number of rows in the heat exchanger*
** *Heating only*
*** *Only with Industry casing*

Table of contents

1 Safety and user information

This is the original operation manual verified by the manufacturer.

Multi*MAXX* HN heating, ventilation and cooling units are designed and manufactured in accordance with state-of-the-art engineering and technological trends, and in compliance with established EU safety and technical standards and codes.

Multi*MAXX* heating units are safe in operation and meet strict quality standards.

Their technical quality level meets the high user requirements for easy maintenance and servicing.

Nevertheless, each unit may pose a risk to the user or third parties, may break down or cause other damage. Safety regulations must therefore be observed at all times. The operation and maintenance of the unit must therefore be conducted in keeping with regulations and user standards; failure to follow them could result in death, serious injury, environmental damage and/or other damage

Observing the safety instructions in this operation manual will help avoid damage to the unit and other damage, and ensure safe and reliable operation of Multi*MAXX* HN units.

The safety aspects covered by this chapter apply to the entire operation manual for Multi*MAXX* HN units.

1.1 Operation manual application scope

The operation manual includes necessary information related to the following areas:

– Transportation
– Mounting
– Installation
– Power supply connection
– Media connection
– Commissioning
– Operation
– Maintenance, cleaning and disposal

1.2 Symbols

The text of this operation manual uses the following symbols:

– Symbol for a new paragraph
• Symbol for instructions to follow
✓ Symbol for the result of an action

Attention!
This symbol indicates additional information on Multi*MAXX* HN heating units and their accessories.

Recycling
This symbol indicates information on handling packing material and used machine parts (classified according to the type of material used).

The following symbols are used throughout the manual as warnings:

Risk of electrocution!
This symbol indicates activities posing a risk of electrocution.

Injury to persons!
This symbol indicates special information, commands and restrictions to avoid injury to persons!

Risk of injury from suspended loads!
This symbol indicates a risk of injury and damage due to suspended loads.

Risk of injury from hot surfaces!
This symbol indicates instructions, commands and restrictions which, if not observed, may result in injury or damage caused by hot surfaces.

Sharp edges can cause injuries!
This symbol indicates instructions, commands and restrictions which, if not observed, may result in cuts or damage caused by sharp edges.

Risk of injury from high pressure!
This symbol indicates instructions, commands and restrictions which, if not observed, may result in injury or damage caused by high pressure of heating or cooling media.

Risk of injury from rotating parts!
This symbol indicates warnings, commands and restrictions which must be observed to avoid injury or damage caused by rotating parts!

Risk of scalding!
This symbol indicates special instructions, commands and restrictions to eliminate injury due to contact with hot media.

Risk of injury from flammable materials!
This symbol indicates instructions, commands and restrictions which, if not observed, may result in injury or damage caused by flammable materials.

Damage to the environment!
This symbol warns of damage to the environment and refers to the applicable environmental protection regulations.

Damage to the unit!
This symbol refers to special data, commands and restrictions to avoid damage to the unit.

RISK OF DAMAGE DUE TO ELECTROSTATIC DISCHARGE!
This symbol refers to locations where the unit's control electronics could be damaged by electrostatic charge.

1.3 Safety at work

To ensure your own safety, comply with the following safety instructions:

Risk of electrocution!
Disconnect the unit from the power supply and make sure it cannot be reconnected. Ensure that the unit is isolated from the power supply, earth it and short-circuit the parts that conduct power. Failure to do so could lead to serious injury or death.

RISK OF DAMAGE DUE TO ELECTROSTATIC DISCHARGE!
While connecting or adjusting Multi*MAXX* HN heating units make sure that you discharge yourself before touching PC boards and electrical components.

Risk of injury from rotating parts!
Before commencing any work, disconnect the unit from the power supply. Ensure that the unit is secured against being reconnected at an appropriate point on the power supply system.

Fluctuations and deviations in supply voltage must not exceed the tolerances specified in the technical data; otherwise, the unit may be damaged.

1.4 Use

The unit must be used pursuant to Commission Regulation (EU) No. 1253/2014.
Multi*MAXX* HN heating, cooling and ventilation unit heaters are for installation in industrial, storage, retail and exhibition areas, i.e. in normal environments according to CSN 33 2000-1, ed. 2 and CSN EN 60 721-3-3 and used for the heating, ventilation, cooling or filtration of indoor and outdoor air. Optional accessories include filters, mixing chambers, intake side elements, brackets, consoles and control units (controllers) with the relevant sensors.
Follow this operation manual and other Multi*MAXX* HN and accessory manuals to ensure proper use.
The following limit values for media apply to the operation of heat exchangers:

Parameter		Unit with	Values for heat exchangers	
			Cu/Al (Cu/Cu)	Fe/FeZn
pH value (at 20°C)			7.5 - 9.0	7.5 - 10.0
Conductivity (at 20°C)		µS/cm	< 700	< 1000
Rest after evaporation		mg/l	-	< 1000
Carbonate hardness		dH	-	< 8°
Oxygen content	O_2	mg/l	< 0.1	< 0.1
Total hardness		°dH	1 - 15	< 12
Calcium	Ca	mg/l	-	< 20
Dissolved sulphur	S		Not detectable	-
Sodium	Na^+	mg/l	< 100	-
Iron	Fe^{2+}, Fe^{3+}	mg/l	< 0.1	< 0.2
Manganese	Mn^{2+}	mg/l	< 0.05	< 0.2
Ammonium	NH_4^+	mg/l	< 0.1	Not determined
Chloride	Cl^-	mg/l	< 100	< 100
Sulphate	SO_4^{2-}	mg/l	< 50	< 150
Corrosive carbon dioxide		mg/l	-	0
Dissolved organic carbon			-	< 10
Copper	Cu	mg/l	-	< 0.03
Sulphide		mg/l	-	0
Nitrite	NO_2^-	mg/l	< 50	-
Nitrate	NO_3^-	mg/l	< 50	< 30

Tab. 1-1: Limit values for media in closed cooling and heating circuits

Damage to the unit!
In open systems (e.g. when using well water, observe the threshold values from tab. 1-1) it is also necessary to remove deposits from the water using a supply line filter. Otherwise, there is a risk of corrosion due to deposits.
In addition, it must be ensured that the unit will be protected against dust and other substances which in connection with water result in an acidic or alkaline reaction (aluminium corrosion).

Improper use Any use other than that described above is considered improper. The manufacturer or supplier is not liable for any damages arising from improper use. The risk shall be borne by the user. No claims resulting from improper use will be considered.

Injury to persons!
Multi*MAXX* HN must not be operated:
– outdoors
– in areas with a risk of explosion
– in areas with a high dust loads and humidity
– in areas with a strong electromagnetic field
– in corrosive environments where plastic and other parts could be damaged

1.5 Safety regulations and standards

It is essential that safety regulations, standards and generally applicable technical rules in force be observed during the installation, electrical connection, commissioning, repair and maintenance of Multi*MAXX* HN heating units.

- CSN 33 1310 ed. 2 — Electrical engineering regulations. Safety regulations for electrical equipment intended to be used by persons without any electrical engineering qualifications.
- CSN 33 2000-1 ed. 2 — Low-voltage electrical installations – Part 1: Fundamental principles, assessment of general characteristics, definitions
- CSN 06 1008 — Fire protection of heating appliances.
- CSN 13501-1+A1 — Fire classification of construction products and building elements Part 1: Classification using test data from reaction to fire tests

1.6 Changes and modifications

No changes or modifications may be made to Multi*MAXX* HN heating units or their accessories.

Changes or modifications to the Multi*MAXX* HN unit or its components will invalidate the CE conformity and render and all warranty claims null and void.

1.7 Spare parts

Only original spare parts are permitted. The producer is not liable for any damage or injury if third-party spare parts are used.

1.8 Staff selection and professional qualifications

Attention!
Each person assigned to work with Multi*MAXX* HN units must read and understand this operation manual.
Installation/commissioning/maintenance/repair: Only by trained and properly instructed HVAC personnel.
Electrical installation: Only by trained electrical engineers qualified pursuant to Clause 6 of Regulation No. 50/78 Coll. of the CUBP and CBU.
All professionals must be able to evaluate the work they have been assigned and recognized and prevent any risks.

2 Technical data

2.1 Unit components

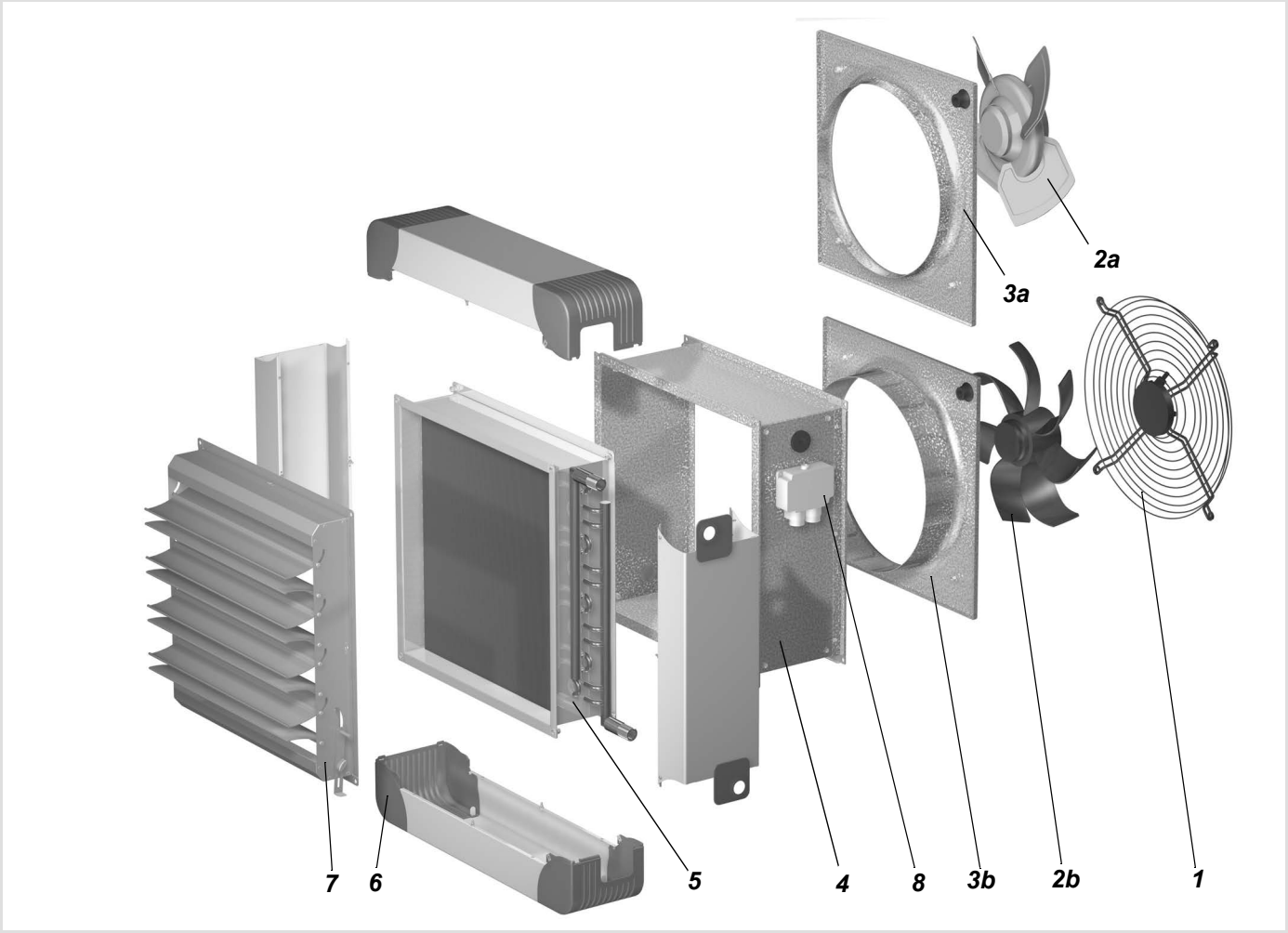


Fig. 2-1: MultiMAXX HN unit components

1: Protection grille (part of the fan)
2a: Wide-blade fan
2b: Curved-blade fan
3a: Air inlet nozzle, short
3b: Air inlet nozzle, long
4: Fan enclosure
5: Cu/Cu heat exchanger
6: Heat exchanger casing Comfort
7: Secondary louvre - manual control
8: Terminal block (in a plastic box)

2.2 Material specifications

Unit part	Material
Fan with protection grille	Various materials
Air inlet nozzle	Galvanized sheet steel
Fan chamber	Galvanized sheet steel
Heat exchanger	Cu/Cu or Cu/Al or Fe/FeZn
Heat exchanger casing	galvanized steel or galvanized painted steel in the Comfort version, plastic corners
Air outlet louvre	galvanized steel or Al louvre slats + galvanized steel or Al louvre slats + stainless
Frost protection	Various materials
Terminal block/switch	Various materials
Condensate pan	stainless

Tab. 2-1: Material specifications of unit parts

2.3 Unit versions

Fig. 2-2: Heating unit with casing in Industry design, with secondary air louvre

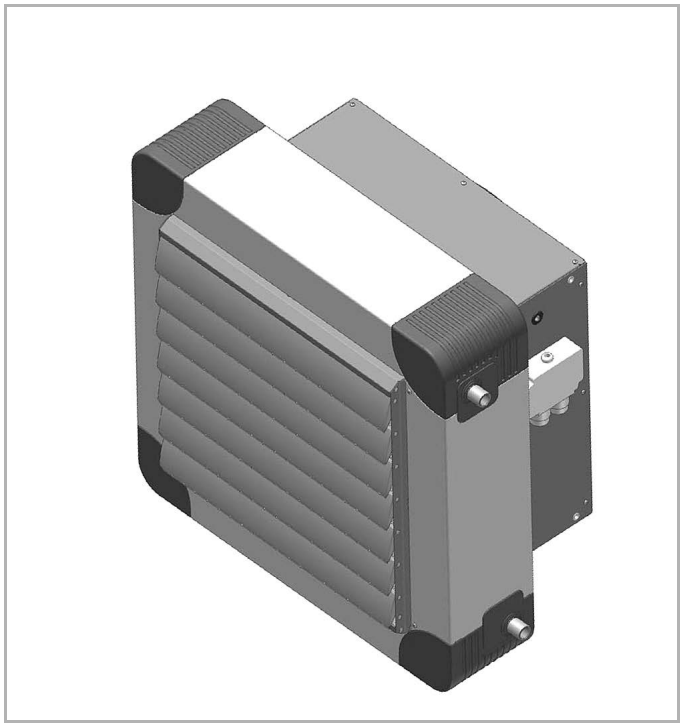


Fig. 2-4: Heating unit with casing in Comfort design, with basic air louvre

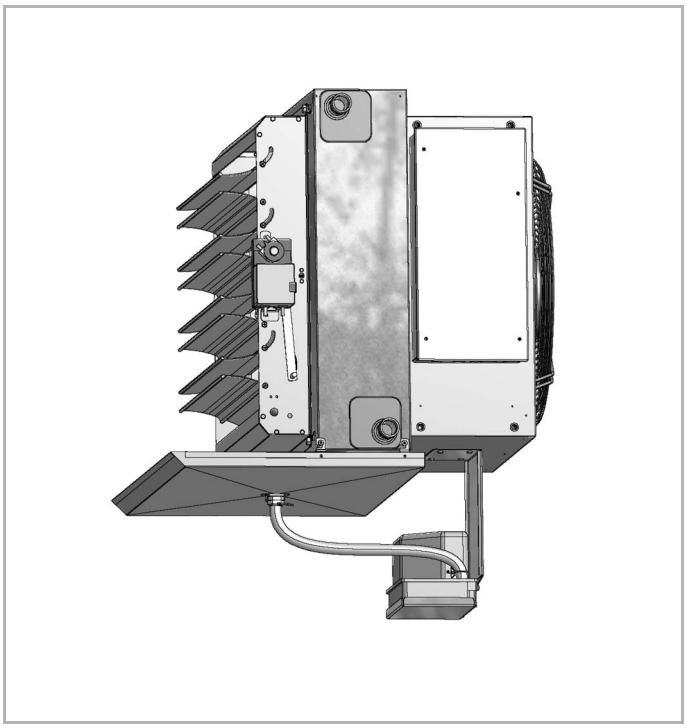


Fig. 2-3: Cooling unit with casing in Industry design, with condensate pump

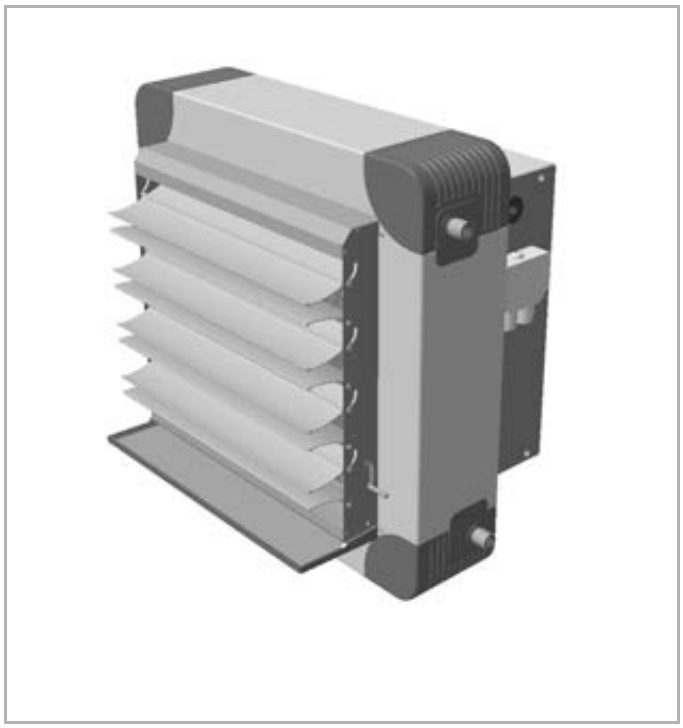


Fig. 2-5: Cooling unit with casing in Comfort design, with condensate pan

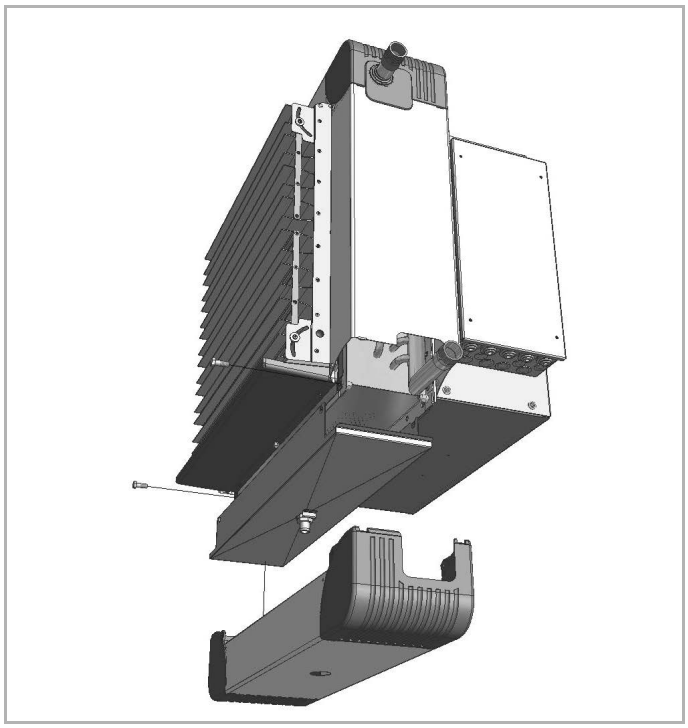


Fig. 2-6: Wall-mounted cooling unit with secondary Basic louvre, with gravity-flow condensate drainage

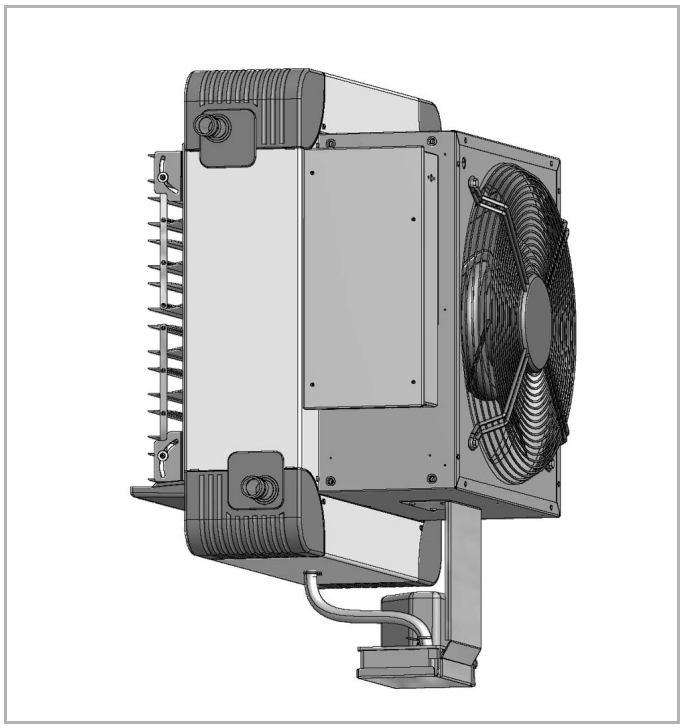


Fig. 2-8: Wall-mounted cooling unit with secondary Basic louvre, with gravity-flow condensate drain

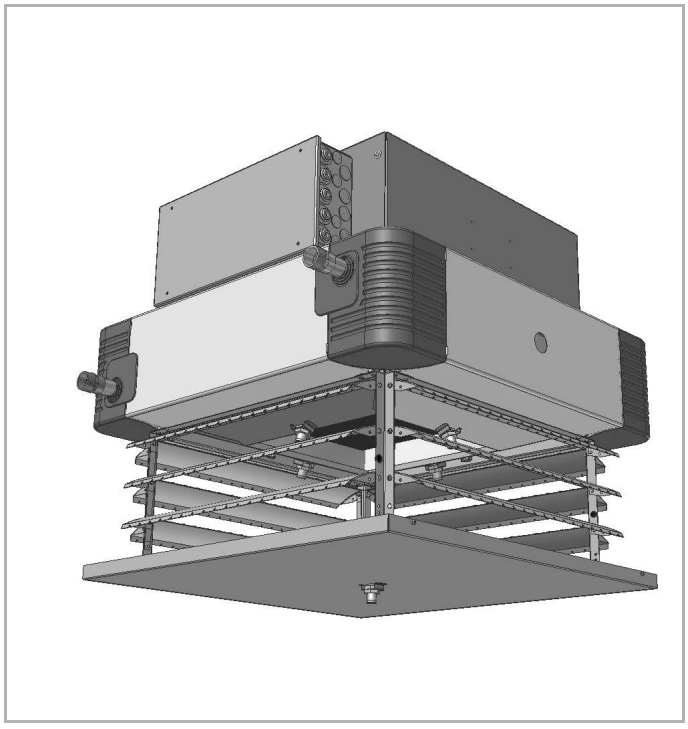


Fig. 2-7: Ceiling-mounted cooling unit with four-side anemostat, with gravity-flow condensate drain

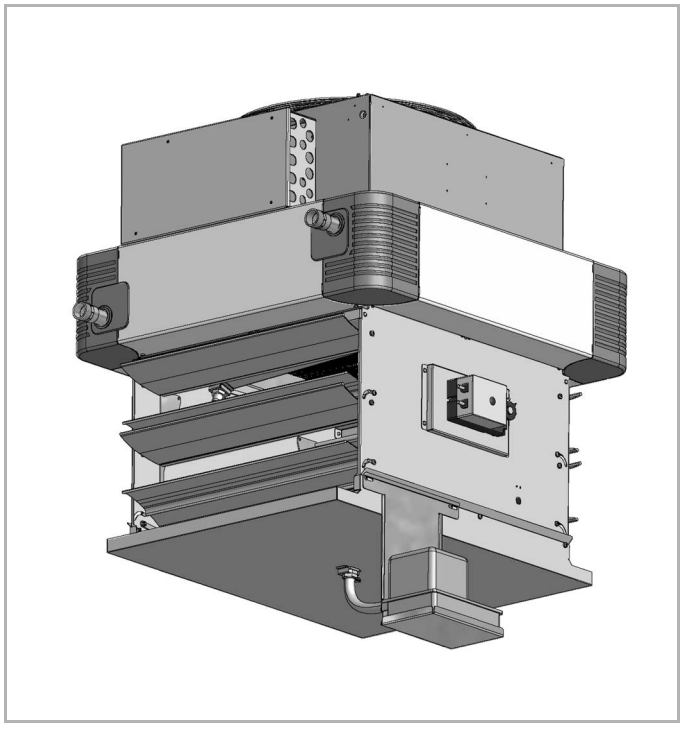


Fig. 2-9: Ceiling-mounted cooling unit with secondary louvre, with condensate pump

2.4 Unit description

Multi*MAXX* HN heating (and possibly cooling) units consist of a fan and a heat exchanger in a galvanized (or painted) steel casing. If required, the heat exchanger casing may have a RAL-shade protective surface finish. The outlet side is fitted with one of several types of outlet louvre (see the type code). The rear of the unit has an axial fan with integrated protective grille, fully compliant with requirements for protection against injury by the fan impeller pursuant to CSN EN ISO 13875.

The rear also provides connections for accessories for air filtration and supply. The fan enclosure has M8 nuts riveted on the sides (4 on each side) for mounting the unit using brackets on the wall or ceiling.

With cooling units make sure that, when the fan is not running, the supply of cooling medium is shut off (in order to prevent condensation in areas not covered by the condensate pan).

Cooling units are fitted with an integrated condensate pan for gravity-flow condensate drain (a condensate drain hose is recommended - internal diameter 16 mm) or with a condensate pump. The condensate pump outlet has a 3/8" pipe fitting at the pump top (refer to the installation manual of condensate pump SI1805). The pump can run for up to 5 minutes without condensate being present with no negative effect on its service life. If the condensate drain line is extended on site, the maximum condensate transport height pursuant to Fig. 2-13 and Table 2-7 must be observed.

2.5 Operating conditions

Heating media

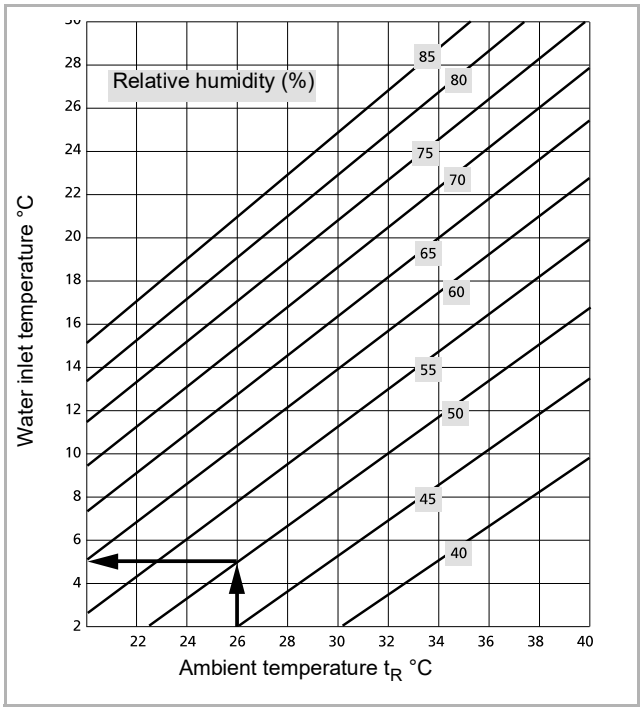
Do not use heating media which could damage the heat exchanger or unit through corrosion, other chemical reaction, abrasion or other aggressive action. Use only non-corrosive, non-flammable liquids or vapours as heating media.

Cooling media

Attention!
Failure to observe the above operating conditions may result in excessive condensate formation and its entrainment by air flow outside the unit.
When installing the unit, take into consideration air humidity in relation to inlet and outlet medium temperature and ambient temperature according to the diagram supplied.

To prevent the formation of condensate on non-insulated casing parts when the temperature falls below the dew point during cooling operation, do not exceed certain supply water/evaporating temperature levels. These depend on the temperature and relative humidity of air in the vicinity of the unit and are specified in diag. 2-1.

Example: When ambient temperature = +26°C and relative humidity is 50%, the inlet temperature of cooling water must not be lower than +5°C.



Diag. 2-1: Cooling operation limit

2.6 Unit dimensions

2.6.1 Dimensions of Multi*MAXX* HN units, Cu/Al, Cu/Cu, Fe/Fe Zn heat exchangers (water used as a medium)

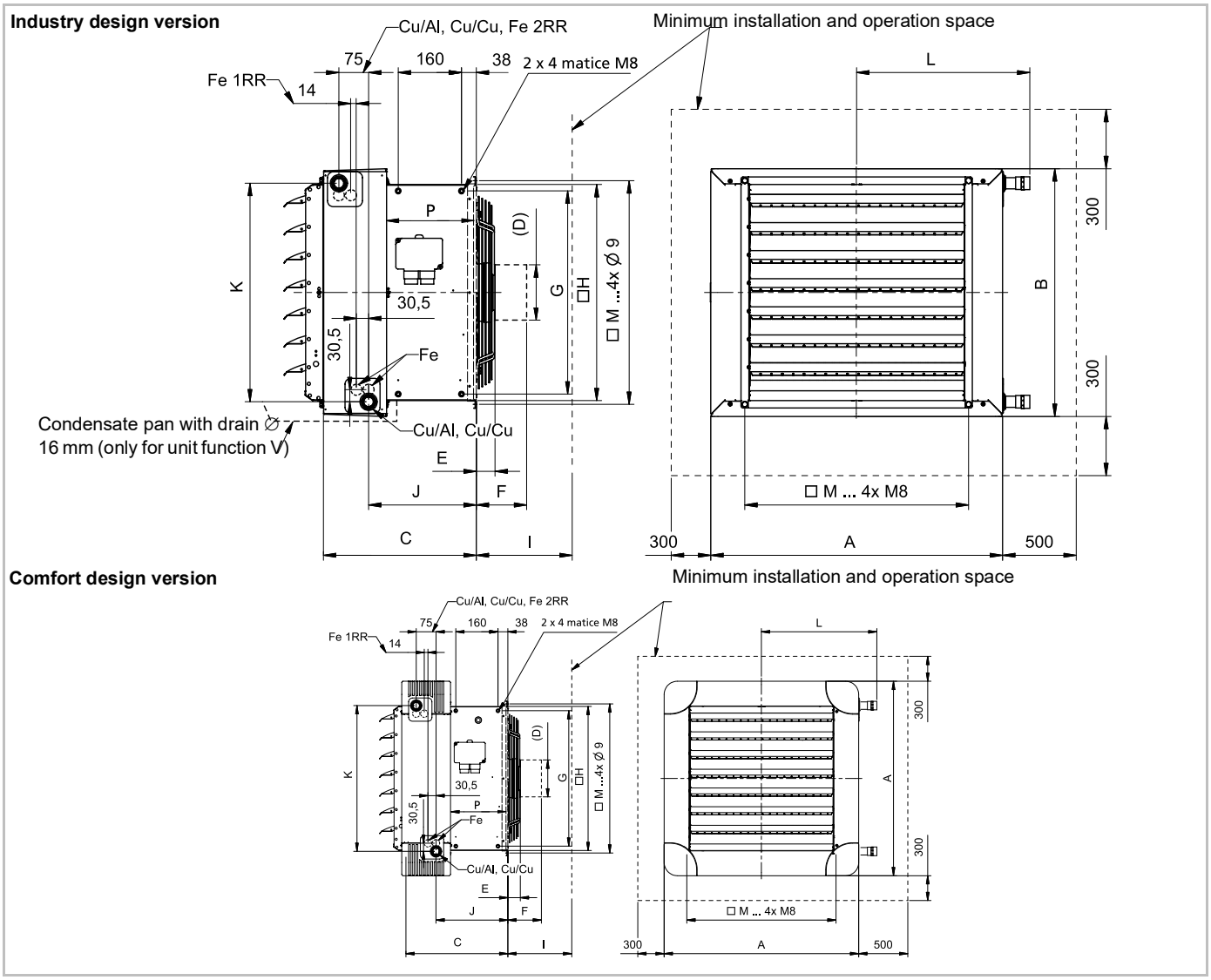


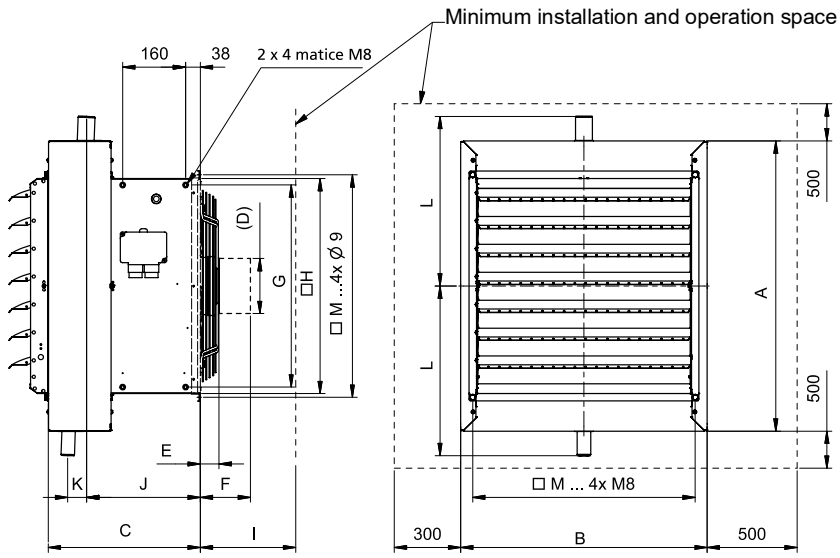
Fig. 2-10: Heating (cooling) unit dimensions and heat exchanger connection

Dimensions [mm]/size	1	2	3	4	5
A	642	738	866	1026	1154
B	520	616	744	904	1032
C	387	387	387	452	434
D (for EC motor)	150	150	175	175	-
E (for backward-curved blade fans)	35	50	51	66	15
E (for wide blade fans)	60	81	100	112	-
F (for EC motor)	150	150	170	150	-
G	418	514	642	802	930
H	451	547	675	835	963
I	300	300	400	400	500
J	273	273	273	348	330
K	457	553	681	841	969
L (for Cu/Al, Cu/Cu)	399	447	511	591	655
L (for Fe/FeZn)	361	409	473	553	617
M	470	566	694	854	982

Tab. 2-2: Unit dimensions

2.6.2 Dimensions of Multi*MAXX* HN units, Fe/Fe Zn heat exchanger (steam used as a medium)

Industry design version



Comfort design version

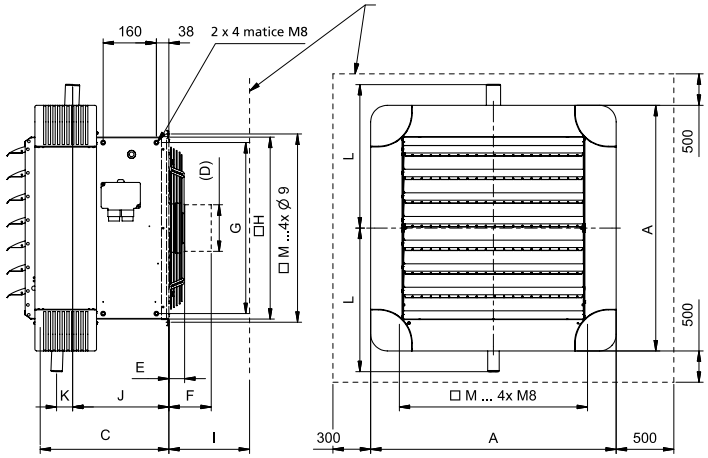


Fig. 2-11: Heating unit dimensions and heat exchanger connection

Dimensions [mm]/size	1	2	3	4	5
A	642	738	866	1026	1154
B	520	616	744	904	1032
C	387	387	387	452	434
D (for EC motor)	150	150	175	175	-
E (for backward-curved blade fans)	35	50	51	66	15
E (for wide blade fans)	60	81	100	112	-
F (for EC motor)	150	150	170	150	-
G	418	514	642	802	930
H	451	547	675	835	963
I	300	300	400	400	500
J	291	290	288	350	329
K	41	45	49	55	59
L	361	409	473	553	617
M	470	566	694	854	982

Tab. 2-3: Unit dimensions

2.7 Heat exchanger outlet connections

Model size		1				2				3				4				5			
Number of rows		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Heat exchanger outlet connections/identification in the type code																					
Cu/Cu Cu/Al	threaded rod/A (male)	R 1"								R 1 1/4"											
	threadless pipe/O *	22				22	28			22	28	35	28	28	35	42	35	28	42		
Fe/Fe Zn PWW/PHW	threaded rod/A (male)	R 1"		-		R 1"		-		R 1 1/4"		-		R 1 1/4"		-		R 1 1/4"		-	
	threadless pipe/O *	33.8								42.4											
Fe/Fe Zn (steam)	threadless pipe/O *	42.4 (inlet) 33.8 (outlet)																			

Tab. 2-4: Heat exchanger outlet connections (external ∅ d [mm])*

2.8 Unit weight and water volume in the heat exchanger

Size	Weight including the heat exchanger			Water volume in the heat exchanger		
	Cu/Al	Cu/Cu	Fe/FeZn	Cu/Al a Cu/Cu (A, C)	Fe/FeZn (S, T)	Fe/FeZn (R)
	kg	kg	kg	l	l	l
HN11	21	24	46	1.0	3.8	2.5
HN12	22	27	67	1.7	7.2	3.2
HN13	24	29	–	2.5	–	-
HN14	25	32	–	3.2	–	-
HN21	29	29	63	1.3	5.2	3.2
HN22	31	33	90	2.4	10.1	4.3
HN23	33	37	–	3.4	–	-
HN24	36	41	–	4.3	–	-
HN31	38	41	80	1.8	7.4	4.3
HN32	42	48	127	3.5	14.4	6.0
HN33	45	54	–	5.3	–	-
HN34	49	61	–	6.3	–	-
HN41	54	63	123	3.0	10.7	5.8
HN42	59	73	177	5.6	20.9	8.3
HN43	64	82	–	8.4	–	-
HN44	70	92	–	9.9	–	-
HN51	81	87	179	3.9	13.8	7.2
HN52	88	100	255	8.1	26.9	10.7
HN53	95	113	–	11.1	–	-
HN54	102	126	–	14.0	–	-

Tab. 2-5: Unit weight and water volume in the heat exchanger (the weight data applies to units with basic slat louvres and 3-stage electric motor)

2.9 Operational limits

Attention!
All other important data regarding capacity, dimensions, weight, medium connections and acoustics are provided in the design data brochure for Multi*MAXX* HN heating units.

Unit	Max. ambient temperature	-20°C to +40°C
	Operating voltage	3 x 400 V (500 V) or 1 x 230 V~, 50 Hz
	Protection rating	IP 54
	Electric motor power input	- see the identification label
	Corrosion resistance class	C3 according to CSN EN ISO 12944-2
	Max. dust volume	10mg/m^3
Cu/Al and Cu/Cu heat exchanger	Max. operating temperature	130°C (water as a medium)
	Max. heating medium pressure	1.6 MPa (water as a medium)
Fe/FeZn heat exchanger	Max. operating temperature	160°C (water as a medium) 180°C (steam as a medium)
	Max. heating medium pressure	1RR - 1.6 MPa, 2RR - 1.0 MPa (water as a medium) 1RR - 0.8 MPa (steam as a medium) 2RR - 0.8 MPa (steam as a medium) - only heat exchanger “R”

2.10 Acoustic and electrical data

Size	Speed	Total sound value		Max. power input [kW]	Max. current A
	rev / min	Sound power dB(A)	Sound pressure* dB(A)		
AC-motor A - 3 x 400 V 2-stage (low speed)					
1	860	61	46	0.05	0.28
	670	55	40	0.03	0.16
2	910	65	50	0.12	0.45
	710	61	46	0.07	0.26
3	640	66	51	0.12	0.49
	500	60	45	0.07	0.28
4	650	68	53	0.24	0.72
	500	59	44	0.15	0.41
AC-motor B - 3 x 400 V 2-stage (high speed)					
1	1320	71	56	0.14	0.49
	1050	67	52	0.09	0.28
2	1270	76	61	0.29	0.61
	890	69	54	0.19	0.35
3	900	76	61	0.31	0.86
	660	70	55	0.20	0.50
4	910	81	66	0.51	1.31
	740	76	61	0.37	0.76
AC-motor C - 3 x 400 V 3-stage					
2	1380	75	60	0.34	1.01
	1060	70	55	0.25	0.58
	690	58	43	0.07	0.50
3	910	73	58	0.28	0.92
	730	69	54	0.20	0.53
	460	57	42	0.07	0.26
4	920	80	65	0.58	1.47
	740	75	60	0.43	0.85
	460	64	49	0.14	0.73
AC-motor D - 1 x 230 V 1-stage (low speed)					
1	920	61	46	0.09	0.52
2	890	65	50	0.14	0.88
AC-motor E - 1 x 230 V 1-stage (high speed)					
1	920	71	56	0.19	1.00
2	1210	76	61	0.33	1.60
3	890	76	61	0.33	1.90
4	910	81	66	0.55	2.80
AC-motor R - 3 x 400 V 2-stage (high speed)					
3	900	73	58	034	1.01
	720	68	53	0.23	0.59
4	870	78	63	0.76	1.84
	650	73	58	0.47	1.06
5	900	80	65	0.85	1.45
	680	71	56	0.47	0.83

Size	Speed	Total sound value		Max. power input [kW]	Max. current A
	rev / min	Sound power dB(A)	Sound pressure* dB(A)		
AC-motor S - 3 x 400 V 3-stage					
1	1370	72	57	0.17	0.55
	1070	66	51	0.12	0.32
	700	56	41	0.04	0.28
2	1370	75	60	0.34	0.67
	1030	67	52	0.26	0.50
	700	58	43	0.07	0.43
3	900	73	58	0.38	0.98
	680	68	53	0.27	0.57
	450	58	43	0.09	0.49
4	870	78	63	0.68	1.78
	660	73	58	0.41	1.03
	420	64	49	0.12	0.89
5	920	80	65	0.92	2.20
	770	71	56	0.66	1.20
	460	66	51	0.19	0.88
AC-motor V - 3 x 500 V 3-stage					
1	1370	72	57	0.17	0.44
	1070	66	51	0.12	0.26
	700	56	41	0.04	0.23
2	1370	75	59	0.34	0.70
	1030	67	52	0.26	0.40
	700	58	43	0.07	0.34
3	900	73	58	0.38	0.78
	680	68	53	0.27	0.46
	450	58	43	0.09	0.39
4	870	78	63	0.68	1.42
	660	73	58	0.41	0.82
	420	64	49	0.12	0.71
5	920	80	65	0.92	2.03
	770	71	56	0.66	1.18
	460	66	51	0.19	1.02
EC-motor Y - 1 x 230 V continuous (cooling)					
1	1630	77	63	0.25	1.80
2	980	66	51	0.08	1.95
3	910	65	51	0.15	2.10
4	750	68	54	0.26	4.30
5	660	67	53	0.28	3.40
EC-motor Z - 3 x 400 V continuous (cooling)					
3	675	64	50	0.13	2.10
4	720	67	53	0.26	2.00
5	670	68	54	0.28	1.40
EC-motor Y - 1 x 230 V continuous (heating)					
1	1830	80	66	0.33	1.80
2	1605	78	64	0.33	1.95
3	1000	75	60	0.37	2.10
4	1050	77	63	0.69	4.30
5	890	75	61	0.63	3.40
EC-motor Z - 3 x 400 V continuous (heating)					
3	1450	84	70	1.18	2.10
4	1200	80	65	1.07	2.00
5	960	77	63	0.75	1.40

* *Sound pressure: Guiding values at a distance 5 metres sideways from the unit, at a maximum air flow rate and in low-reflection space. Space volume 1500 m^3, absorption surface 200 m^2 Sabin, hemisphere emission = directional factor 2. These values may be strongly influenced by environmental factors, both positively and negatively.*

2.11 Condensate pump

Cooling units may produce condensate, which is collected in the condensate pan. If a gravity-flow condensate drain is not provided, a condensate pump must be used. The pump will transport condensate to collection or waste outlet points.

2.11.1 Condensate drain function

The condensate pan is connected to the condensate pump by a hose. The pump has the following functions:

– It starts when the specified level of condensate in the pan is exceeded.
– It stops when the level of condensate drops below the minimum level (approx. 25 mm).
– It raises an alarm when the maximum condensate level in the condensate pan is exceeded.

2.11.2 Condensate pump technical data and capacity in wall-mounted and ceiling-mounted units

The maximum operating pressure of the pump is 0.1 MPa (1 bar), with the maximum water volume being 500 l/h. Fig. 2-13 indicates the pump's capacity in l/h in relation to transport height.

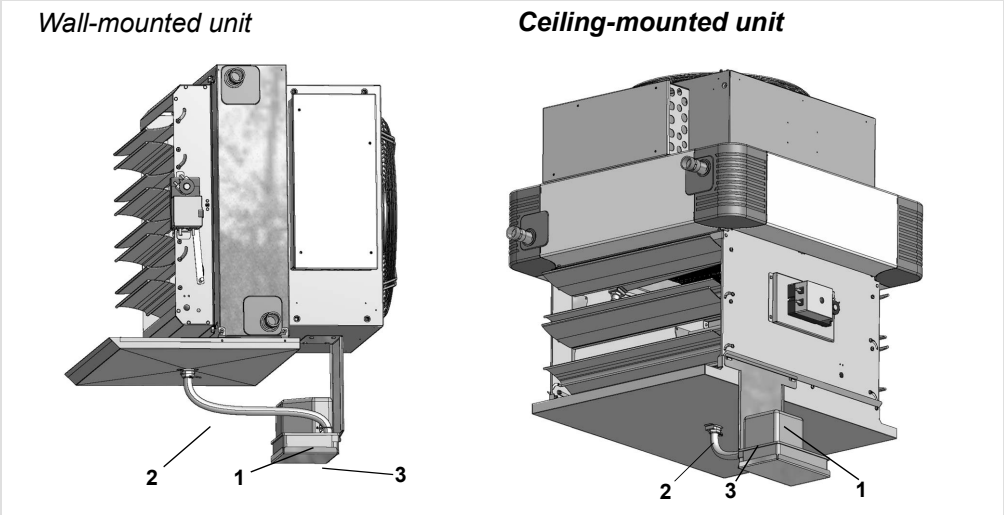


Fig. 2-12: Condensate pump in wall-mounted and ceiling-mounted units

Pos. 1: Condensate pump
Pos. 2: Suction hose
Pos. 3: Condensate pan with floats

Condensate pump technical data

Technical data	Values
Operating voltage	230 V AC/50 Hz
Operating current	0.8 A
Power input	90W
Protection rating	IP 20
Max. transport height	5.4 +/- 0.4 m

Tab. 2-6: Condensate pump technical data

Technical data	Values
Maximum water volume	500 l/h
Sound pressure level	< 47 dBA (1 metre from the pump)
Alarm sensor signal	1 A induction, 4 A ohmic
Drain connection fitting	3/8“

Tab. 2-6: Condensate pump technical data

Condensate pump capacity

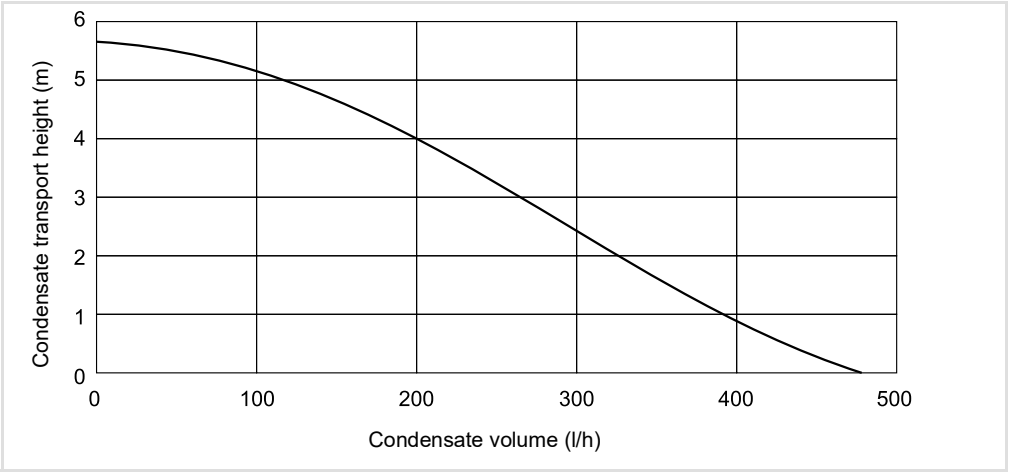


Fig. 2-13: Condensate pump capacity (transport height/condensate volume)

Transport height	Transport distance			
	5 m (l/h)	10 m (l/h)	20 m (l/h)	30 m (l/h)
1 m	460	380	280	200
2 m	390	320	240	180
3 m	300	250	190	150
4 m	200	180	130	100
5 m	90	80	60	50

Tab. 2-7: Condensate pump transport distance

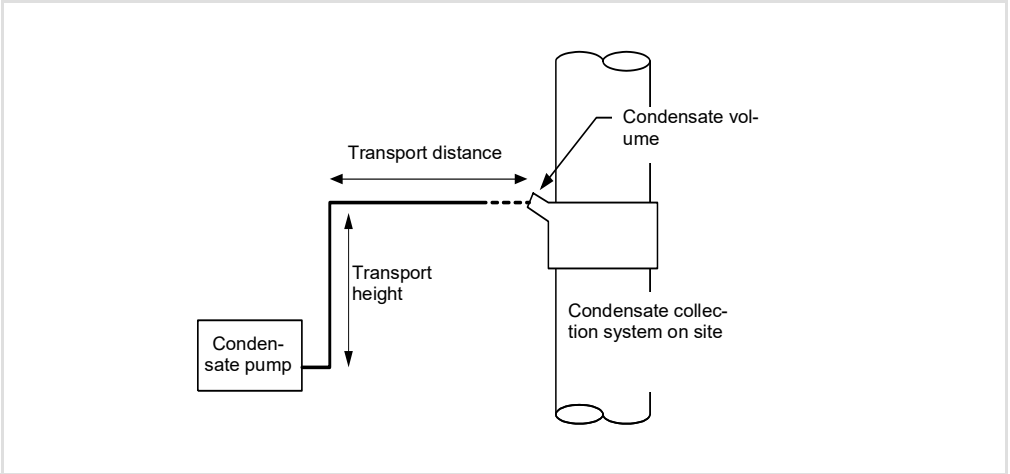


Fig. 2-14: Diagram of connecting the condensate pump to the condensate drain collection system

2.12 Air side accessories

The following accessories are available for Multi*MAXX* HN units:

Identification	Order code	Design
Mixed air module, direct	ZH#.200#	Mixing outdoor and recirculating air; galvanized sheet metal, Al profile
Mixed air module, lateral	ZH#.210#	Mixing outdoor and recirculating air; galvanized sheet metal, Al profile
Shut-off damper	ZH#.230#	Outdoor air supply; galvanized sheet metal, Al profile
Flexible connection adapter	ZH#.25#0	Elastic connection segment, max. length 150 mm, galvanized sheet metal, plastic
Rectangular duct 150	ZH#.26#0	Connection segment, max. length 150mm, galvanized sheet metal, plastic
Rectangular duct 1000	ZH#.2700	Connection segment, max. length 1000 mm, galvanized sheet metal, plastic
90° elbow, symmetrical	ZH#.2800	Air duct, galvanized sheet metal
90° elbow, asymmetrical	ZH#.2900	Air duct, galvanized sheet metal
Canopy	ZH#.3100	Protection against rain, with a grille to prevent birds from entering; galvanized steel, sheet metal
Rain canopy	ZH#.3200	Protection against rain, with a grille to prevent birds from entering; galvanized steel, sheet metal
Protection grille	ZH#.3300	Air side terminal point; galvanized mesh
Passage duct for slanted roofs	ZH#.3400	Air duct for mounting the roof outlet hood; galvanized steel
Roof outlet hood	ZH#.35##	Air duct terminal point with or without filter, class G2, G4 or F7; painted galvanized steel (RAL 9002)
Filter mat	ZH#.370#	Class G2, G3 or G4 filter mat according to CSN EN 779; galvanized sheet metal, filtration material
Spare bag filter for the roof outlet hood	ZH#.380#	Bag filter class G2, G4 or F7; galvanized sheet metal, filtration material
Bag filter	ZH#.36##	Class G2, G4 or F7 filter mat according to CSN EN 779; galvanized sheet metal, filtration material
Spare filter for bag filters	ZH#.390#	Bag filter class G2, G4 or F7; galvanized sheet metal, filtration material
Spare filter fleece for flat filters	ZH#.400#	Filter fleece G2, G3 or G4; filtration material
Roof passage duct with plinth	ZH#.4900	Roof outlet hood mounting, air duct; plastic, galvanized sheet metal
Wall frame	ZH#.5100	Air duct mounting on the wall; galvanized sheet metal
Flange	ZH#.5200	Mounting accessories onto the base unit (recirculation); galvanized sheet metal
Suspension bracket Kompakt C	ZH#.5300	Unit suspension (circulation type); galvanized sheet metal
Suspension bracket Studio	ZH#.5400	Unit suspension (circulation type); galvanized sheet metal
Suspension bracket Modular	ZH#.550#	Unit suspension ; galvanized sheet metal
Ceiling suspension bracket	ZH#.560#	Ceiling-mounted unit suspension; threaded rods, galvanized sheet metal

Tab. 2-8: Air side accessories

Symbol „#“ - see the type code on page 3

Attention!
All other important data regarding air side accessories is provided in the “Design data brochure for Multi*MAXX* HN heating units"

2.13 Ecodesign Directive requirements pursuant to Commission Regulation (EU) 2016/2281

Values indicated in Table 2-9 are according to the requirements of Commission Regulation (EU) 2016/2281 implementing EU Parliament and Council Directive 2009/125/EC on defining the framework for determining requirements for Ecodesign-certified products related to energy consumption and Ecodesign-certified air heaters, cooling units, high-temperature process coolers and ventilation convectors.

Size	Unit code	Electric motor version	Fan speed stage	Total cooling capacity	Cooling capacity (sensible)	Cooling capacity (latent)	Heat energy consumption	Total electrical power consumption	Air flow rate	Sound power level
				$P_{rated,\,c}$ [kW]	$P_{rated,\,c}$ [kW]	$P_{rated,\,c}$ [kW]	$P_{rated,\,h}$ [kW]	P_{elec} [kW]	V [m^3/h]	L_{WA} [dB(A)]
1	HN14.#W####.B##	AC	1	6.0	4.5	1.5	8.8	0.090	1360	67.0
	HN14.#V####.B##		2	7.4	5.8	1.6	10.6	0.140	1770	71.0
	HN14.#W####.Y##	EC	Min.	4.1	3.0	1.1	4.0	0.007	540	41.0
	HN14.#V####.Y##		Max.	9.0	7.3	1.7	13.5	0.362	2555	81.0
2	HN24.#W####.B##	AC	1	10.3	8.0	2.3	12.8	0.190	2000	69.0
	HN24.#V####.B##		2	11.9	9.5	2.4	16.3	0.290	2830	76.0
	HN24.#W####.Y##	EC	Min.	5.1	3.7	1.4	5.1	0.005	670	38.0
	HN24.#V####.Y##		Max	11.4	9.0	2.4	18.8	0.372	3460	78.0
3	HN34.#W####.B##	AC	1	14.2	10.9	3.3	19.8	0.200	3100	70.0
	HN34.#V####.B##		2	17.4	13.7	3.7	24.1	0.310	4090	79.0
	HN34.#W####.Y##	EC	Min.	7.3	5.2	2.1	7.0	0.003	925	30.0
	HN34.#V####.Y##		Max	19.3	15.6	3.7	26.3	0.372	4630	73.0
4	HN44.#W####.B##	AC	1	21.5	16.3	5.2	34.2	0.370	5580	76.0
	HN44.#V####.B##		2	27.7	21.8	5.9	39.6	0.510	6890	81.0
	HN44.#W####.Y##	EC	Min.	12.9	9.3	3.6	12.5	0.006	1655	34.0
	HN44.#V####.Y##		Max	29.9	24.1	5.8	43.7	0.777	7980	77.0
5	HN54.#W####.R##	AC	1	15.6	11.2	4.4	40.2	0.470	6220	68.0
	HN54.#V####.R##		2	39.9	32.0	7.9	53.5	0.850	9380	77.0
	HN54.#W####.Y##	EC	Min.	15.6	11.2	4.4	13.3	0.013	1740	35.0
	HN54.#V####.Y##		Max	39.9	32.0	7.9	50.9	0.694	8725	75.0

Tab. 2-9: Values according to Commission Regulation (EU) 2016/2281 requirements
The values apply to:
2-pipe systems - heating capacity with heating water 45/40°C, inlet air temperature 20°C, air RH 50% and cooling capacity with cooling water 7/12°C, inlet air temperature 27°C, air RH 47%,

3 Shipping and storage

3.1 Shipping

The manufacturer's instructions must be observed during shipping (see the symbols on the packaging).

Attention!

- Check the shipment for complete and correct contents against the delivery note.
- For repeated shipping and storage use the original packaging!

Damage to the unit!

- Check the unit to make sure it was not damaged during shipping.

Attention!

Claims for damage or missing parts can only be filed with the insurance company only if damage is confirmed by the shipper.

3.2 Unit handling and shifting

- The unit can be held or suspended only from its bottom edges, avoiding outlets and heat exchanger connections; alternatively, it can be suspended using the specific designated points!

Only lifting and moving equipment with sufficient load capacity may be used.

Risk of injury from suspended loads!

Do not move the heating unit above persons.

Injury to persons!

Do not used damaged handling equipment.
Forklift trucks can only be used to transport units on pallets. They must be secured to prevent tipping.

Sharp edges can cause injuries!

When handling the unit, use gloves, safety boots and protective clothing.

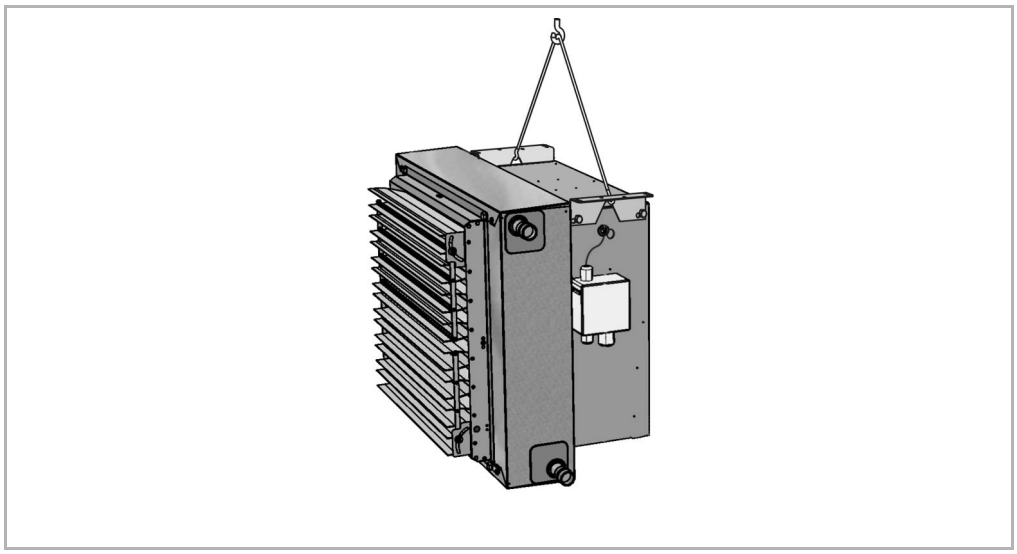


Fig. 3-1: Transporting the unit

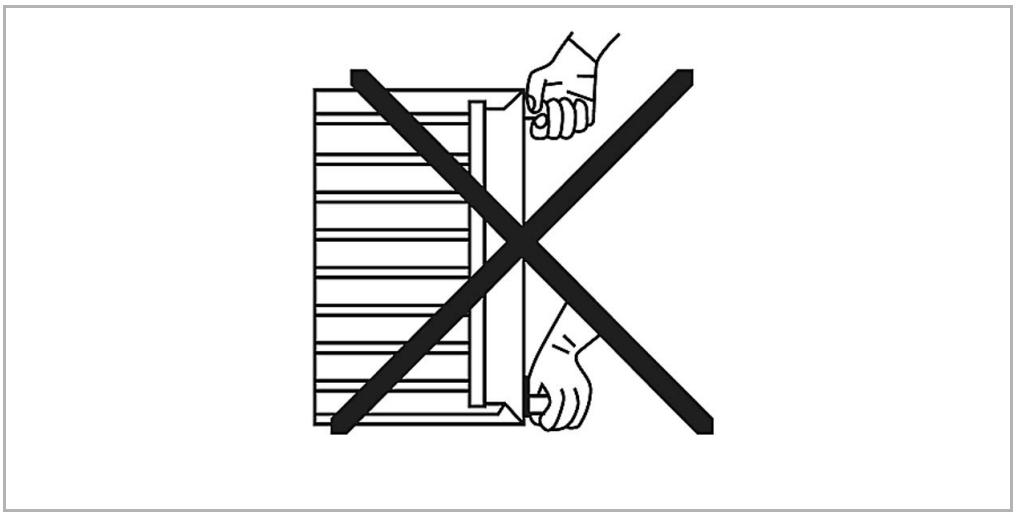


Fig. 3-2: Wrong manner of handling the unit

3.3 Storage

Multi*MAXX* HN heating units must be protected against humidity and contamination and stored in areas protected from weather conditions in compliance with environment parameters Class IE 12 according to CSN EN IEC 60721-3-1 ed. 2/

Attention!
Permitted storage conditions:
Air temperature: -25 °C to 40 °C
Air humidity: 50 to 85% without condensation

4 Installation

4.1 Installation site load-bearing capacity

Attention!
The site of installation must be suitable to permanently bear the load of the heating unit; if necessary, this must be checked by a structural engineer or a designer.
The suspension brackets of Multi*MAXX* HN units are to be mounted by 2x 4 M8 rivet nuts on the sides of the fan enclosure (see Fig. 2-10 and Fig. 2-11).
The fixing material is supplied with the suspension brackets. Unused M8 rivet nuts must be plugged by M8 bolts used to secure the unit to the shipping pallet.

4.2 Installation on the ceiling

The following must be planned: the height of suspension, the distance of the units and the minimum distance from the ceiling. The minimum mounting height above the floor is 2.7 m.

Max. suspension height for ceiling mounting.

Size	Max. suspension height (m) - louvres C, D
HN11	11.5
HN12	9.8
HN13	9.0
HN14	7.5
HN21	14.0
HN22	13.0
HN23	12.0
HN24	11.0
HN31	13.0
HN32	12.0
HN33	11.0
HN34	10.0
HN41	14.5
HN42	13.0
HN43	12.0
HN44	11.0
HN51	12.0
HN52	11.0
HN53	10.5
HN54	9.5

Data in the table are indication values and apply to discharge air temperatures Δ15 to 20 K above room temperature

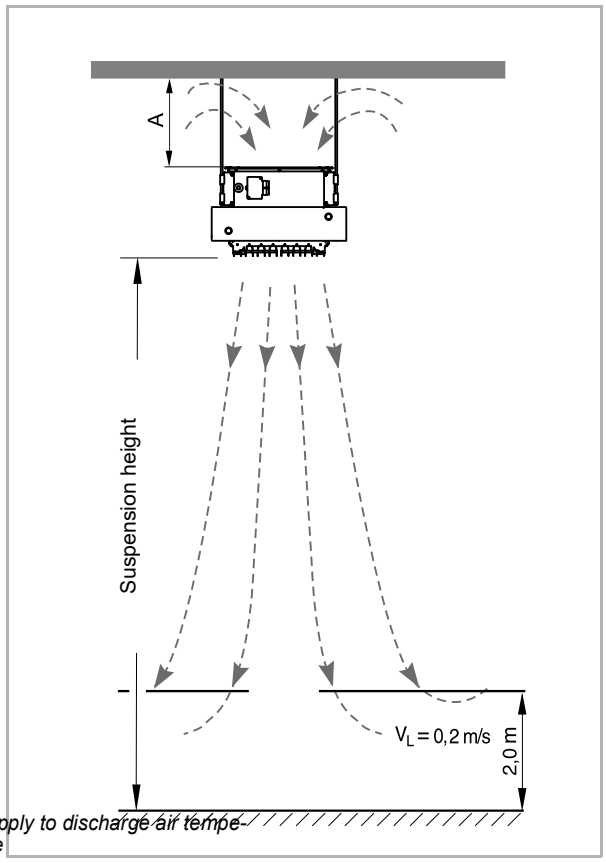


Fig. 4-1: Suspension height of ceiling-mounted units

Attention!
The maximum suspension height of ceiling-mounted units changes depending on the discharge air temperature, low speeds and low air flow rates or due to external pressure drop.

Minimum distance from the ceiling A (see Fig. 4-1)

It is necessary to maintain a minimum distance from the ceiling in order for a sufficient amount of air to be drawn in and to provide access for servicing and maintenance.

Size	1	2	3	4	5
Dimension A (mm)	300	300	400	400	500

Distance between ceiling-mounted units (see Fig. 4-2)

In order for the entire room to be covered we recommend the following distances between units:

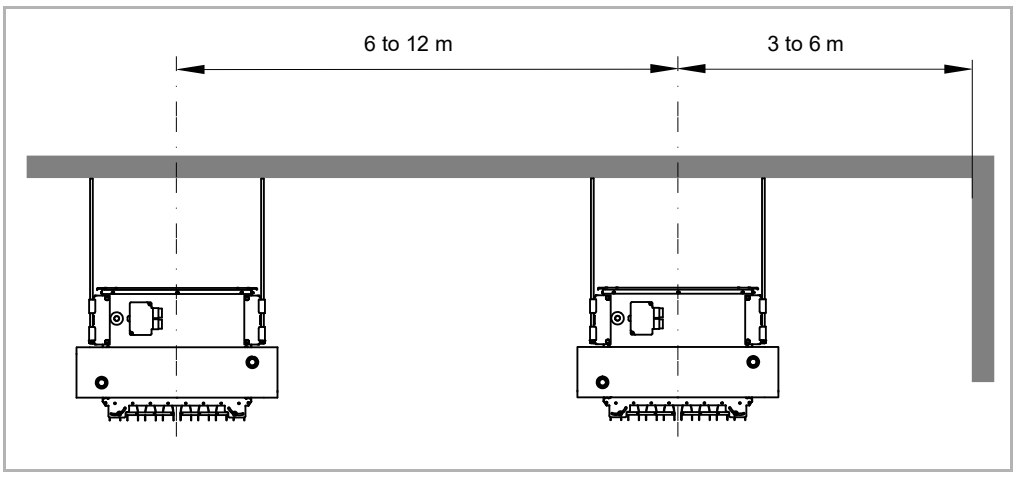


Fig. 4-2: Distances between ceiling-mounted units

For the method of mounting recirculation units on the ceiling using a ceiling suspension bracket (ZH#.560#) see Fig. 4-6, a for air mixing units see Fig. 4-10.

4.3 Wall mounting

The following must be planned: the minimum height, air discharge direction, distance between units and minimum distance from the wall (see Fig. 4-3).

Injury to persons!
The minimum mounting height above the floor is 2.7 m.

Attention!
For thermally-technical reasons the heating units should not be mounted too high on the wall to ensure air mixing.

Air flow discharge direction

The air flow discharge direction must be adjusted in such a way so as to prevent draughts. The primary air flow must not be directed against walls, beams, cranes, shelves, columns or similar obstacles!

Recommended distances between units when mounted on the wall (see Fig. 4-3)

Distances between the units depend on heating requirements, the number of units and their layout.

Minimum distance from the wall A (see Fig. 4-3)

It is necessary to maintain a minimum distance from the wall in order for a sufficient amount of air to be drawn in and to provide access for servicing and maintenance.

Size	1	2	3	4	5
Dimension A (mm)	300	300	400	400	500

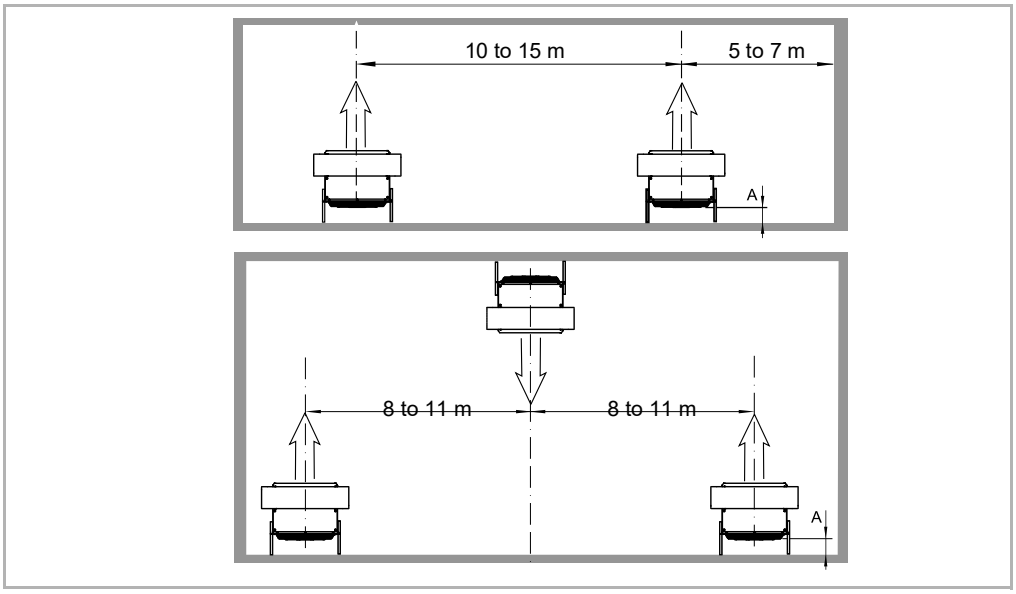


Fig. 4-3: Distances between wall-mounted units

Air throw

Air throw in wall-mounted units

Size	Max. air throw (m) - louvres U, W
HN11	8.2
HN12	7.7
HN13	7.1
HN14	6.8
HN21	9.5
HN22	9.1
HN23	8.7
HN24	8.3
HN31	9.3
HN32	8.9
HN33	8.1
HN34	7.5
HN41	10.8
HN42	10.2
HN43	9.6
HN44	8.9
HN51	10.2
HN52	9.8
HN53	9.3
HN54	9.0

Data in the table are indication values and apply to discharge air temperatures Δ15 to 20 K above room temperature

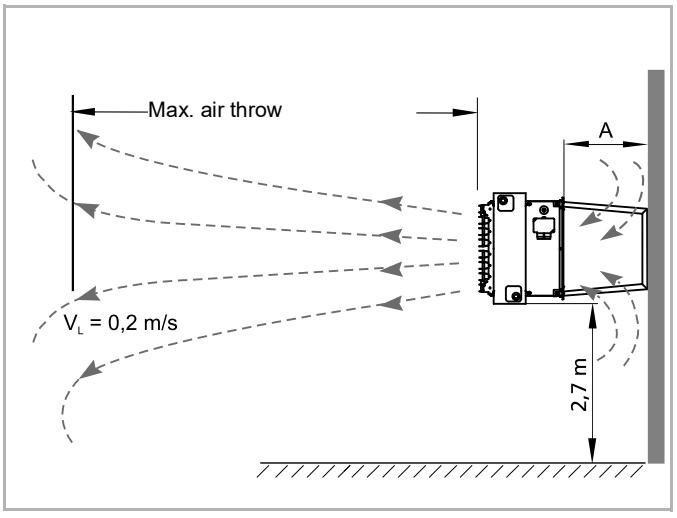


Fig. 4-4: Air throw

For mounting the unit on the wall using the “Studio“ bracket (ZH#.5400) see Fig. 4-8, with the “Modular“ bracket (ZH#.5500) see Fig. 4-7, with the “Kompakt C“ bracket (ZH#.5300) see Fig. 4-9, for air mixing units with the “Modular“ bracket (ZH#.550#) see Fig. 4-11.

4.4 Safe distance

Attention!
When installing heating units ensure that there is a safe distance from flammable substances according to CSN 06 1008 and CSN 13501-1 of at least 400 mm from the sides of the unit and 1000 mm in the direction of discharge.

4.5 Installation of the unit

Attention!
Heating units mounted on the ceiling must always be in a horizontal position to allow the bleeding and emptying of the heat exchanger. Fixing points: Heating units must be secured at 4 fixing points at least.

When welding the pipes onto the heat exchanger, be careful not to damage the paint on the unit's casing,

Damage to the unit!
It is absolutely essential that the units be mounted firmly, but not under tension.

Attention!
Heating units must be mounted safely and reliably, in a visually correct manner. Their original suspension brackets are recommended for that purpose.

4.6 Unit casing fitting

Units in the Industry design version are supplied with the casing already fitted.

Attention!
The Comfort casing is supplied with the unit as a separate component, to be fitted only after the unit has been completely installed. The rubber guards (No. 7) must be put on medium connection fittings before connecting the pipes. When fitting the casing, follow the steps shown in Fig. 4-5.

After fitting, the top and bottom sections of the casing must be secured using bolts (see No's 4 and 6). Finally, fit the rubber guards of the heat exchanger connections (see No. 7).

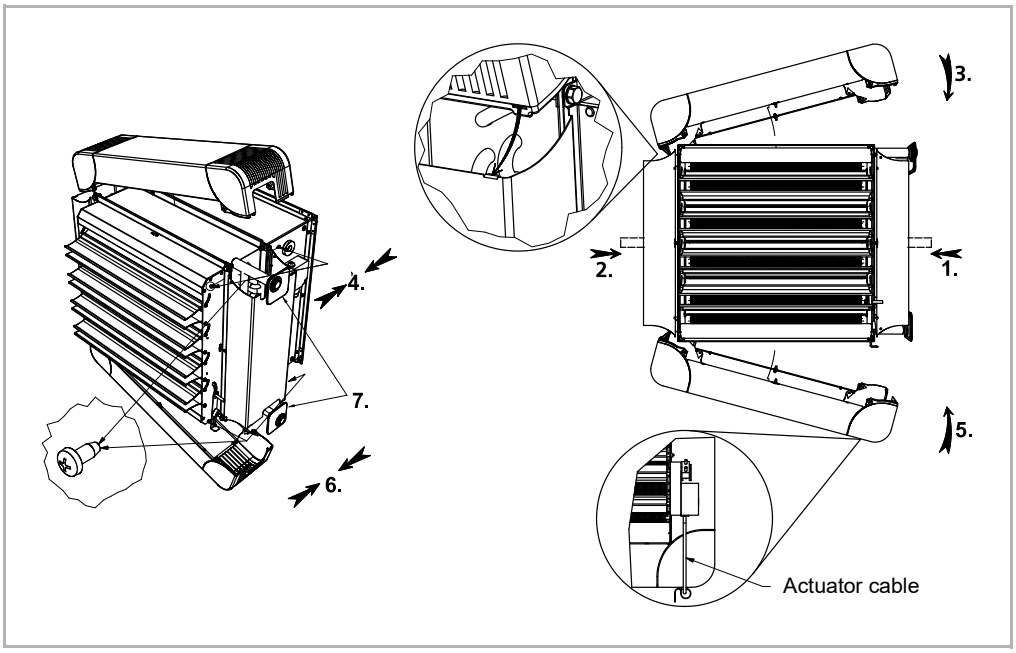


Fig. 4-5: Fitting the Comfort casing

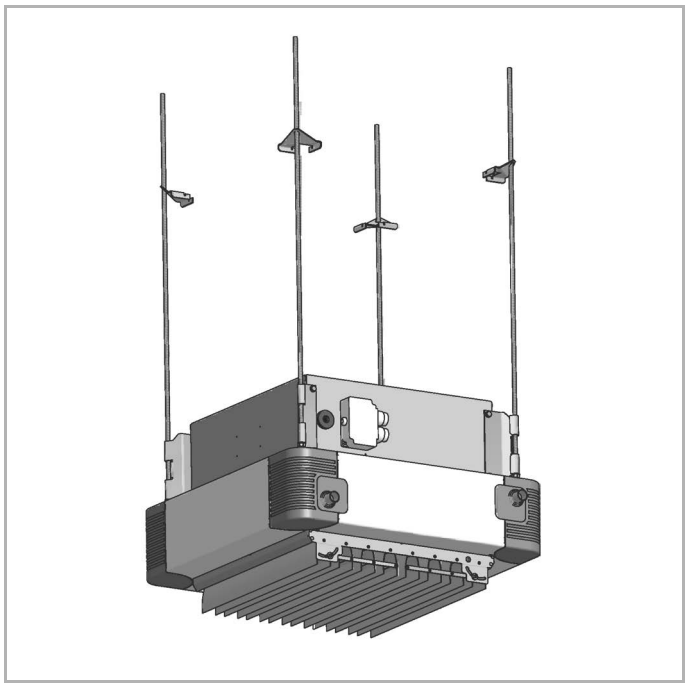


Fig. 4-6: Ceiling mounting using a ceiling suspension bracket (ZH#.5601)

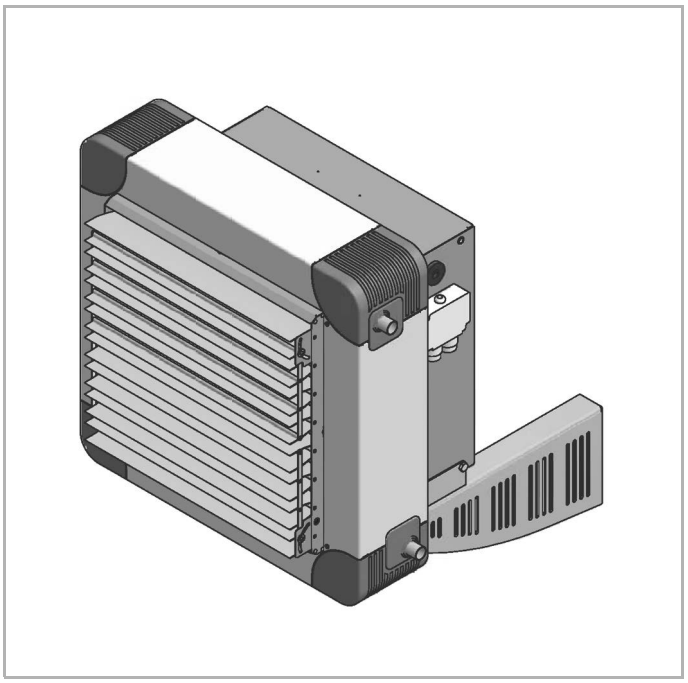


Fig. 4-8: Wall mounting using the Studio suspension bracket (ZH#.5400)

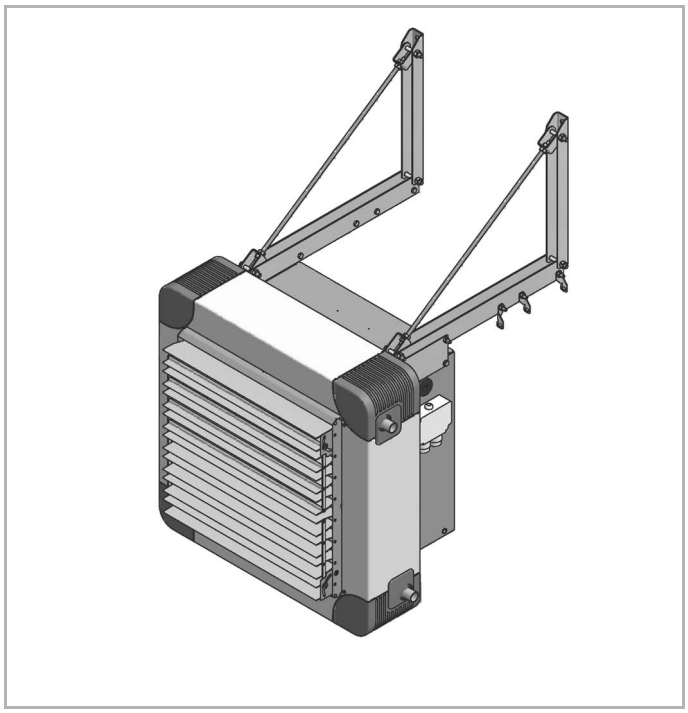


Fig. 4-7: Wall mounting using the Modular suspension bracket (ZH#.5500)

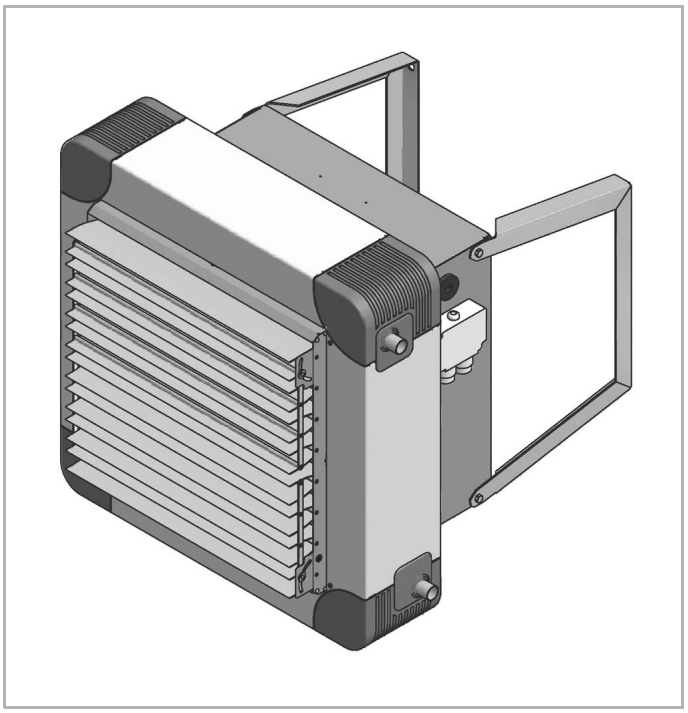


Fig. 4-9: Wall mounting using the Kompakt C suspension bracket (ZH#.5300)

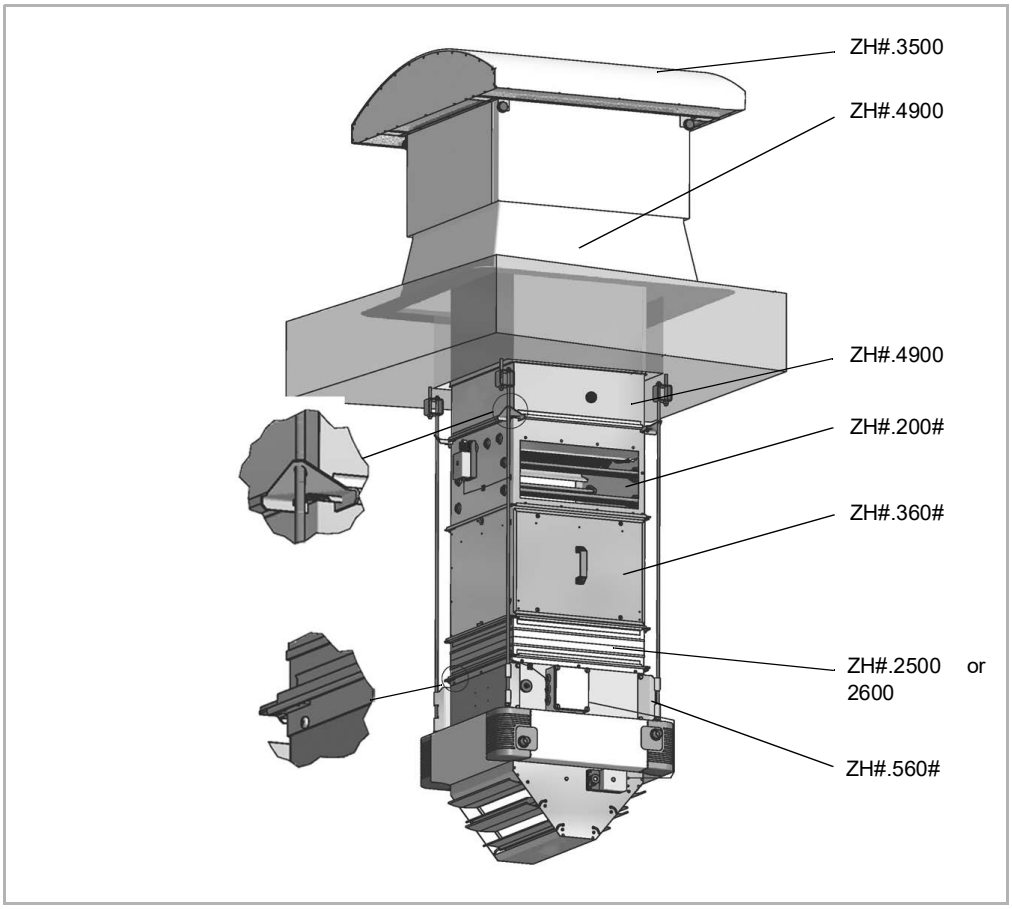


Fig. 4-10: Ceiling mounting of an air mixing unit and accessories with a ceiling suspension bracket (ZH#.560#)

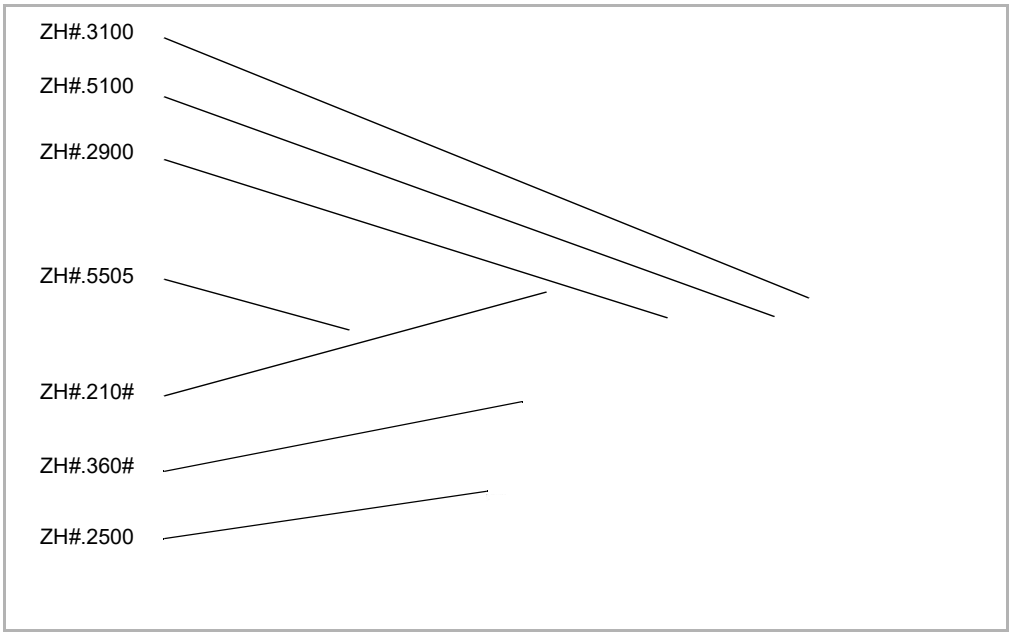


Fig. 4-11: : Wall mounting of an air mixing unit and accessories with the Modular suspension bracket (ZH#.560#)

Air mixing units have the accessories flange factory-fitted; for recirculation units the flange (ZH#.5200) must be ordered as an accessory and fitted on site.

The mixing chambers in wall-mounted units must in a position such that the damper blades are vertical (see Fig. 4-11).

The first accessory module to be mounted is either the Flexible connection (ZH#.25#0) or Rectangular duct 150 (ZH#.26#0). For installation examples see Fig. 4-10 and Fig. 4-11.

5 Media connection

5.1 Pipe connection

Attention!
The inlet and outlet pipes must be installed in such a way to prevent any mechanical tension on the heat exchanger and to allow easy access
to the heating unit for maintenance and repair.
Connecting pipes: It is necessary to bleed air from the connecting pipes and heat exchanger on site!
Heating/cooling medium inlet/outlet: Observe the designation of the connections!

Damage to the unit!
When installing the pipes, it is necessary to hold the heat exchanger connection outlet using a pipe wrench or pliers to prevent it from rotating (see Fig. 5-1).

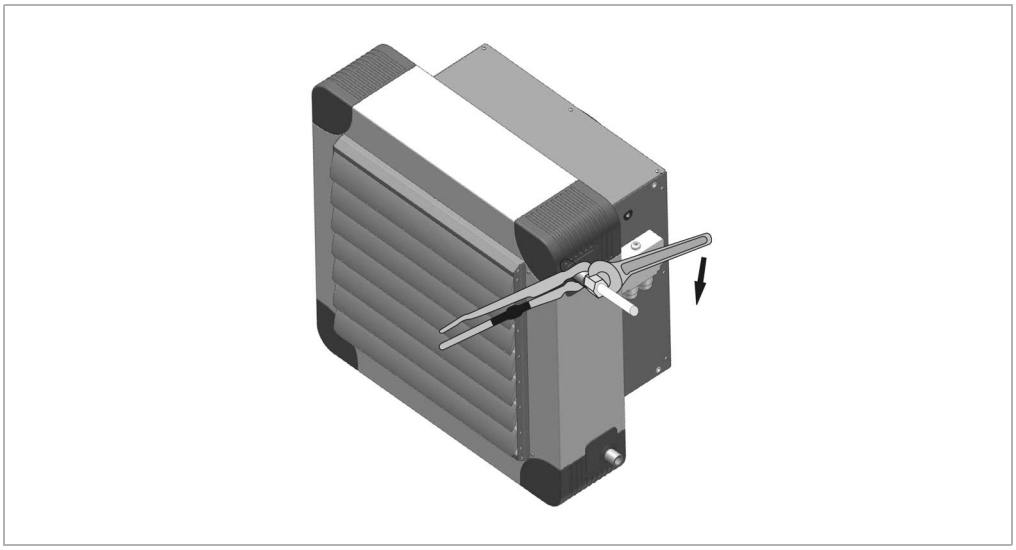


Fig. 5-1: Connecting the medium connection pipe to heat exchanger connections

5.2 Connection dimensions

The spacings of heat exchanger connections are indicated in Fig. 2-10 and Fig. 2-11, for heat exchanger connection end fittings Table 2-4.

5.3 Condensate drain connection

For proper condensate drainage it is necessary to connect the condensate drain to the condensate pan on site (see the operation manual “Louvres” supplied with the unit, page 5).

- Slide a plastic hose or copper pipe onto the condensate pan outlet provided and seal it.
- Route the condensate drain so that it is inclined.
- When connecting the condensate drain to a drainage system it is necessary to consider wastewater disposal regulations (water trap).

5.4 Condensate pump connection

The condensate pump and its components are supplied with the following components: pump holder, condensate pump, suction hose and necessary connection parts - 2 screws for mounting the pump holder onto ceiling-mounted units or 4 screws for wall-mounted units, 2 screws for attaching the holder to the condensate pump, 1 self-adhesive plastic sleeve.

When connecting the condensate pump to a wall-mounted unit and its condensate pan follow the steps in the order indicated in Fig. 5-2.

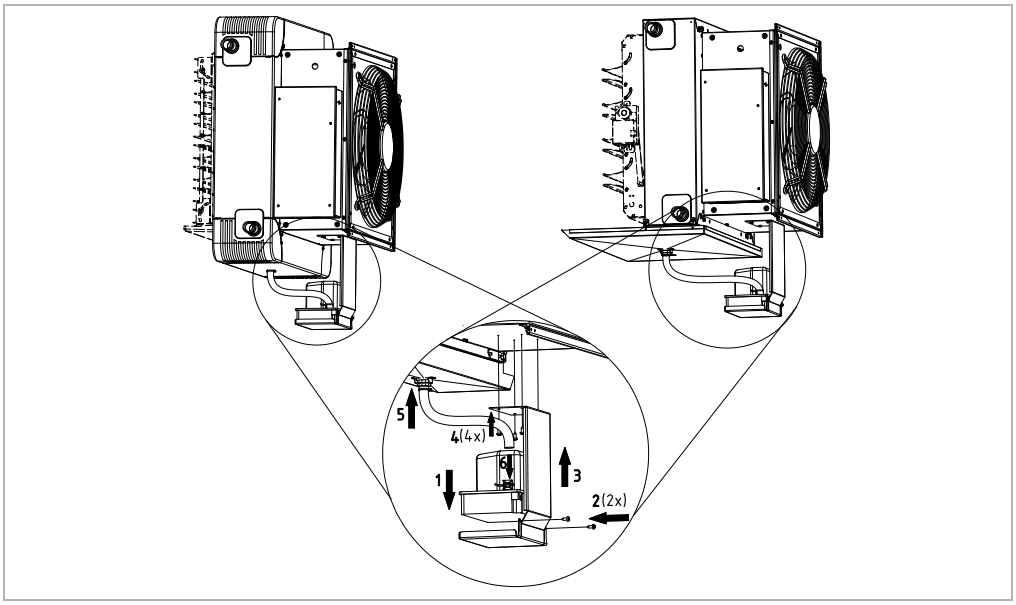


Fig. 5-2: Mounting and connecting the condensate pump to Comfort and Industry-type wall-mounted units

When connecting the condensate pump to a ceiling-mounted unit and its condensate pan follow the steps in the order indicated in Fig. 5-3.

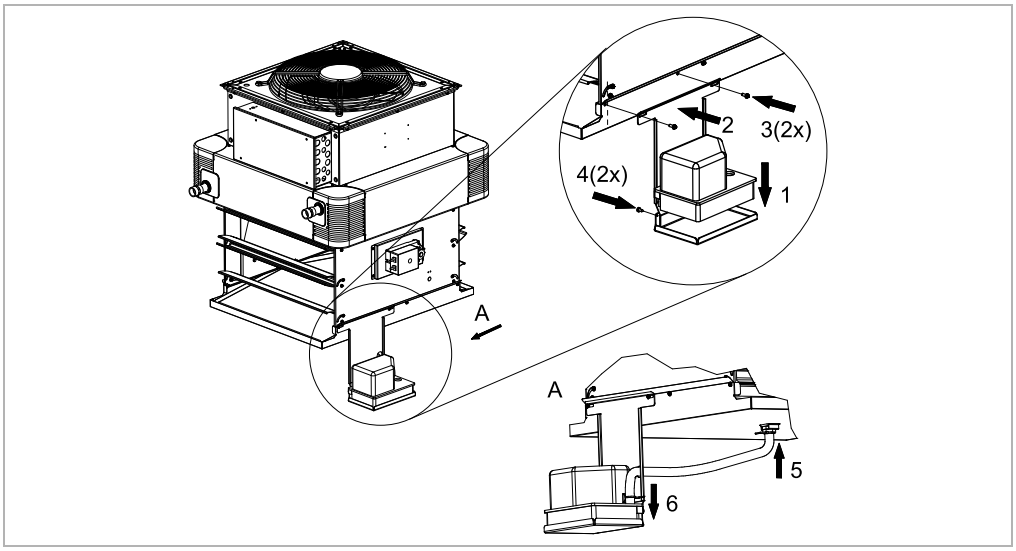


Fig. 5-3: Mounting and connecting the condensate pump to Comfort-type ceiling-mounted units

The end of the condensate pump hose must be connected to a condensate drainage pipe on site. If the hose is not self-draining, due to its extension for example, the volume of condensate will be reduced (see Fig. 2-13 and Table 2-7).

Attention!
When connecting the hose ensure that it is not bent or kinked. To prevent noise transmission the hose should be insulated from all surfaces it might come into contact with.

6 Electrical connections

Risk of electrocution!
The electrical installation may only be carried out by persons qualified pursuant to Section 6 of Regulation CUBP and CBU No. 50/78 Coll.

Attention!
When carrying out the electrical connection of the unit, it is necessary to observe operational safety regulations and the generally recognized rules of engineering practice.

- CSN 33 1310 ed. 2 Electrical engineering regulations.

  Safety regulations for electrical equipment intended to be used by persons without any electrical engineering qualifications.

- CSN 33 2000 -1 ed. 2 Low-voltage electrical installations – Part 1: Fundamental principles, assessment of general characteristics, definitions.

6.1 Wiring diagrams

Carry out the electric connection of Multi*MAXX* HN units according to the relevant wiring diagram. The wiring diagram is attached to the inside cover of the unit's plastic terminal box or is enclosed separately.

Risk of electrocution!
The wiring diagrams do not specify any protective measures. The applicable standards and regulations must always be observed when making electrical connections.

Control/power electronics	Fuse
MATRIX 2001, 3001	B 10 A
MATRIX 2002, 3002, 4002	B 16 A
MATRIX 2003, 3003, 4003	B 16 A
MATRIX 4004	B 10 A
Controller	B 6 A

Tab. 6-1: Protection

6.1.1 Cable installation (cable connection)

Install cables in accordance with conditions on site.

Cable types and cross-sections are to be selected by an authorised electrical engineering firm. Connections on site and the location of cables are to withstand high temperatures.

Electrically shielded cables must be used for thermal protection contacts, with shielding in the terminal block being provided by connection to the protective conductor terminal (PE). The decision whether to provide shielding at both ends can only be made following the evaluation of conditions on site (e.g. in the event of severe interference), whereby the relevant applicable regulations and standards shall be observed.

When installing cabling, seal all bushings in a waterproof manner (protection against splashing water).

6.1.2 Electric motor protection

Protection by thermal contact (AC-motors):

As standard, all AC-motors of Multi*MAXX* HN unit fans are fitted with thermal protection contacts, which must be connected.

When the maximum permitted temperature of the electric motor winding is exceeded, the motor is stopped by the MC4 electrical enclosure.

To provide protection for a group of units, thermal protection contact wires in the winding can be used. After that, it is sufficient to provide overcurrent protection for the group for the sum total of the current. Overcurrent protection of TCs must always be connected (TCs in the contactor coil or relay 912.MVS1.0, which is part of control units supplied by FläktGroup).

Motor operation contact (EC-motors):

All EC-motors of Multi*MAXX* HN fans use the so-called motor operation contact to evaluate the necessity of motor protection. It is dry contact which assesses possible motor faults and, if there are none found, it closes within 15 seconds of starting the unit (providing the power supply for the unit), e.g. via the MC4 electrical enclosure. The contact load is 2A/250 V AC.

To provide protection for a group of units these motor operation contacts are connected in series.

If any other electric motor protection is used on site, the warranty will become void.

6.1.3 Controls of the basic unit

Units can be controlled using a control unit designated for recirculation or air mixing units; see the block diagram on Fig. 6-46 and Fig. 6-47.

Controlling the unit via frequency changes or reduced voltage is prohibited.

6.2 Plastic electrical enclosure/Steel electrical enclosure

Multi*MAXX* HN units are supplied with a plastic or steel electrical enclosure.

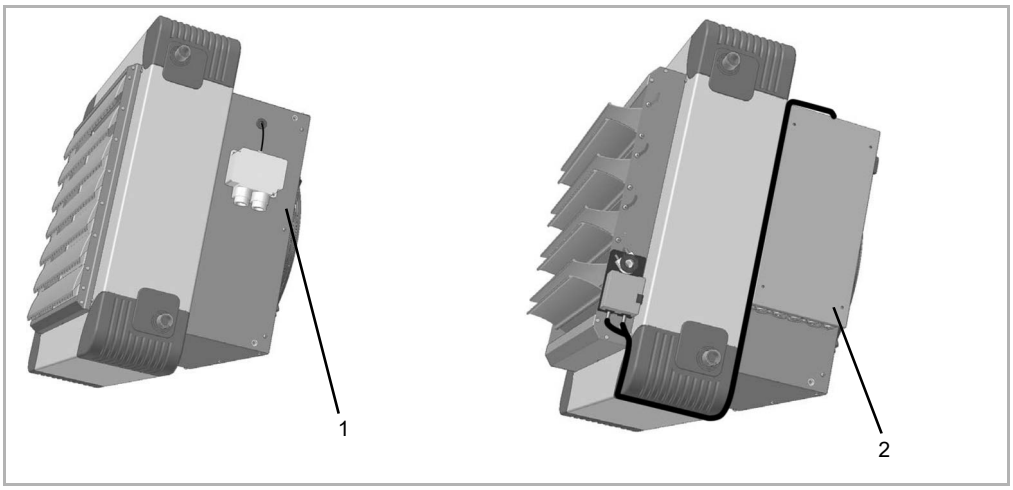


Fig. 6-1: Pos. 1: Plastic electrical enclosure
Pos. 2: Steel electrical enclosure

Plastic electrical enclosure

Inside the plastic electrical enclosure there is a terminal block and (depending on the model of the unit) possibly some other integrated electrical features (frost protection).

Steel electrical enclosure

Inside the steel electrical enclosure there are control/power electronics (MATRIX 2001/3001, 2002/3002/4002, 2003/3003/4003, 4004).

Attention!
The plastic enclosure and fan switch do not always have free terminals for connecting electrical accessories! These must be provided by an additional electrical terminal block (supplied by the site contractor).

6.3 3-speed, 3-phase electric motor 3 x 400 V (3 x 500 V), 50 Hz (electric motor designation C, S, V) wiring diagram

- with thermal protection contacts
- with pole switching
- winding diagram ΔΔ/YY/D
- without voltage switching
- operating voltage: 3 x 400 V, 3 x 500 V, 50 Hz

6.3.1 3-stage operation at operating voltage 3 x 400 V (3 x 500 V)

- MC4 control unit controls
- power supply voltage: 9 + PE = 10-core cable
- TC shielded line: 2-core cable

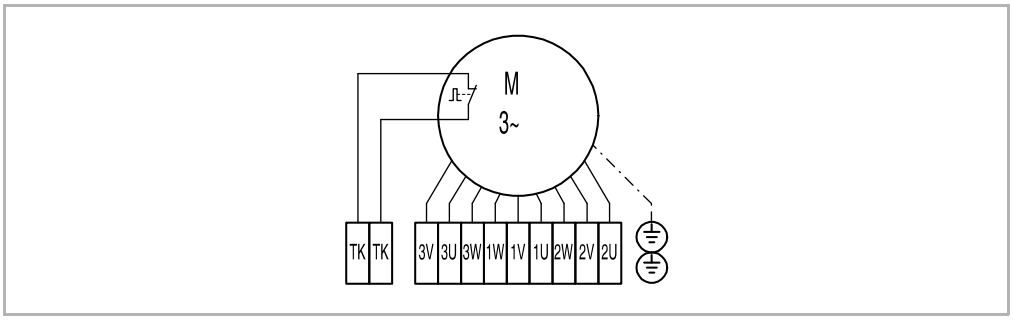


Fig. 6-2: Wiring diagram - 3-stage operation

6.3.2 1-stage operation at operating voltage 3x400 (3 x 500 V) - electric motor terminal block wiring diagram

- power supply voltage: 3 + PE = 4-core cable
- TC shielded line: 2-core cable

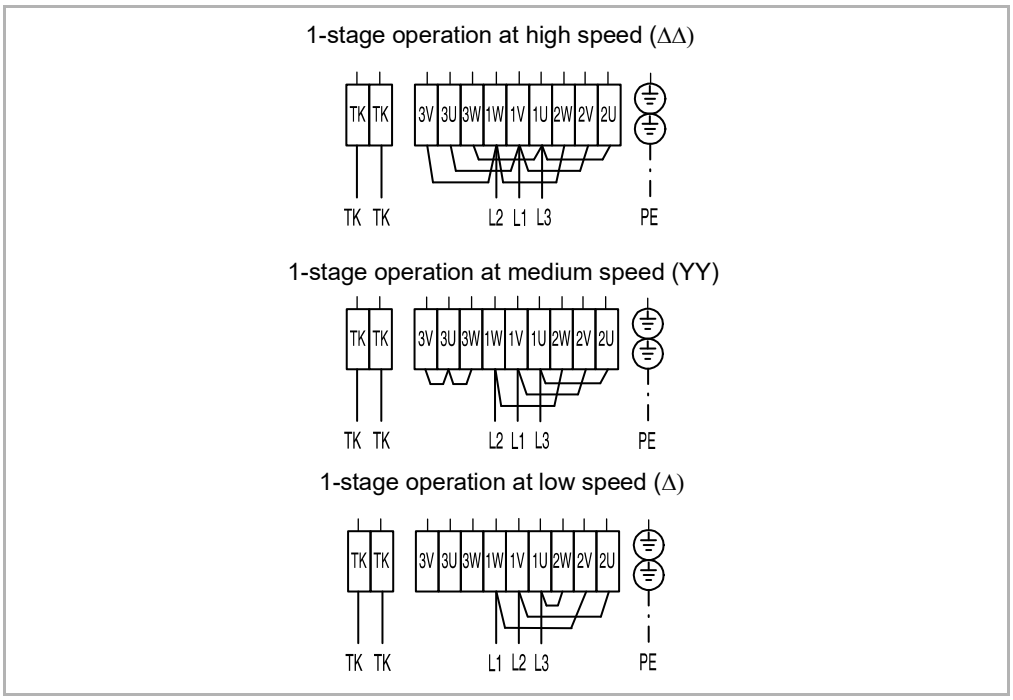


Fig. 6-3: Wiring diagram – 1-stage operation

Attention!
The electric motor cannot be operated with only two phases, otherwise it might be damaged.
For the proper function of the unit it is necessary to observe the fan rotation direction indicated by an arrow on the impeller. If the impeller rotation direction is wrong, it can be changed by swapping the 2 phases.

6.4 2-speed, 3-phase electric motor 3 x 400 V, 50 Hz (electric motor designation A, B, R) wiring diagram

- with thermal protection contacts
- winding diagram Δ/Y
- without voltage switching
- operating voltage: 3 x 400 V, 50 Hz

6.4.1 2-stage operation at operating voltage 3 x 400 V

- MC4 control unit controls
- power supply voltage: 6 + PE = 7-core cable
- TC shielded line: 2-core cable

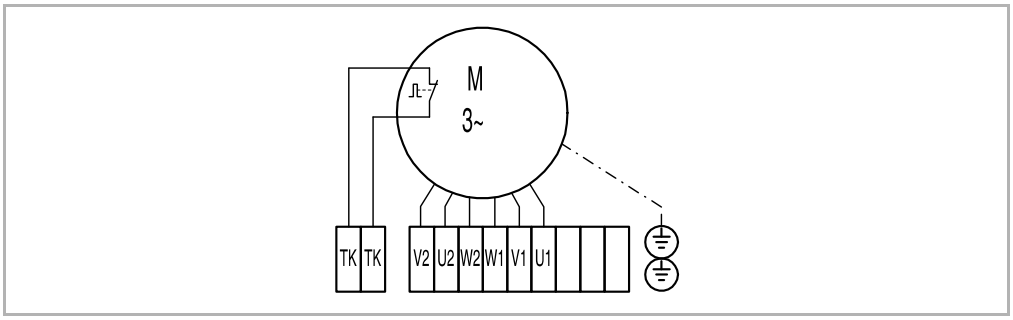


Fig. 6-4: Wiring diagram - 2-stage operation

6.4.2 1-stage operation at operating voltage 3 x 400 V - electric motor terminal block wiring diagram

– power supply voltage: 3 + PE = 4-core cable
– TC shielded line: 2-core cable

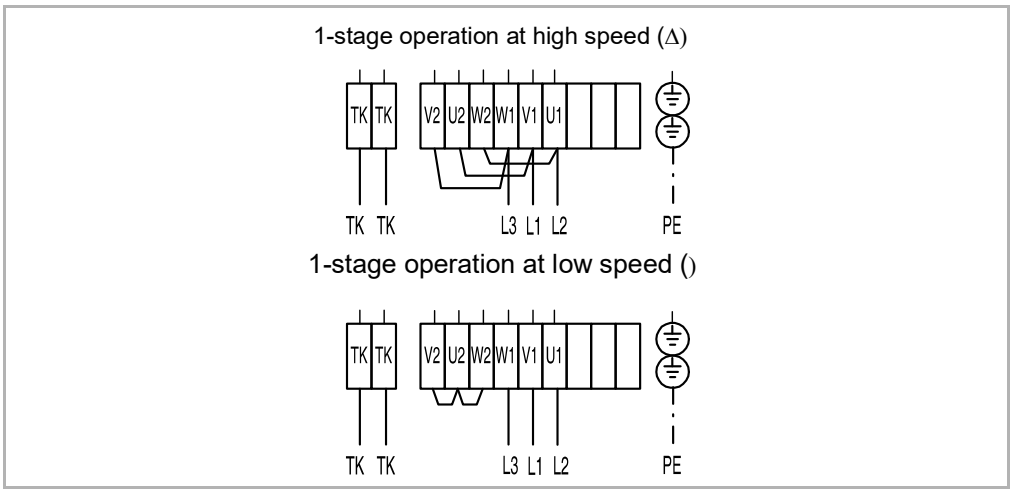


Fig. 6-5: Wiring diagram – 1-stage operation

Attention!
The electric motor cannot be operated with only two phases, otherwise it might be damaged.
For the proper function of the unit it is necessary to observe the direction of fan rotation indicated by an arrow on the impeller. If the direction of impeller rotation is wrong, it can be changed by swapping the 2 phases.

6.5 1-speed, 1-phase electric motor 1 x 230 V, 50 Hz (electric motor designation D, E) wiring diagram

– with thermal protection contacts (only sizes 2-5)
– operating voltage: 1 x 230 V, 50 Hz

6.5.1 1-stage operation at operating voltage 1 x 230 V

– MC4 control unit controls
– power supply line: 2 + PE = 3-core cable
– TC shielded line: 2-core cable

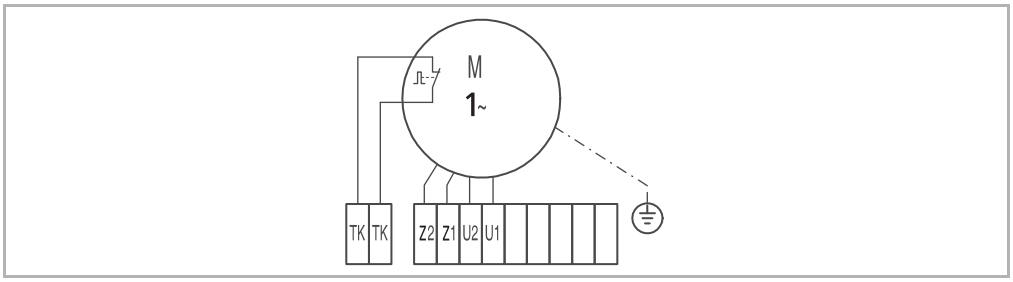


Fig. 6-6: Wiring diagram - 1-stage operation

6.5.2 1-stage operation at operating voltage 1 x 230 V - electric motor terminal block wiring diagram

– power supply voltage: 2 + PE = 3-core cable
– TC shielded line: 2-core cable

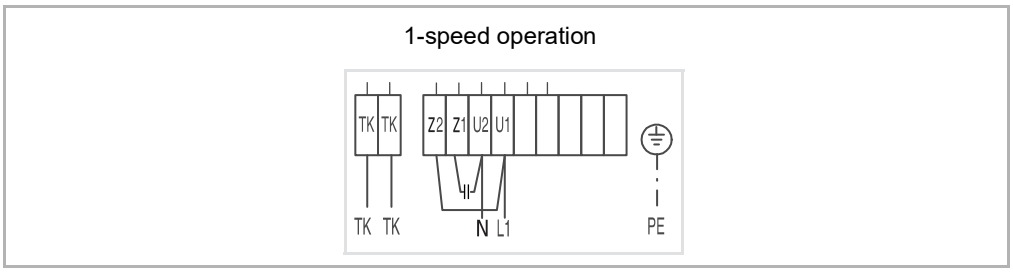


Fig. 6-7: Wiring diagram – 1-stage operation

6.6 1-speed EC-motor 1 x 230 V, 50 Hz (electric motor designation Y) wiring diagram

– motor operation contact
– operating voltage: 1 x 230 V
– with control unit MC 4
– control voltage: 1.25 V to 10 V
– power supply line: 2 + PE = 3-core cable
– shielded line: 5-core cable

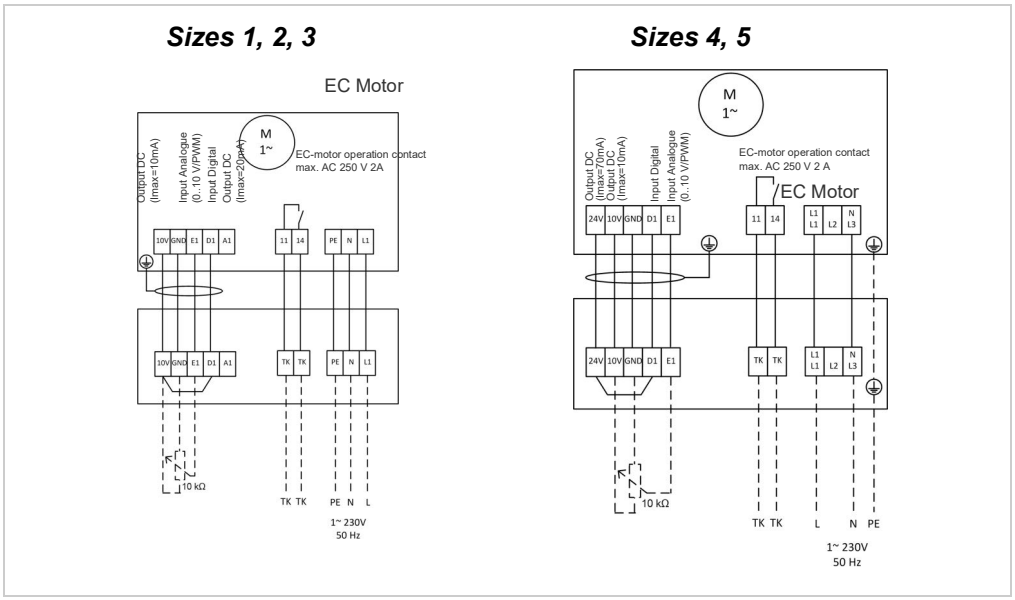


Fig. 6-8: Wiring diagram - stepless operation (EC-motor Y)

6.7 3-speed stepless EC-motor 3 x 400 V, 50 Hz (electric motor designation Z) wiring diagram

- motor operation contact
- operating voltage: 3 x 400 V
- with control unit MC 4
- power supply line: 3 + PE = 4-core cable
- shielded line: 5-core cable

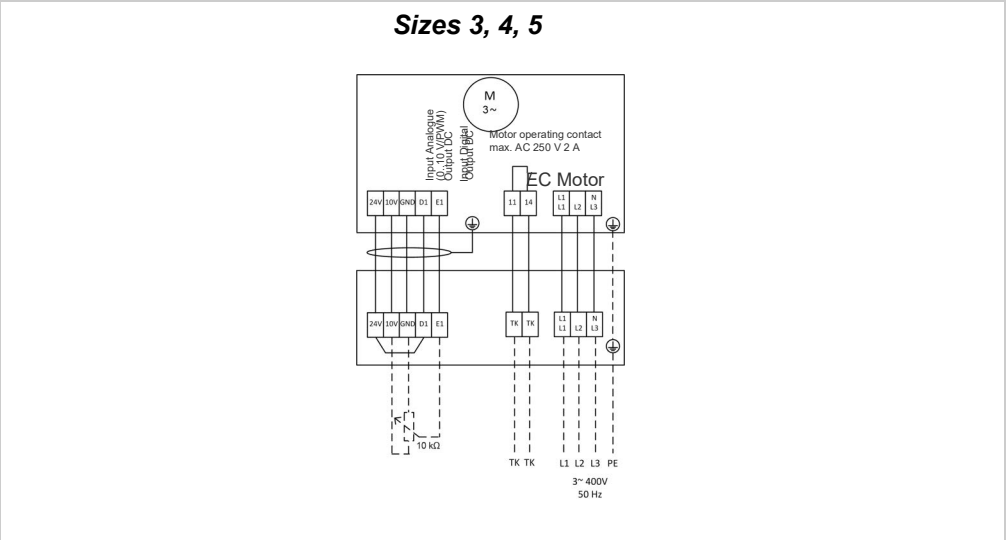


Fig. 6-9: Wiring diagram - stepless operation (EC-motor Z)

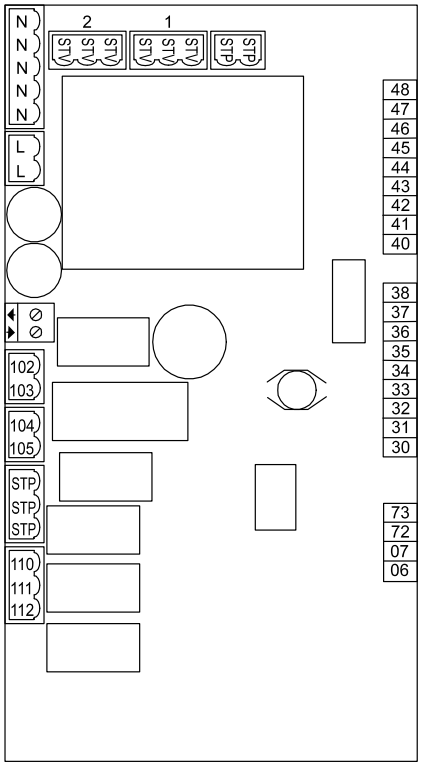
6.8 Overview of MATRIX printed circuit boards

MATRIX PCBs are installed in a steel electrical enclosure. The following overview describes the various types of control board. To make the necessary connections, the following board diagrams indicate the relevant controller types. The controller type (e.g. MATRIX 3001) is indicated in a wiring diagram on the inside of the electrical enclosure cover or on the PCB.

Each component to be connected always includes a table with information as to whether this component can be connected to the controller supplied.

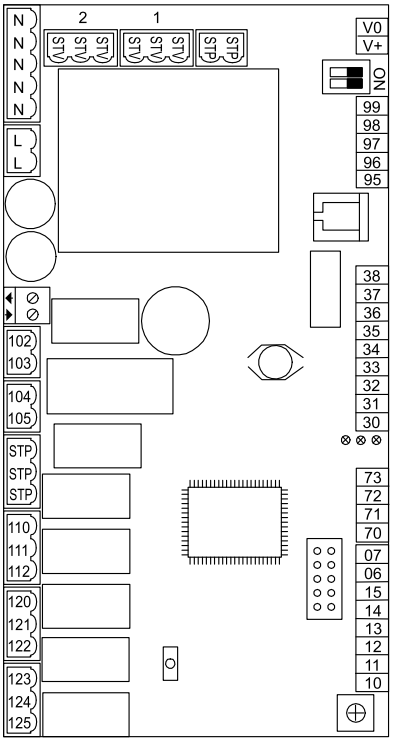
6.8.1 MATRIX 2001 and MATRIX 3001 control system PCB

MATRIX	
2001	3001
✓	



- Power supply connection
- Controller connection
- Connection of other units with MATRIX 200#
- External room temperature sensor

MATRIX	
2001	3001
	✓

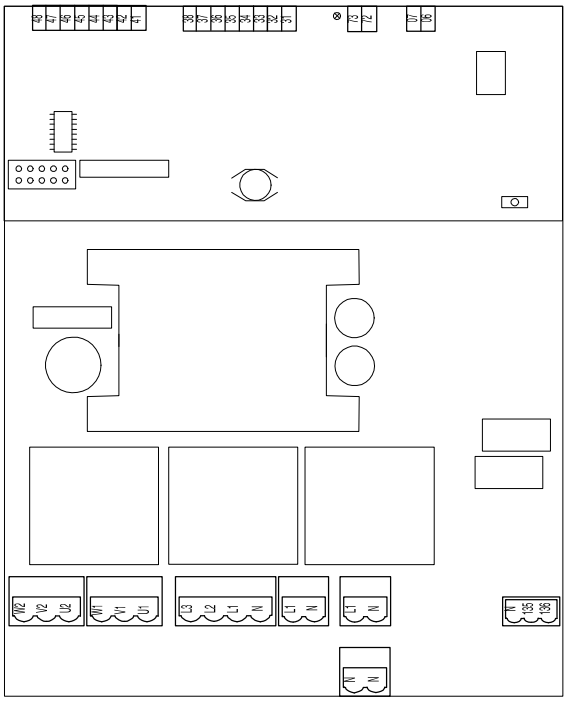


- Power supply connection
- Secondary louvre connection
- Controller connection
- Connection of other units with MATRIX 200#/200#
- Contact inlet medium temperature sensor
- External room temperature sensor
- Supply air temperature sensor
- Operation status and fault indication outputs
- External control input

Fig. 6-10: MATRIX 2001 and MATRIX 3001 controller type

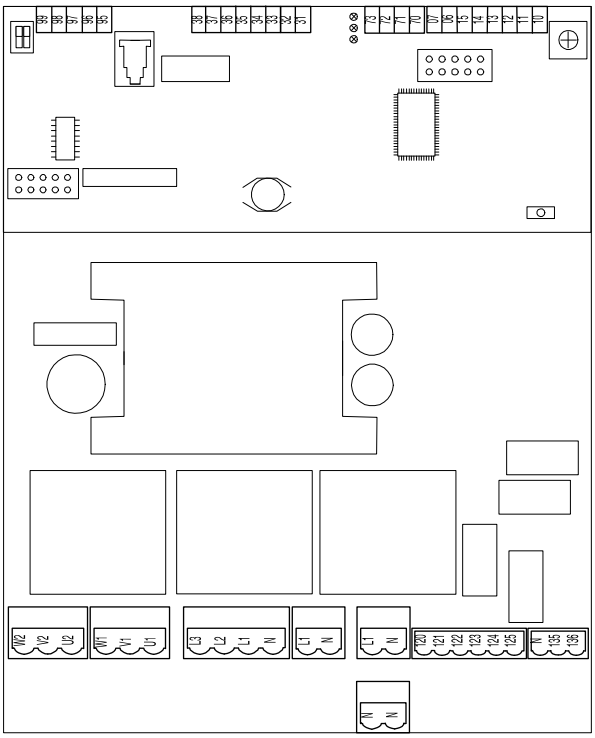
6.8.2 MATRIX 2002 and MATRIX 3002 control system PCB

MATRIX			
2002	**3002**	**4002**	**4002+IO**
✓			



- Power supply connection
- Secondary louvre connection (in combination with MATRIX 3000)
- Controller connection
- Connection of other units with MATRIX 200#
- External room temperature sensor

MATRIX			
2002	**3002**	**4002**	**4002+IO**
	✓		

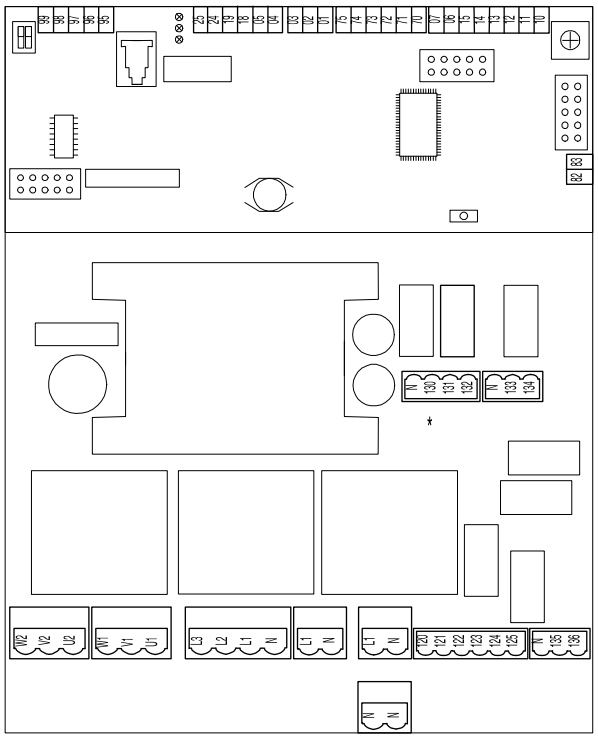


- Power supply connection
- Secondary louvre connection
- Controller connection
- Connection of other units with MATRIX 200#/200#
- Contact inlet medium temperature sensor
- External room temperature sensor
- Supply air temperature sensor
- Operation status and fault indication outputs
- External control input

Fig. 6-11: MATRIX 2002 and MATRIX 3002 controller type

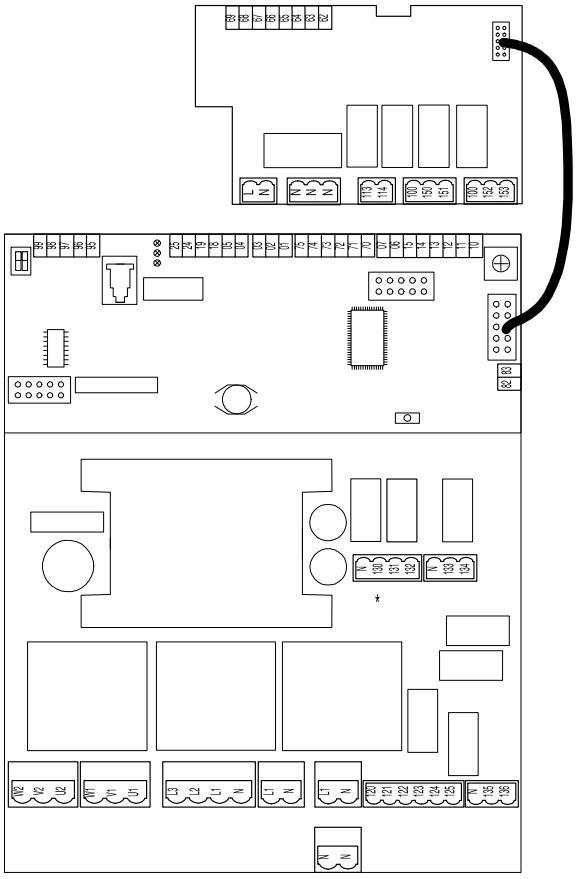
6.8.3 MATRIX 4002 and MATRIX 4002+IO control system PCB

MATRIX			
2002	**3002**	**4002**	**4002+IO**
		✓	



- Power supply connection
- Secondary louvre connection
- Mixing damper connection
- Controller connection
- Connection of other units with MATRIX 300#/400#
- Contact inlet medium temperature sensor
- External room temperature sensor
- External outdoor temperature sensor
- Supply air temperature sensor
- Operation status and fault indication outputs
- External control input
- External exhaust fan

MATRIX			
2002	**3002**	**4002**	**4002+IO**
			✓

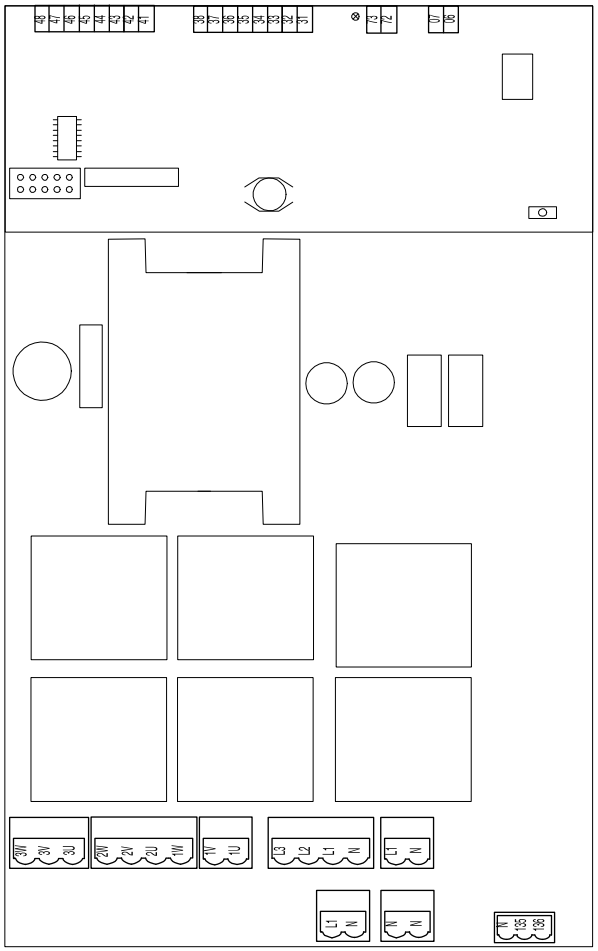


- Power supply connection
- Secondary louvre connection
- Mixing damper connection
- Controller connection
- Connection of other units with MATRIX 200#/300#
- Contact inlet medium temperature sensor
- External room temperature sensor
- Supply air temperature sensor
- Operation status and fault indication outputs
- External control input
- External exhaust fan
- IO-board external control inputs
- control system demand - heating or cooling operation (pot. - free indication)

Fig. 6-12: MATRIX 4002 and MATRIX 4002+IO controller type

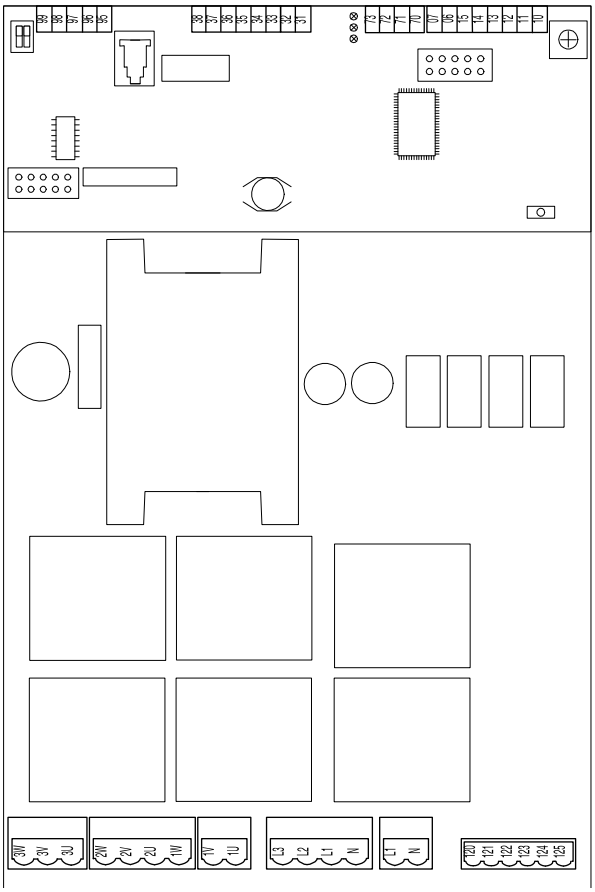
6.8.4 MATRIX 2003 and MATRIX 3003 control system PCB

MATRIX			
2003	3003	4003	4003+IO
✓			



- Power supply connection
- Secondary louvre connection (in combination with MATRIX 3000)
- Controller connection
- Connection of other units with MATRIX 200#
- External room temperature sensor

MATRIX			
2003	3003	4003	4003+IO
	✓		

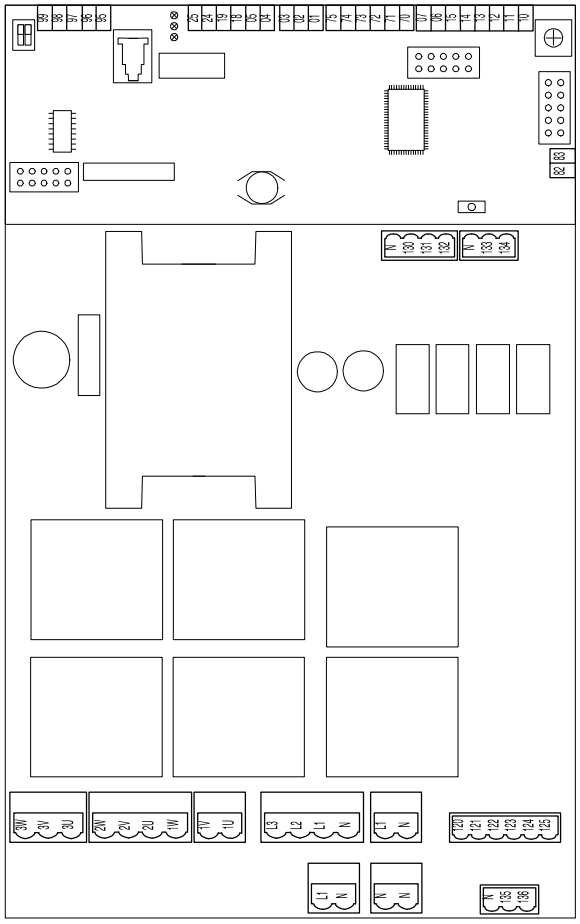


- Power supply connection
- Secondary louvre connection
- Controller connection
- Connection of additional units with MATRIX 200#/300#
- Contact inlet medium temperature sensor
- External room temperature sensor
- Supply air temperature sensor
- Operation status and fault indication outputs
- External control input

Fig. 6-13: MATRIX 2003 and MATRIX 3003 controller type

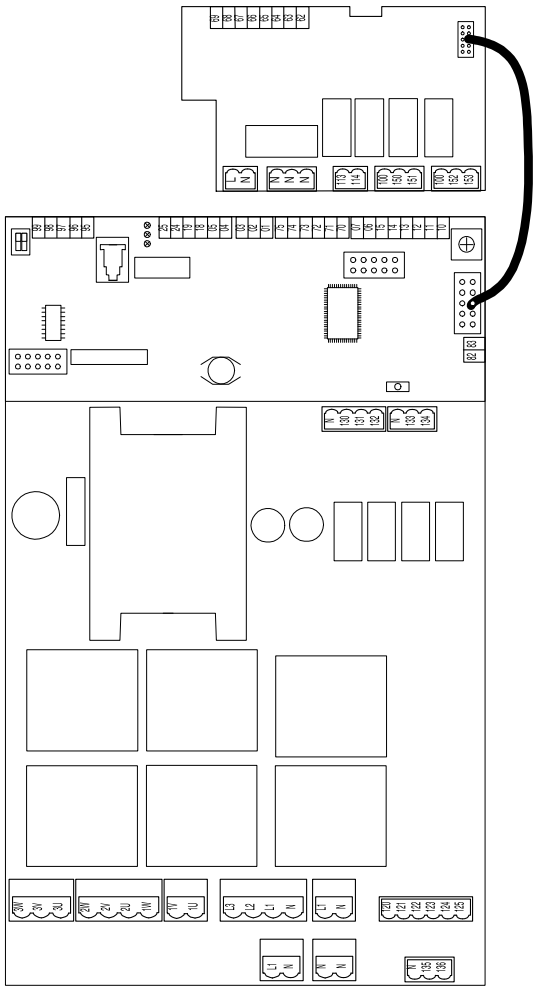
6.8.5 MATRIX 4003 and MATRIX 4003+IO control system PCB

MATRIX			
2003	3003	4003	4003+IO
		✓	



- Power supply connection
- Secondary louvre connection
- Mixing damper connection
- Controller connection
- Connection of additional units with MATRIX 300#/400#
- Contact inlet medium temperature sensor
- External room temperature sensor
- External outdoor temperature sensor
- Supply air temperature sensor
- Operation status and fault indication outputs
- External control input
- External exhaust fan

MATRIX			
2003	3003	4003	4003+IO
			✓

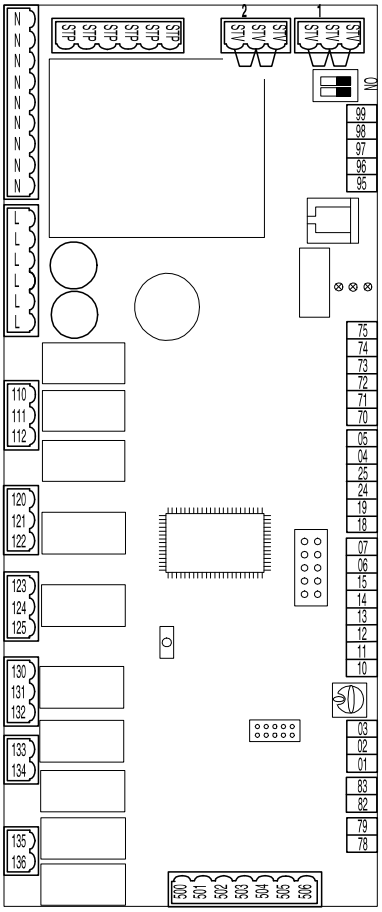


- Power supply connection
- Secondary louvre connection
- Mixing damper connection
- Controller connection
- Connection of additional units with MATRIX 300#/400#
- Contact inlet medium temperature sensor
- External room temperature sensor
- External outdoor temperature sensor
- Supply air temperature sensor
- Operation status and fault indication outputs
- External control input
- External exhaust fan
- IO-board external control inputs
- control system demand - heating or cooling operation (pot. - free indication)

Fig. 6-14: MATRIX 4003 and MATRIX 4004+IO controller type

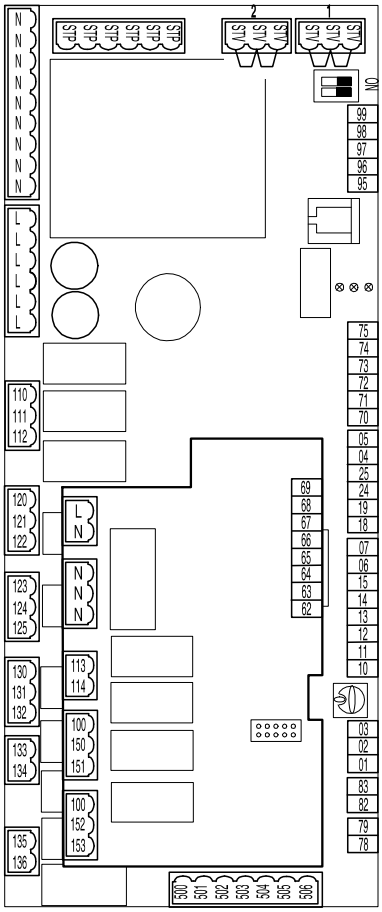
6.8.6 MATRIX 4004 and MATRIX 4004+IO control system PCB

MATRIX	
4004	4004+IO
✓	



- Power supply connection
- Secondary louvre connection
- Mixing damper connection
- Controller connection
- Connection of other units with MATRIX 300#/400#
- Contact inlet medium temperature sensor
- External room temperature sensor
- External outdoor temperature sensor
- Supply air temperature sensor
- Operation status and fault indication outputs
- External control input
- External exhaust fan

MATRIX	
4004	4004+IO
	✓



- Power supply connection
- Secondary louvre connection
- External valve
- Mixing damper connection
- Controller connection
- Connection of other units with MATRIX 300#/400#
- Contact inlet medium temperature sensor
- External room temperature sensor
- External outdoor temperature sensor
- Supply air temperature sensor
- Operation status and fault indication outputs
- External control input
- External exhaust fan
- IO-board external control inputs
- control system demand - heating or cooling operation (pot. - free indication)

Fig. 6-15: MATRIX 4004 and MATRIX 4004+IO controller type

6.9 Controller/room temperature sensor location

Controllers with an IP54 protection rating do not have an integrated room temperature sensor. Such controllers are supplied with an external room temperature sensor.

Attention!
The installation site of the room temperature sensor is crucial for the precise control of room temperature. Consequently, do not install the sensor (see Fig. 6-16):

– next to doors, windows or pass-through windows etc. as intense air movement distorts readings,
– on cold or warm walls such as external walls or chimney as wall temperature distorts readings,
– on drapes or curtains as insulating air layers distort readings,
– In the immediate vicinity of the unit's outlet air vent grille as the temperature of discharged air distorts readings.

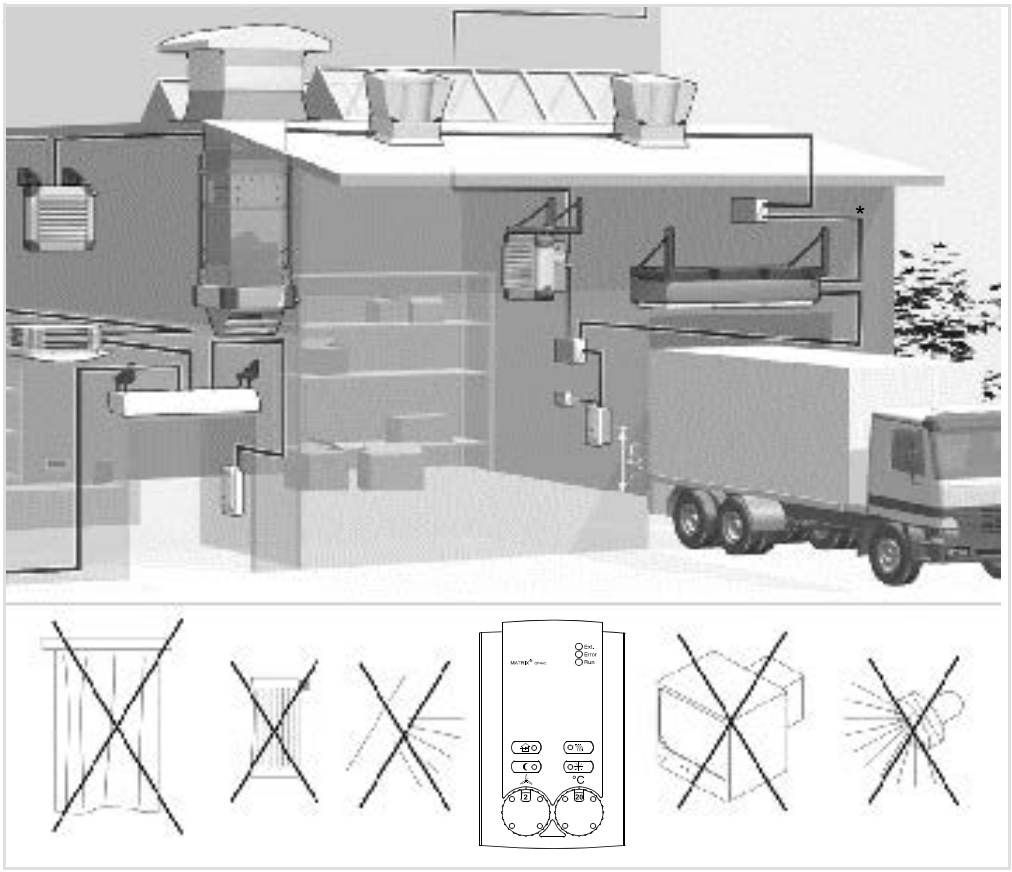


Fig. 6-16: Room temperature sensor/controller installation

For information on mounting the controller on the wall see the controller's manual. This will also provide the relevant for drilling holes in the wall.

6.9.1 Controller installation

Attention!
In this case an external room temperature sensor is necessary.

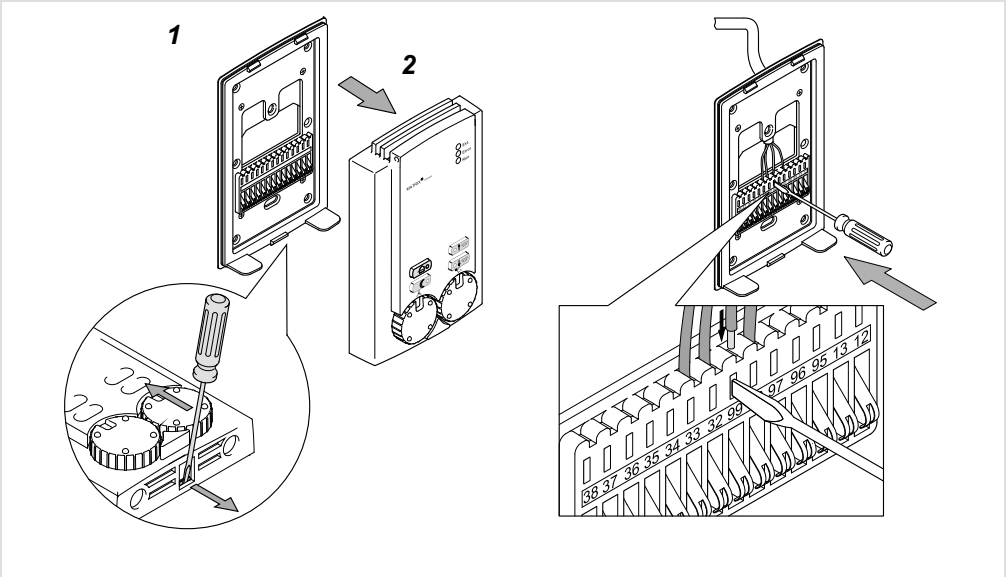


Fig. 6-17: Opening the controller

Pos. 1: Mounting plate
Pos. 2: Top section

- Using a screwdriver remove the top section from the rear of the controller as shown in Fig. 6-17 and remove the top part of the mounting plate upwards.

Attention!
Depending on the type of the MATRIX control system various cables with a varied number of cores are used.
For the relevant data on connections and cable types see the Chapter “electrical connections with MATRIX” on page 48.
Install low-voltage and network cables so that they are at least 150mm apart.

- Pull the cable connecting the unit’s electrical enclosure with the controller through the hole in the mounting plate (see Fig. 6-17) and connect all its cores to terminals.
- First loosen the terminals using a suitable screwdriver (see Fig. 6-17) and connect the respective cores to the terminal openings provided. The terminal spring will secure the cable in place once you remove the screwdriver.

6.10 Electrical connections with MATRIX

6.10.1 Connecting the mains power for units with 230 V power supply

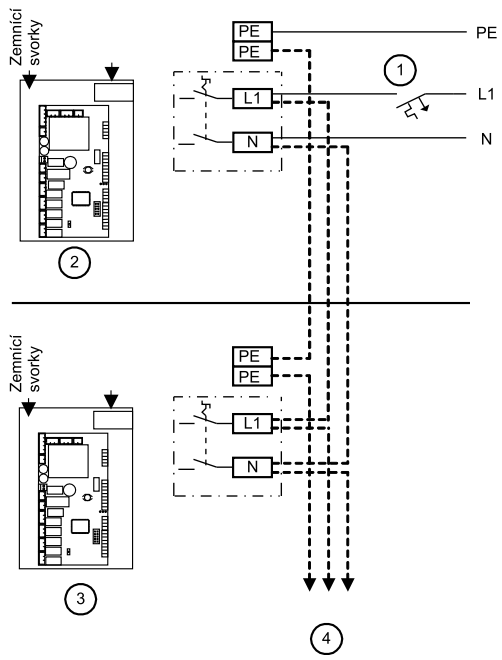


Fig. 6-18: Mains power connection

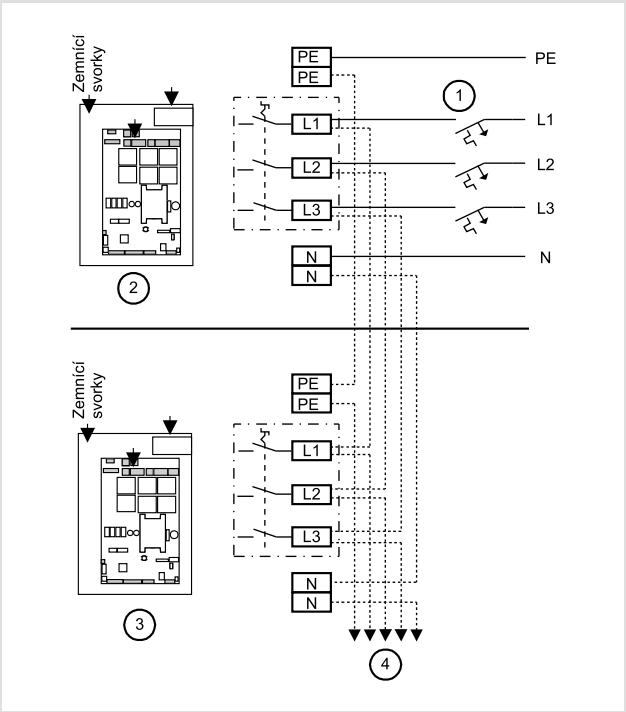
MATRIX			
2001	**3001**	**4004**	**4004+IO**
✓	✓	✓	✓

Pos. 1: Power supply 230 V AC/50 Hz, protection on-site max. B 10 A
Pos. 2: Connecting to the 1st unit; L1, N to the fan switch
Pos. 3: Connecting to the 2nd unit; L1, N to the fan switch
Pos. 4: To other units

- Connect the mains power as indicated in the wiring diagram.

Attention!
The first unit can be used to provide power supply for other units (see Fig. 6-18, pos. 3 and pos. 4). At the same time, the total power input of the units must not exceed the value indicated in Table 6-1.
If necessary, another power supply source must be used. Double installation is permitted for power supply terminals.

6.10.2 Connecting the mains power for units with 400 V power supply



MATRIX			
2002	**3002**	**4002**	**4002+IO**
2003	**3003**	**4003**	**4003+IO**
✓	✓	✓	✓

Pos. 1: Power supply 400 V AC/50 Hz, protection on-site max. B 16 A
Pos. 2: Connecting to the 1st unit; L1 , L1, L3 to the fan switch
Pos. 3: Connecting to the 2nd unit; L1 , L1, L3 to the fan switch
Pos. 4: To other units

- Connect the mains power as indicated in the wiring diagram.

Fig. 6-19: Mains power connection

Attention!
The first unit can be used to provide power supply for other units (see Fig. 6-19, pos. 3 and pos. 4). At the same time, the total power input of the units must not exceed the value indicated in Table 6-1.
If necessary, another power supply source must be used. Power supply terminals can have
double connection.

6.10.3 Connecting control lines

Attention!
To connect the control lines use the following cables:
– Multi-core control cable 0.5 mm^2 with Cu shielding; in FläktGroup units this is connected to the shielding terminal in such a way so as to guarantee the best possible electrical contact.
– The shielding terminal should be connected to the frame in a way that maximizes the contact surface area!
– The maximum total length of the line must not exceed 50 m.

We do not recommend cabling such as multi-core 0.5 mm^2 with Al shielding.

MATRIX			
200 #	**300 #**	**400 #**	**400#+IO**
✓			

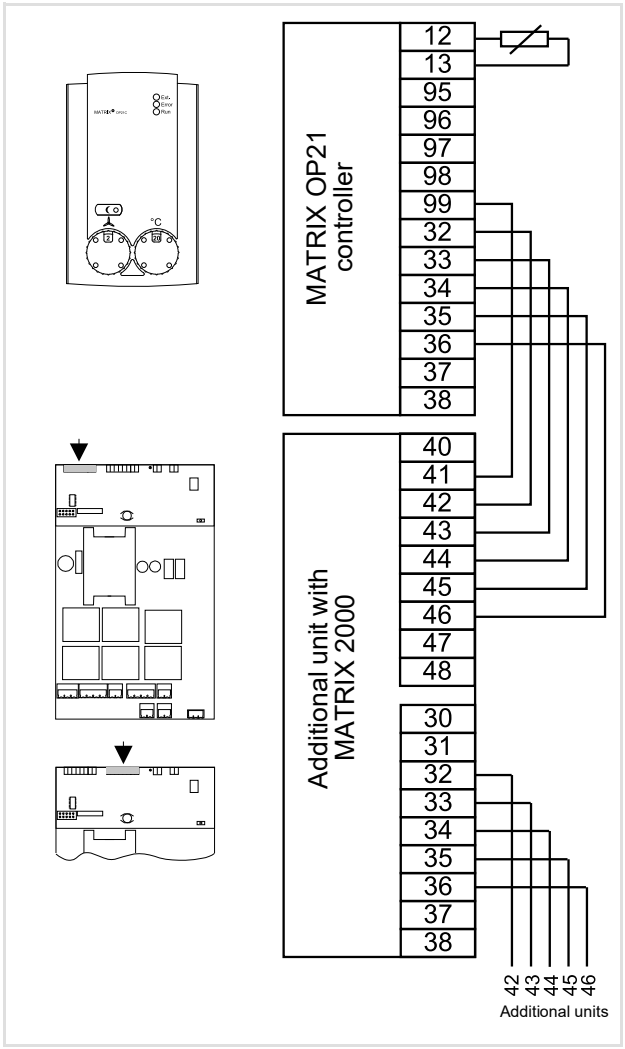


Fig. 6-20: Controller-to-heating unit connection

Controller - heating unit - additional unit connection (without valve control)

With MATRIX OP21 controllers it is only possible to operate units with MATRIX 200# controls. Up to 16 heating units may be connected to one OP21.

- Connect the control lines according to the wiring diagram supplied.

– Control lines: see the note at the bottom of page 49.

MATRIX			
200 #	300 #	400 #	400#+IO
✓	✓		

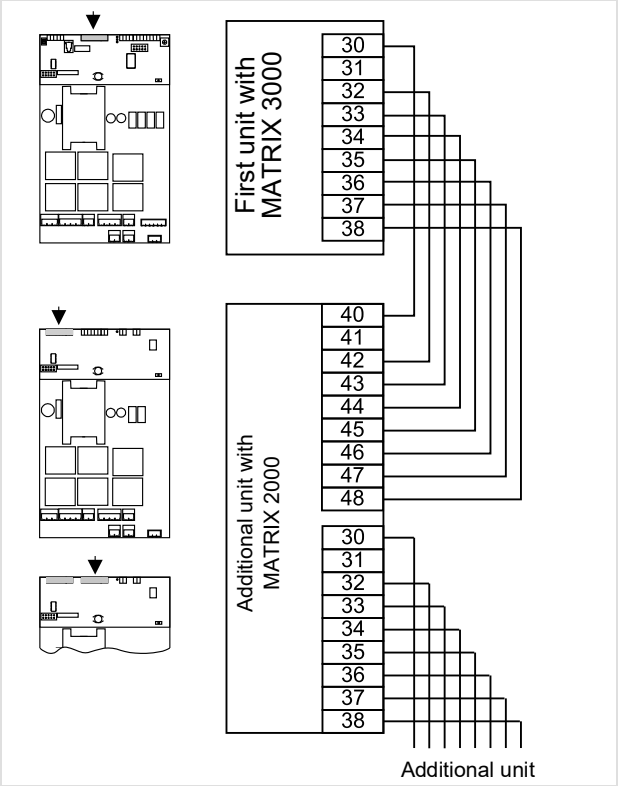


Fig. 6-21: First unit - additional units connection

First unit with MATRIX 300# – additional unit with MATRIX 200# connection

Units MATRIX 300# control systems can only be operated with units with MATRIX 200# control systems.

- Connect the control lines according to the wiring diagram supplied.

– Control lines: see the note at the bottom of page 49.

6.10.4 Bus system connection

MATRIX			
200 #	300 #	400 #	400#+IO
✓			

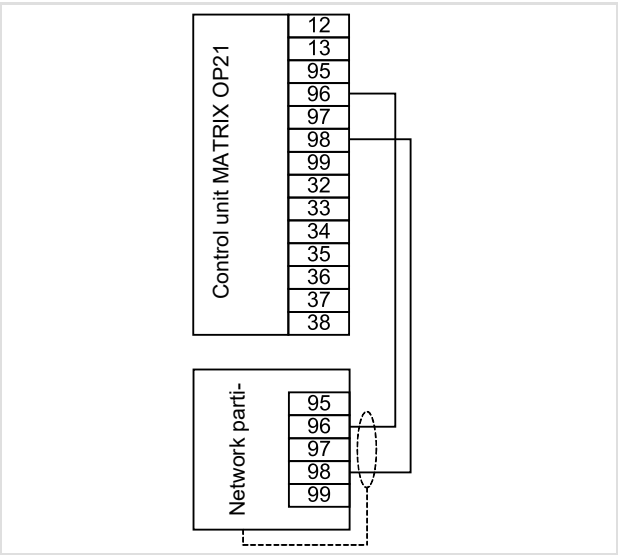


Fig. 6-22: Controller - network participant connection

Controller - network participant connection

When connecting a MATRIX OP21 controller to a MATRIX.NET network it is necessary to use two-core bus lines.

- Connect the bus lines according to the wiring diagram supplied.

– Recommended bus bar cable:
2 x 2 x ... mm^2 (see the note at the bottom of page 52)

MATRIX			
200 #	**300 #**	**400 #**	**400#+IO**
	✓		

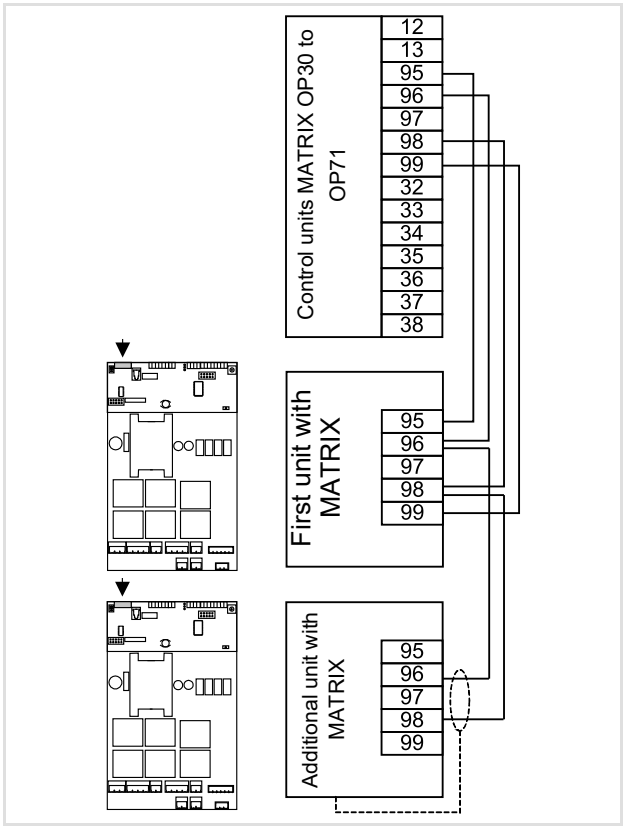


Fig. 6-23: Controller-to-heating unit connection

Controller-to-heating unit connection

With MATRIX OP3#/44/5# controllers it is only possible to operate units with MATRIX 3000/ 4000 controls.

- Connect the bus lines according to the wiring diagram supplied.

– Recommended bus cable:
2 x 2 x ... mm^2 (see the note at the bottom of page 52)

Attention!
For connection use only shielded data cables according to CSN EN 50170 with twisted-pair cores.

6.10.5 Connecting an outdoor temperature sensor (optional)

MATRIX			
200 #	300 #	400 #	400#+IO
		✓	✓

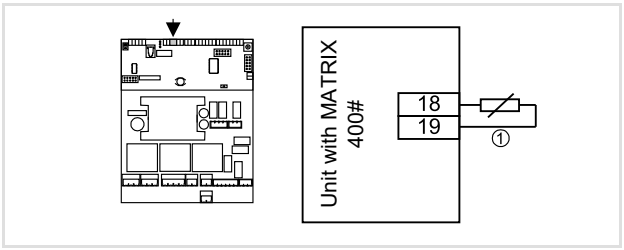


Fig. 6-24: Connecting an outdoor temperature sensor

Pos. 1: Connecting cable (see the note on page 49)

- Connect the outdoor temperature sensor according to the wiring diagram supplied.

6.10.6 Connecting a contact medium inlet sensor (optional)

MATRIX			
200 #	300 #	400 #	400#+IO
	✓	✓	✓

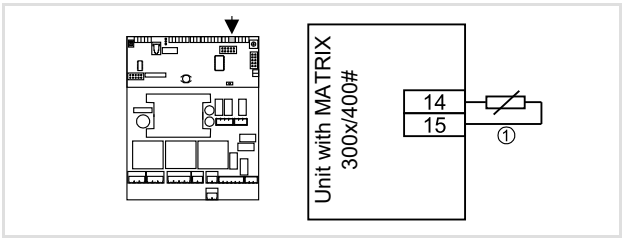


Fig. 6-25: Connecting a contact medium inlet sensor

Pos. 1: Connecting cable (see the note on page 49)

- Connect the contact inlet medium temperature sensor according to the wiring diagram supplied.

6.10.7 Connecting a room temperature sensor

MATRIX			
200 #	300 #	400 #	400#+IO
✓	✓	✓	✓

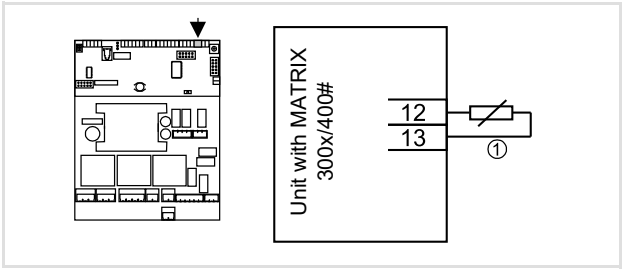


Fig. 6-26: Connecting a room temperature sensor

Pos. 1: Connecting cable (see the note on page 49)

- Connect the room temperature sensor according to the wiring diagram supplied.

Connection can be carried out

– in MATRIX 200# on the OP21C controller (terminals 12-13)
– in MATRIX 300#/400# directly on the controller or the OP3#/OP44/OP5# controller.

6.10.8 Connecting a frost protection sensor

MATRIX			
200 #	300 #	400 #	400#+IO
		✓	✓

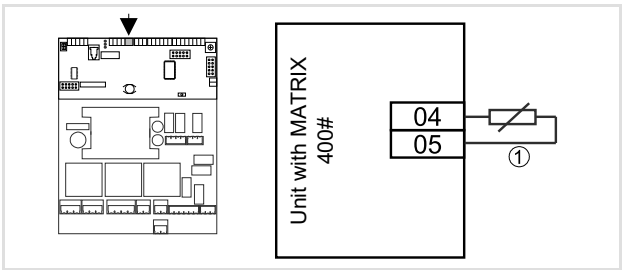


Fig. 6-27: Connecting a frost protection sensor

Pos. 1: Connecting cable (see the note on page 49)

- Connect the frost protection sensor according to the wiring diagram supplied.

6.10.9 Connecting a supply air temperature sensor

MATRIX			
200 #	300 #	400 #	400#+IO
	✓	✓	✓

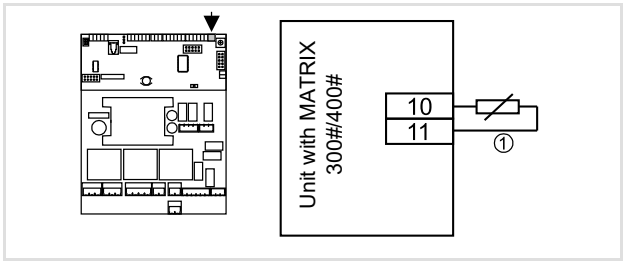


Fig. 6-28: Connecting a supply air temperature sensor

Pos. 1: Connecting cable (see the note on page 49)

- Connect the supply air temperature sensor according to the wiring diagram supplied.

Attention!
Connect the shielding of sensor cables to the frame using a shielding terminal, maximizing the contact surface.

6.10.10 Connecting an air quality sensor (CO_2 sensor)

MATRIX			
200 #	300 #	400 #	400#+IO
			✓

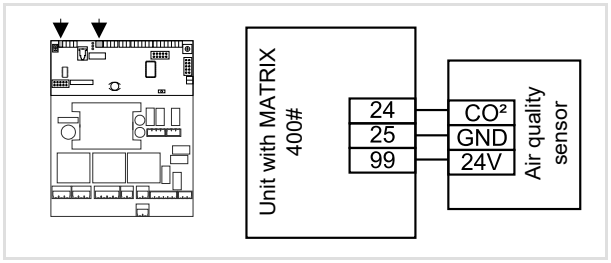


Fig. 6-29: Connecting an air quality sensor

- Connect the 903WRF04CO2V air quality sensor according to the wiring diagram supplied.

6.10.11 Connecting operation status and fault indication

MATRIX			
2001	3001	4001	4001+IO
	✓	✓	✓

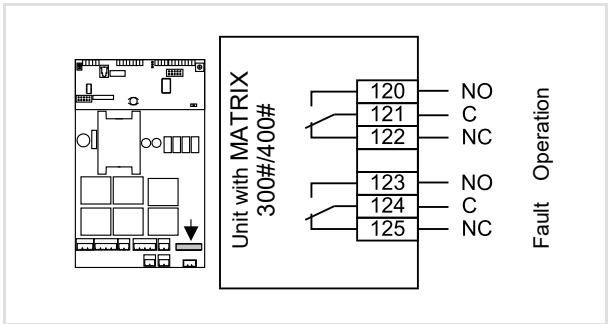


Fig. 6-30: Connecting operation status and fault indication

Controllers provide an option to read operation and fault indication messages via dry contacts. Contact load at 230 V AC is max. 4 A resistive/2 A inductive.

- Carry out connection according to the wiring diagram supplied.

Operation:
Closed contact on terminals 120 -121.

Fault:
Closed contact on terminals 124 - 125.

6.10.12 Connecting functional inputs and outputs

MATRIX			
2001	3001	4001	4001+IO
	✓	✓	✓

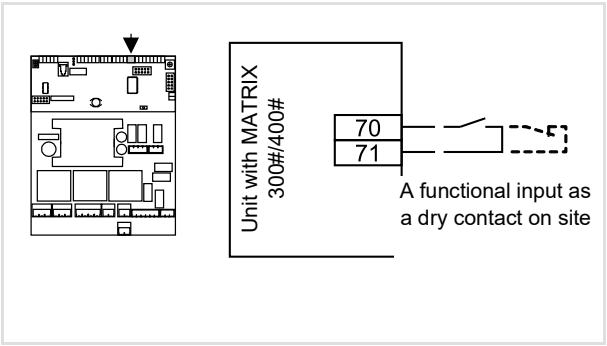


Fig. 6-31: Connection of a functional input

A functional input may be connected to provide various functions depending on the version.

To activate a function this contact must be:
– closed in economy mode,
– open when a unit with frost protection is off
– closed in a door contact

To change the function MATRIX.PC service software is necessary.

- Carry out connection according to the wiring diagram supplied.

Loop resistance must not exceed 500 Ω.

MATRIX			
2001	3001	4001	4001+IO
			✓

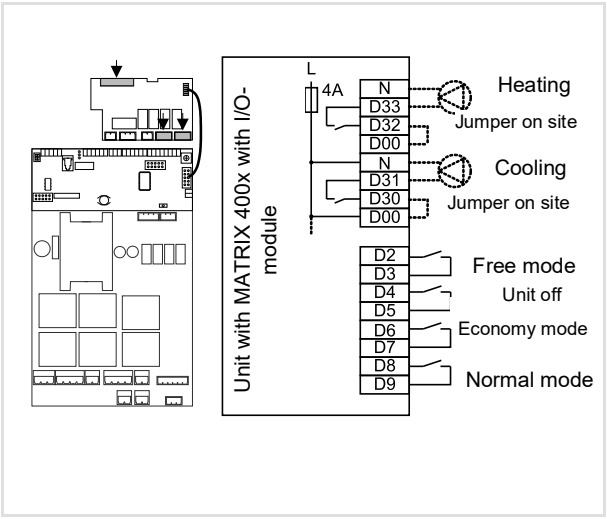


Fig. 6-32: Connecting functional inputs and outputs

Functional inputs

Functional inputs may be assigned various functions.

– Normal mode
– Economy mode
– Free mode (the function of these modes may be programmed using MATRIX.PC service software)
– Switching off the unit (without room frost protection)

Functional outputs

The control system has two functional outputs:

– Heating demand (max. 230 V/4 A ohmic/2A inductive)
– Cooling demand (max. 230 V/4 A ohmic/2A inductive)

If jumpers are not installed between D00-D30 and D00-D32, outputs D30-D31 and D32-D33 cannot be used as dry contact outputs (max. 2 A).

– Internal protection for all outputs of the I/O module is 4A.

- Carry out connection according to the wiring diagram supplied.

Loop resistance must not exceed 500 Ω (max. 24 V).

6.10.13 Secondary louvre connection

MATRIX			
200 #	**3001**	**400 #**	**400#+IO**
	✓		

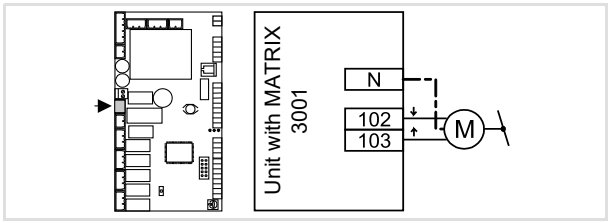


Fig. 6-33: Secondary louvre connection

- Connect secondary louvre according to the wiring diagram supplied.

MATRIX			
2002	**3002**	**4002**	**4002+IO**
2003	**3003**	**4003**	**4003+IO**
		4004	**4004+IO**
	✓	✓	✓

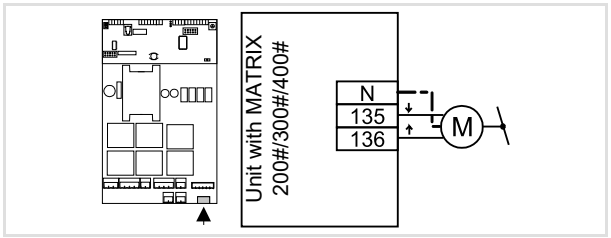


Fig. 6-34: Secondary louvre connection

- Connect secondary louvre according to the wiring diagram supplied.

6.10.14 Connecting unit valves

MATRIX			
200 #	**300 #**	**400 #**	**400#+IO**
			✓

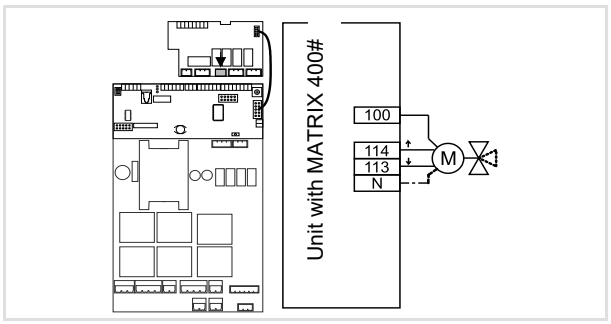


Fig. 6-35: Connecting unit valves

- Connect valve actuators according to the wiring diagram supplied.
- The terminal is on the IO module.
- Connect an external valve without permanent 230 V power supply (terminal 100) to terminals 113-114-N.
- Valve opens - terminal 114
  Valve closes - terminal 113

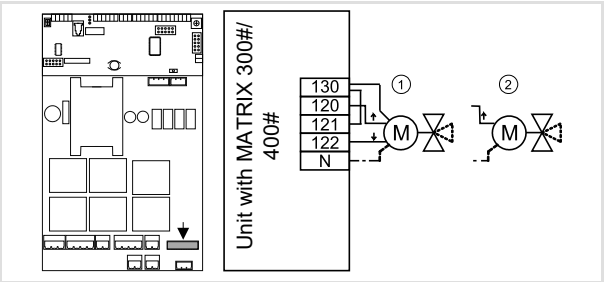
6.10.15 Valve connection via a valve module

MATRIX			
200 #	**300 #**	**400 #**	**400#+IO**
✓	✓	✓	✓

Attention!
Information on connecting the valve actuator to the MATRIX.V valve module is provided in the “Global modules” manual.

6.10.16 Shut-off valve connection

MATRIX			
200 #	300 #	400 #	400#+IO
	✓	✓	✓



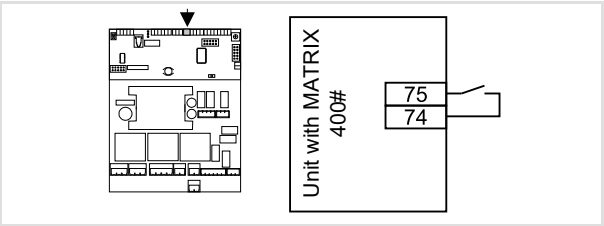
1 = 230 V 934### series valve
2 = 230 V return spring valve

- Connect valve actuators according to the wiring diagram supplied.
- Connect an external valve without permanent 230 V power supply (terminal 130) to terminals 120-122-N.
- When connecting a 934### series valve, a jumper must be installed between terminals 121-130.
- Valve opens - terminal 120
  Valve closes - terminal 122

Fig. 6-36: Shut-off valve connection

6.10.17 Differential pressure switch connection

MATRIX			
200 #	300 #	400 #	400#+IO
		✓	✓

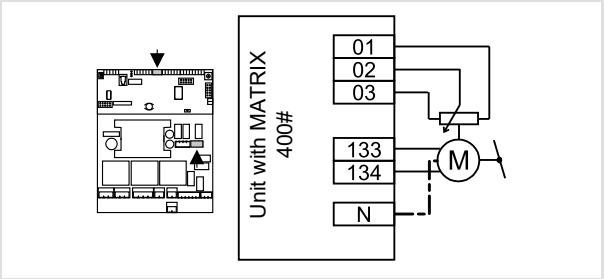


- Connect the differential pressure switch according to the wiring diagram (when the contact is open, filter contamination is within permitted limits)

Fig. 6-37: Differential pressure switch connection

6.10.18 Mixing chamber damper connection

MATRIX			
200 #	300 #	400 #	400#+IO
		✓	✓



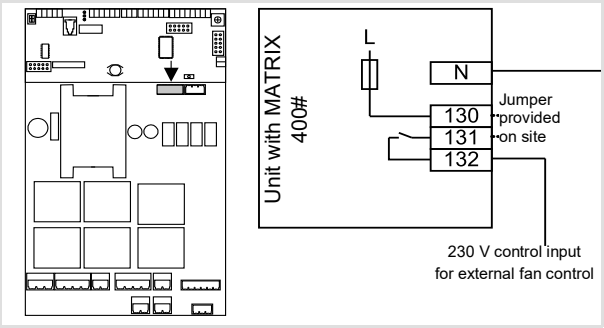
- Connect the mixing chamber damper according to the wiring diagram supplied.

– Terminal 133 - closed.
– Terminal 134 - open.
– Terminal 02 - potentiometer in intermediate position

Fig. 6-38: Mixing chamber damper connection

6.10.19 Exhaust fan connection

MATRIX			
200 #	300 #	400 #	400#+IO
		✓	✓



An exhaust fan can be connected in ventilation mode.

– Following the installation of a jumper between terminals 130 and 131, terminal 132 has 230 V power supply.
– Relay contact max. 4 A ohmic/2 A induction.
– Internal protection of all control outputs is 4 A.

- Connect the exhaust fan according to the wiring diagram supplied.

Fig. 6-39: Exhaust fan connection

6.11 MATRIX.Net network and shielding connection

This chapter provides information on MATRIX.Net and the proper way of setting up a network.

MATRIX.Net is a network which can be used to connect various FläktGroup control system components to each other via a data interface (network participants). Through this data interface participants exchange information necessary for control.

Network participants may be:

– Adjustment controllers
– Controllers
– Global modules
– Controllers with display
– LON interfaces
– WBE interfaces
– service software

6.11.1 Group structure

A group consists of at least 2 and up to 20 participants (controller, 16 heating units, valve module, DV module, LON module). A group may comprise, for instance, one controller and one control system/unit. It can also consist of a LON module and a controller/unit. In units with MATRIX 3000 and MATRIX 4000 the controller may be replaced by a global module such as MATRIX.LON to make these units form a group.

Group structure in the MATRIX 2000 system

The MATRIX 2000 system makes it possible to create a group as shown in the example in Fig. 6-40.

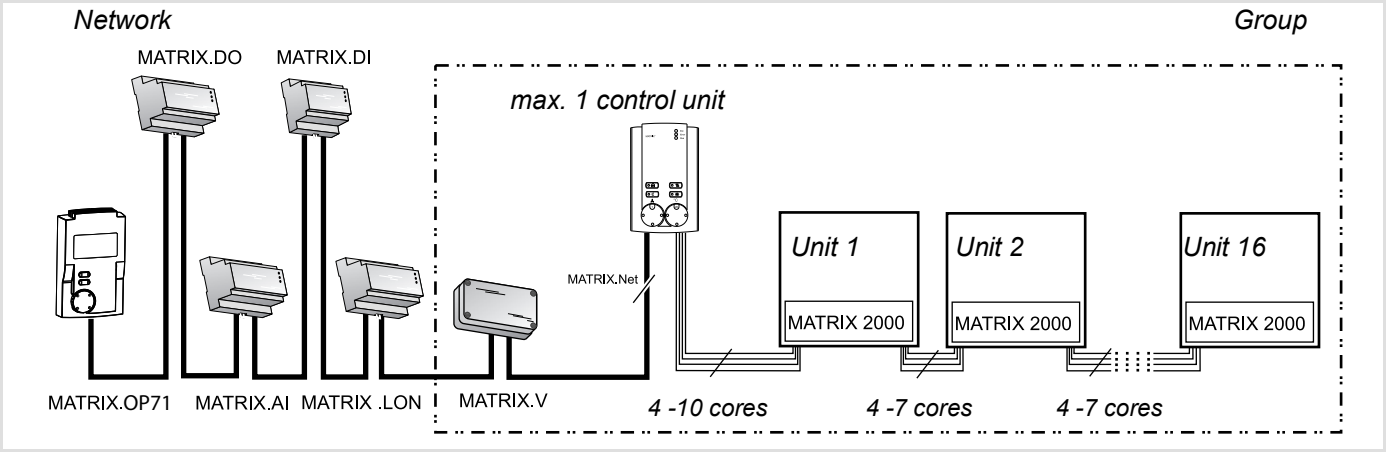


Fig. 6-40: MATRIX 2000 control system group structure

The group address is assigned using the group address switch on the controller – see Chapter “Commissioning and testing” in the “MATRIX controller” operation manual.

The assignment of modules (MATRIX.V, MATRIX.LON) in the MATRIX.V module is performed by the group address switch or, in the MATRIX.LON module, using software – see Chapter “Commissioning and testing” in this manual and in the “MATRIX.LON” operation manual.

The MATRIX.Net network is connected on the controller.

Group structure in the MATRIX 3000 system in combination with the MATRIX 2000 system

A group can be created with MATRIX 2000 and MATRIX 3000 systems. Fig. 6-41 in the example shows a network consisting of a controller, MATRIX 2000 and MATRIX 3000 systems and various global modules.

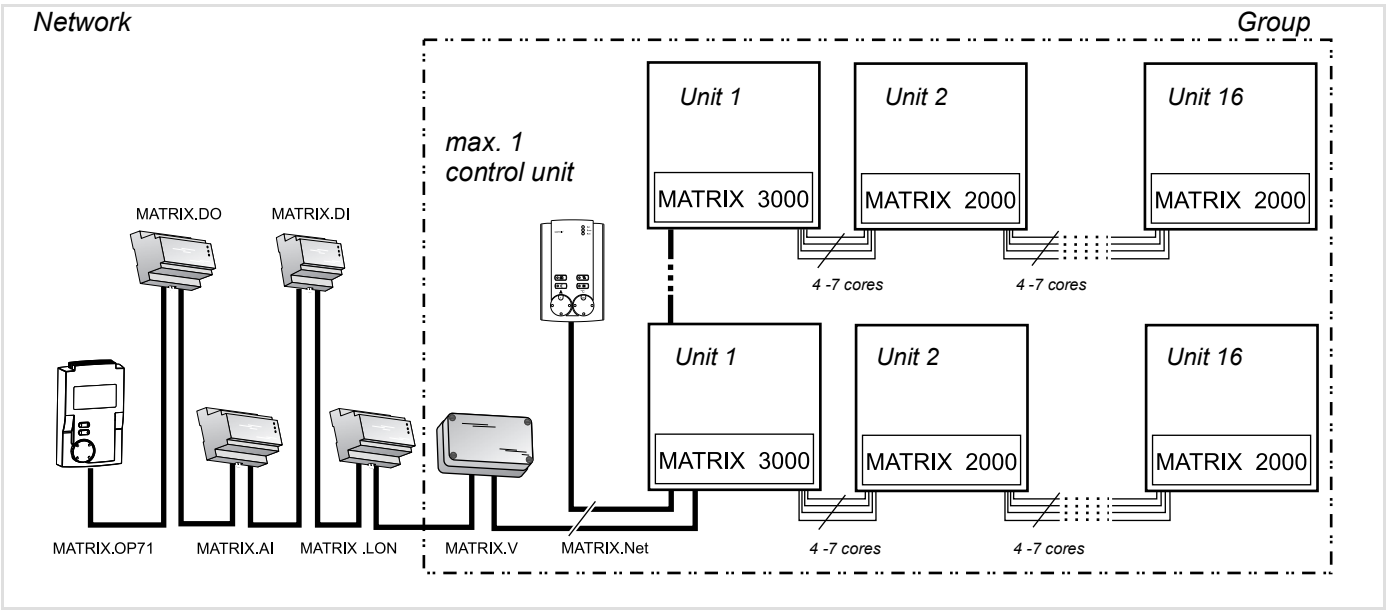


Fig. 6-41: Group structure combining MATRIX 2000 and MATRIX 3000 controllers

The group address is assigned:

– using the group address switch on the controller – see Chapter “Commissioning and testing” in the “MATRIX controller” operation manual.
– on the MATRIX 3000 controller panel - see the operation manual of the device.

The assignment of modules (MATRIX.V, MATRIX.LON) in the MATRIX.V module is performed by the group address switch or, in the MATRIX.LON module, using software – see Chapter “Commissioning and testing” in this manual and in the “MATRIX.LON” operation manual.

Units 2-16 can be arranged in any sequence.

The controller must be connected to the MATRIX 3000 control system.

With the MATRIX 3000 control system it is possible to create a group with MATRIX 2000 system components.

If global modules such as MATRIX.LON, DI, DO and AI are present and the necessary operation parameters and values are relayed via these group modules, the controller is not necessary.

Group structure with MATRIX 3000 and/or MATRIX 4000 systems

A group can be created with MATRIX 3000 and MATRIX 4000 systems. Fig. 6-42 The example shows a network consisting of a controller, MATRIX 3000 a MATRIX 4000 systems and various global modules.

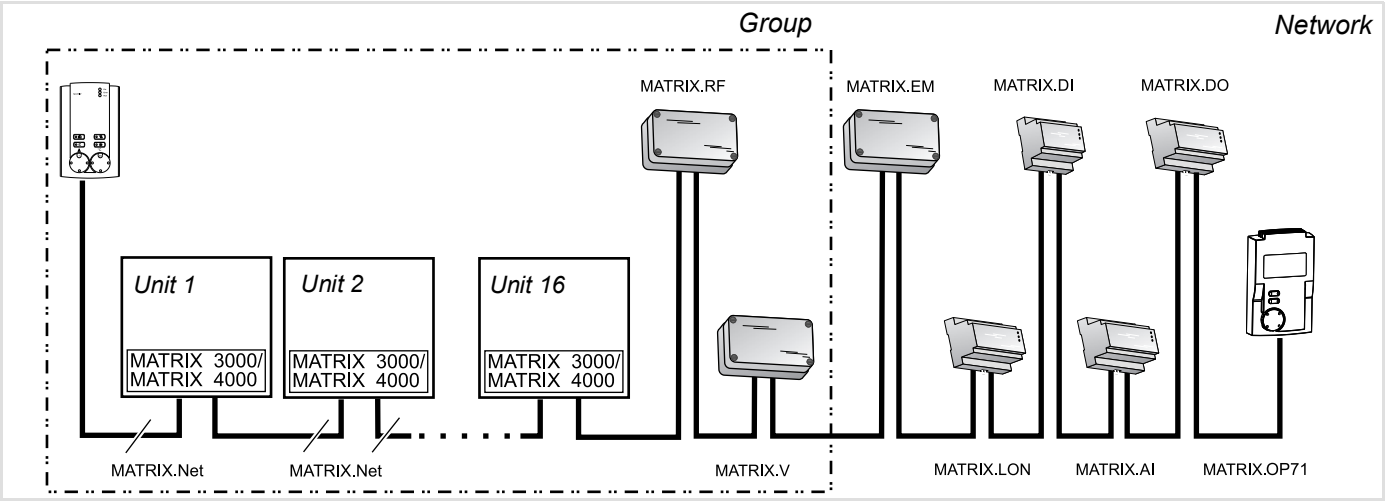


Fig. 6-42: Group structure combining MATRIX 3000 and MATRIX 4000 controller types

Controllers/units can be arranged in any desired sequence. It is also possible to use MATRIX 3000 or MATRIX 4000 systems exclusively. We recommend putting the controller in the first position in the group.

The group address is assigned:

– using the group address switch on the controller – see Chapter “Commissioning and testing” in the “MATRIX controller” operation manual.
– on the MATRIX 3000/4000 controller panel - see the operation manual of the device.

The assignment of MATRIX.LON module data is performed via LON® configuration.

MATRIX.V, MATRIX.RF and MATRIX.EM modules are assigned to this group using the group address switch; see the “Commissioning and testing” Chapter in the “MATRIX global modules“ operation manual.

Attention!
Combining units with the MATRIX 3000 system and the MATRIX 2000 system is possible in this group structure – see “Group structure with the MATRIX 3000 system in combination with the MATRIX 2000 system” on page 47. Units with the MATRIX 4000 cannot be combined with units with the MATRIX 2000 system.

6.11.2 MATRIX.Net network structure

The network can consist of one or more (up to 16) groups. Global modules can be integrated in the network later. The network structure/network topology of MATRIX.Net must be performed in a linear manner – see “Network topology” on page 62.

The maximum extent of the MATRIX.Net network is shown in Fig. 6-43.

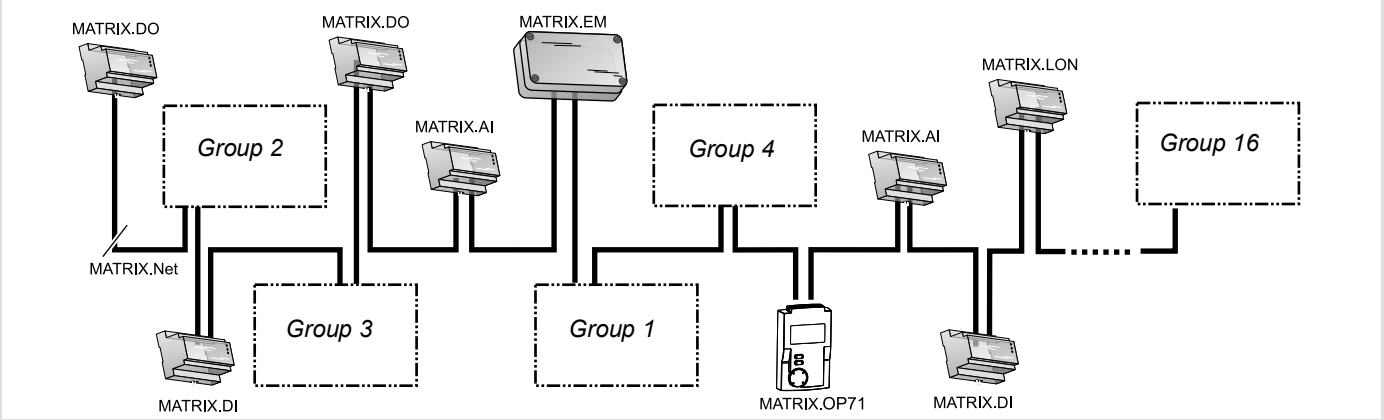


Fig. 6-43: Maximum network structure example

The maximum size network may consist of:

– Up to 16 groups of units – see “Network topology” on page 62.
– two modules with a digital input (MATRIX.DI)
– two modules with an analogue input (MATRIX.AI)
– two modules with a digital output (MATRIX.DO)
– one controller with display (MATRIX.OP71)
– exhaust air administrator (MATRIX.EM)
– up to 16 LON modules (MATRIX.LON).

Units and global modules can be arranged in any sequence. The determining factor of assigning individual units and global modules to a group is:

– the setting of the group address switch (see the “Commissioning and testing” Chapter in this operation manual)
– And the assignment of the module input and output to the group of units with MATRIX.PC service software (see Online help for service software MATRIX.PC), not the physical arrangement.

6.11.3 MATRIX.Net network topology

The MATRIX.Net system may be built in a line structure or a line structure with a branch. All units with a MATRIX system have access to this data interface.

To prevent reflections interfering with transmission the data interface must be terminated at each physical end. The related boards have integrated switch resistors to safely terminate the interface – for more information on each global module in the “Connection of MATRIX.Net” paragraph.

6.11.4 Line structure

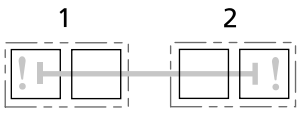


Fig. 6-44 shows a MATRIX.Net system in a line structure. For instance, in this case two groups are each in a network with one controller and global module.

In addition, the controller’s power supply through the control panel is shown (terminals 95/99).

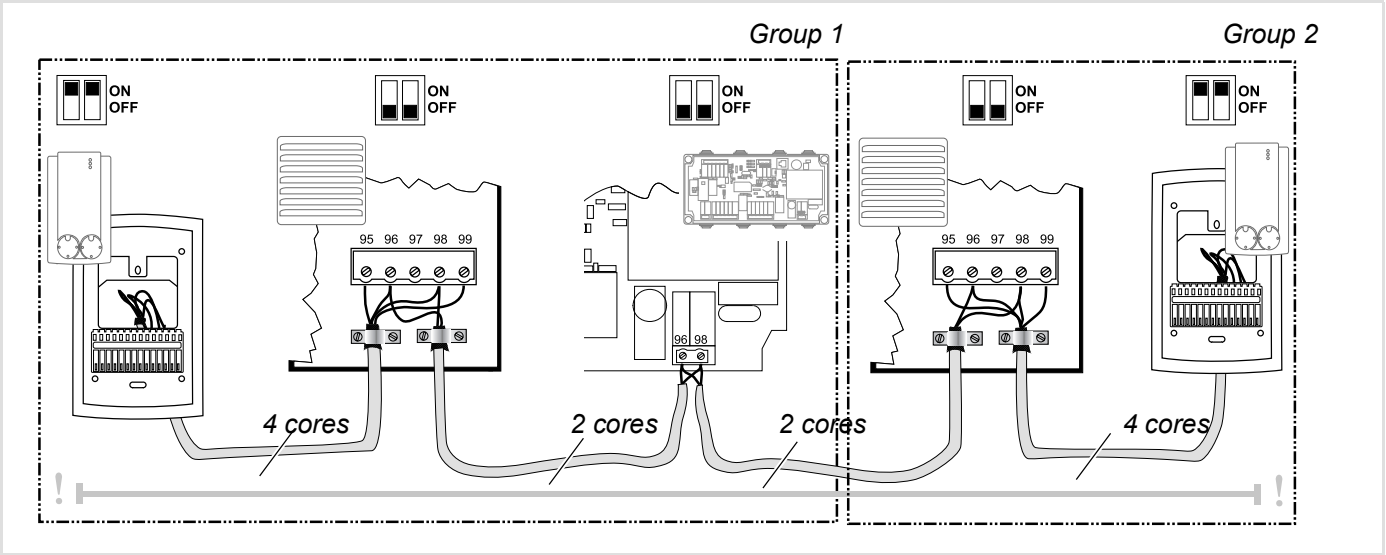


Fig. 6-44: MATRIX.Net network configuration with a line structure

Attention!
The data transfer cable must be laid as indicated in Fig. 6-44 in such a way that only one side of the respective shielding is applied – see “Shielding/Earthing” on page 64.

6.11.5 Line structure with branches

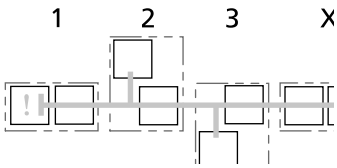


Fig. 6-45 shows a MATRIX.Net system in a line structure with a branch. The example shows the connection of the controller via a branch in multiple groups. The maximum permitted branch length is 25 metres.

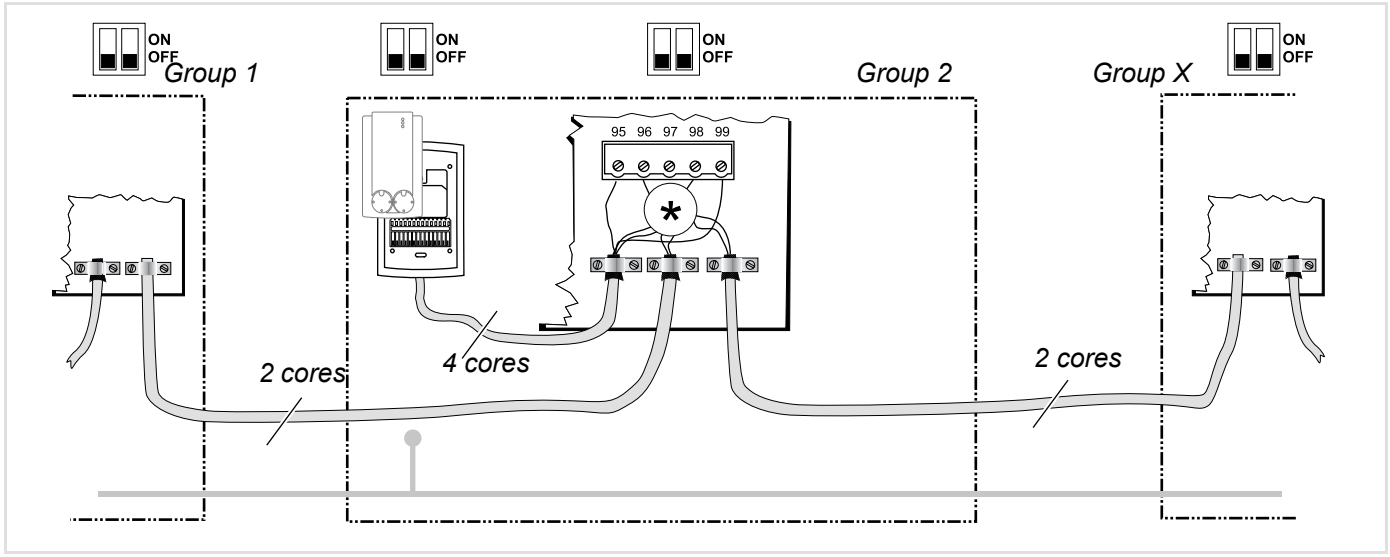


Fig. 6-45: MATRIX.Net network configuration with a line structure with a branch

** As it is not allowed to connect three wires using terminals an intermediate terminal must be provided! For that purpose auxiliary terminals (STV) on the board (if not already used) or dedicated terminals fitted on-site can be used.*

Attention!
The data transfer cable must be laid as indicated in Fig. 6-45 in such a way that only one side of the respective shielding is applied – see “Shielding/Earthing”on page 64.

6.11.6 MATRIX.Net network configuration

Data cable

To build a MATRIX.Net network use only twisted core shielded data transfer cables according to EN 50170.

Attention!
We recommend the following data cable: 2 x 2 x ... mm^2

Line length

Regardless of the cross section and the number of participants the maximum line length including branches must not exceed 600 m.

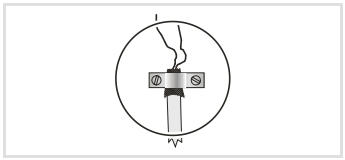
The branch line must not exceed 25 m. The total length of all branch lines must not exceed 150 m.

Attention!
With more than 110 participants and in excessively long lines a network amplifier must be used.

The cross-section of the bus cable must always be adjusted in accordance with the MATRIX.Net network line length.

Line length	Line type
Up to 50 m	2 x 2 x 0.22 mm² *
	1 x 2 x 0.22 mm² *
Up to 600 m	2 x 2 x 0.5 mm² *
	1 x 2 x 0.5 mm² *
* Includes two cores for providing power supply to controller or modules.	

Shielding/earthing



- The data transfer cable (MATRIX.Net) in heating units is connected at one end in the terminal in such a way so as to ensure the best possible electrical contact.
- The shielding terminal should be connected to the frame in a way that maximizes the contact surface area!
- In systems with a large network, or if large-scale EMC impairment is likely, the shielding should be applied at each end of the cable. Ensure beforehand that no differences in potential occur.

6.12 Connecting the MC4 control unit, potentiometer or control system on site

Connect the control system via a terminal block. This is located in the plastic electrical enclosure or fan switch, mounted either on the left or right of the fan enclosure (depending on the configuration of the medium connections).

Notes to the MC4 control unit!
Wiring diagrams are provided with each MC4 control unit.
For connection use control and network cables considering the unit configuration and local regulations, see Fig. 6-46 and Fig. 6-47. Connect the thermal protection contact using control cable 0.5 mm^2 with Al shielding, e.g. J-Y(ST)Y 2x2x0.8.

Note to fan speed control using potentiometer 950EC1!
The potentiometer is used for controlling the speed of the EC-motor in a 0 - 100% range, but not for switching off its power supply.

Note to the control system provided on site!
For the exact connection of each component (actuators, room temperature sensors, frost protection etc.) see the relevant wiring diagrams for your unit.
Before carrying out connection, compare the type code of the unit's electrical equipment with the wiring diagram, to make sure they correspond.
In 2-stage electric motors it is necessary to provide connections with left-hand pole winding.
When determining the parameters of electrical protection on site, take into account the maximum rated current of the motor fan (see Chapter 02:10).

Risk of electrocution!
Before opening the connection electrical enclosure or the fan switch, the heating unit must be disconnected from the power supply at all poles.
• Connection may only be carried out in accordance with the unit's wiring diagram.

Attention!
The location in which the room temperature sensor is installed is crucial for accurate temperature control in the room.
- do not install next to doors, windows or pass-through windows etc. as intense air movement distorts readings,
- do not install on cold or warm walls such as external walls or chimney as wall temperature distorts readings.
- do not install in the immediate vicinity of the unit's outlet air vent grille as the temperature of discharged air distorts readings.

6.12.1 MC4 control unit function

Function "Z" - continuous control of the outlet louvre to ensure the required direction of the discharge air flow (two end positions).

Function "K" - continuous control of mixing chamber louvres (shut-off damper) to ensure the required mixing ratio of intake air (two end positions). The heat exchanger frost protection feature switches off the fan and closes the mixing chamber dampers on the outdoor air intake side; once the heat exchanger's ambient temperature increases, the fan automatically starts and the unit works only in heating mode, which means that the mixing damper is closed to fresh air.

Function "F" - indicated the increasing pressure drop across the filter; in other words its contamination and need for replacement.

The MC4 control unit also has a input for remote fan speed control.

Group of air mixing heating units Multi*MAXX* HN with control unit MC 4

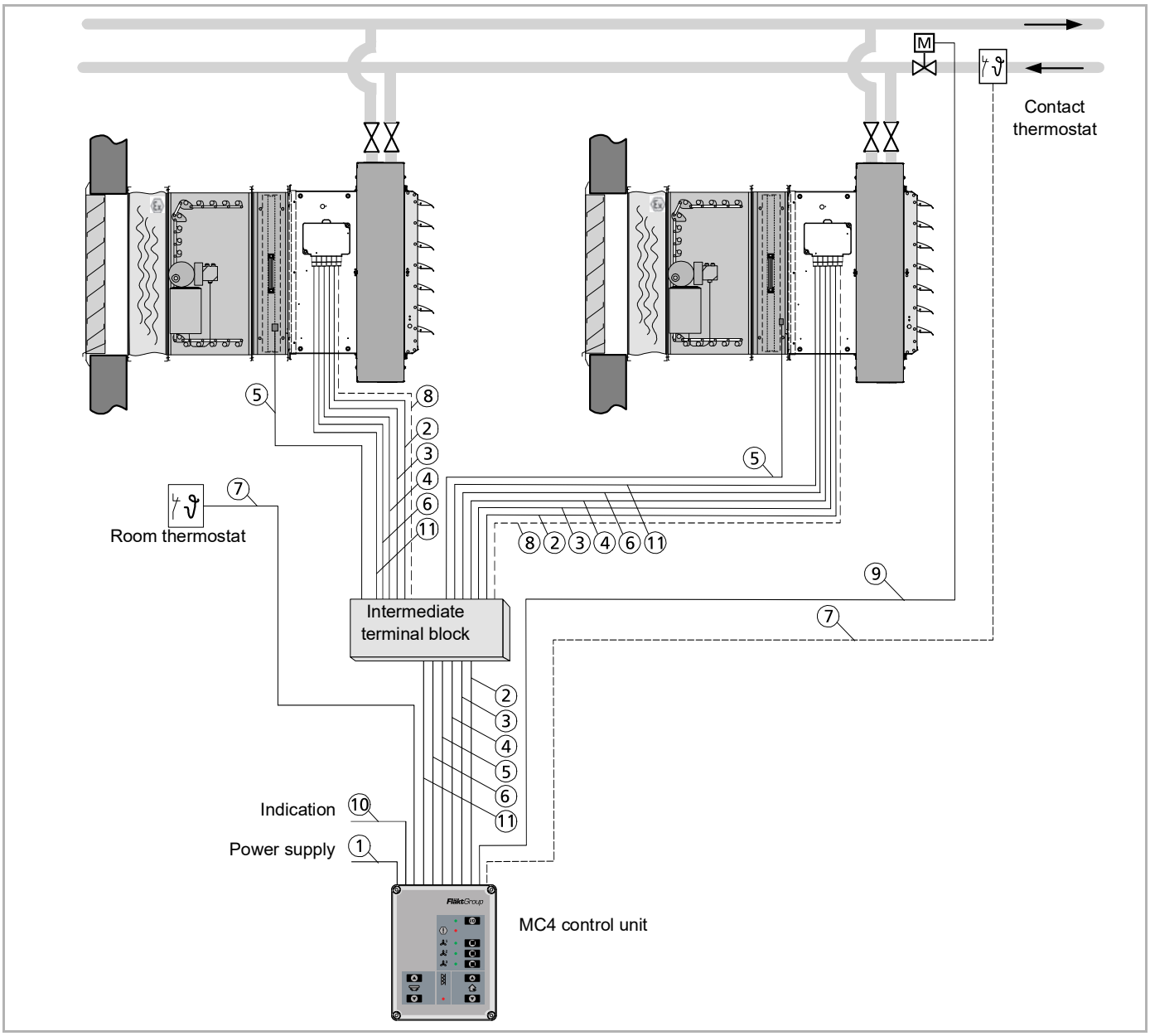


Fig. 6-46: Group of air mixing heating units MultiMAXX HN with control unit MC 4

Control unit cables - number of cores

Control unit	**MC4M3AC** 3x400 V	**MC4M2AC** 3x400 V	**MC4M1EC** 1x230 V	**MC4M3EC** 3x400 V
Cable 1 (Power supply)	5	5	3	5
Cable 2 (Louvre control)	3	3	3	3
Cable 3 (Frost protection)	5	5	5	5
Cable 4 (Electric motor)	10	7	3	4
Cable 5 (Filter)	2	2	2	2
Cable 6 (Mixing chamber)	3	3	3	3
Cable 7 (Room thermostat)	3	3	3	3
Cable 7 (Contact thermostat)	2	2	2	2
Cable 8 (EC-motor control)	-	-	3	3
Cable 9 (Shut-off valve)	2	2	2	2
Cable 10 (Indication)	3 (6)*	3 (6)*	3 (6)*	3 (6)*
Cable 11** (Thermal protection contact for AC-motor) (Motor operation contact for EC-motor)	2	2	2	2

** The number in the brackets indicates the number of cores when a filter is used - function F (00F, Z0F)*

*** Shielded cable*

Cables 2, 5 and 6 are for units with auxiliary functions (0KF, ZKF).

Group of recirculation heating units Multi*MAXX* HN with control unit MC 4

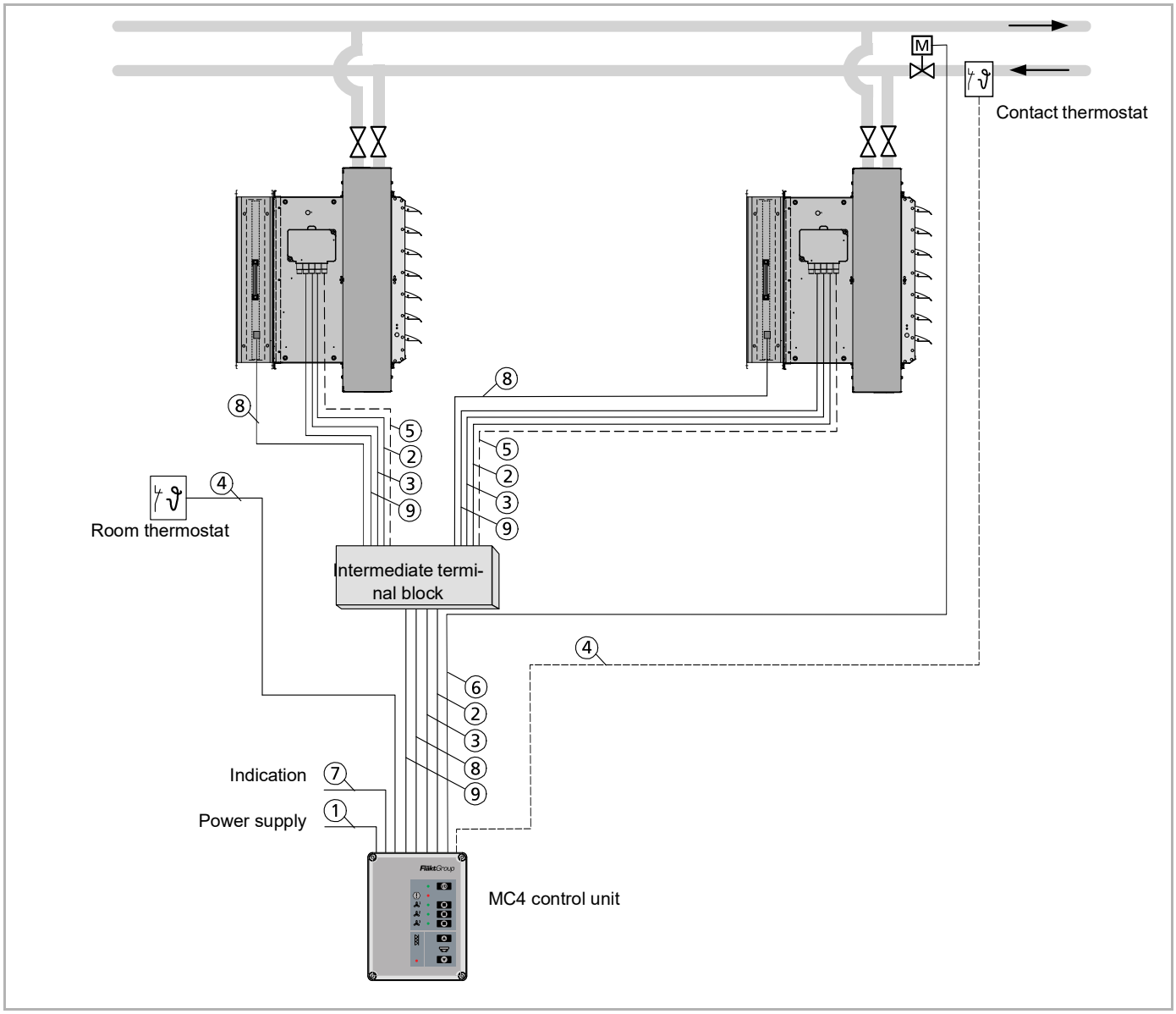


Fig. 6-47: Group of recirculation heating units Multi*MAXX HN with control unit MC 4*

Control unit cables - number of cores

Control unit	**MC4U3AC** 3x400 V	**MC4U2AC** 3x400 V	**MC4U1AC** 1x230 V	**MC4U1EC** 1x230 V	**MC4U3EC** 3x400 V
Cable 1 (Power supply)	5	5	3	3	5
Cable 2 (Louvre control)	3	3	3	3	3
Cable 3 (Electric motor)	10	7	3	3	4
Cable 4 (Room thermostat)	3	3	3	3	3
Cable 4 (Contact thermostat)	2	2	2	2	2
Cable 5 (EC-motor control)	-	-	-	3	3
Cable 6 (Shut-off valve)	2	2	2	2	2
Cable 7 (Indication)	3 (6)*	3 (6)*	3 (6)*	3(6)*	3(6)*
Cable 8 (Filter)	2	2	2	2	2
Cable 9** (Thermal protection contact for AC-motor) (Motor operating contact for EC-motor)	2	2	2	2	2

** The number in the bracket indicates the number of cores when a filter is used - function F (00F, Z0F)*
*** Shielded cable*

Cables 2, 5 and 8 are for units with auxiliary functions (Z00, 00F, Z0F).

Group of recirculation heating units Multi*MAXX* HN with EC-motor with speed control by potentiometer 950EC1

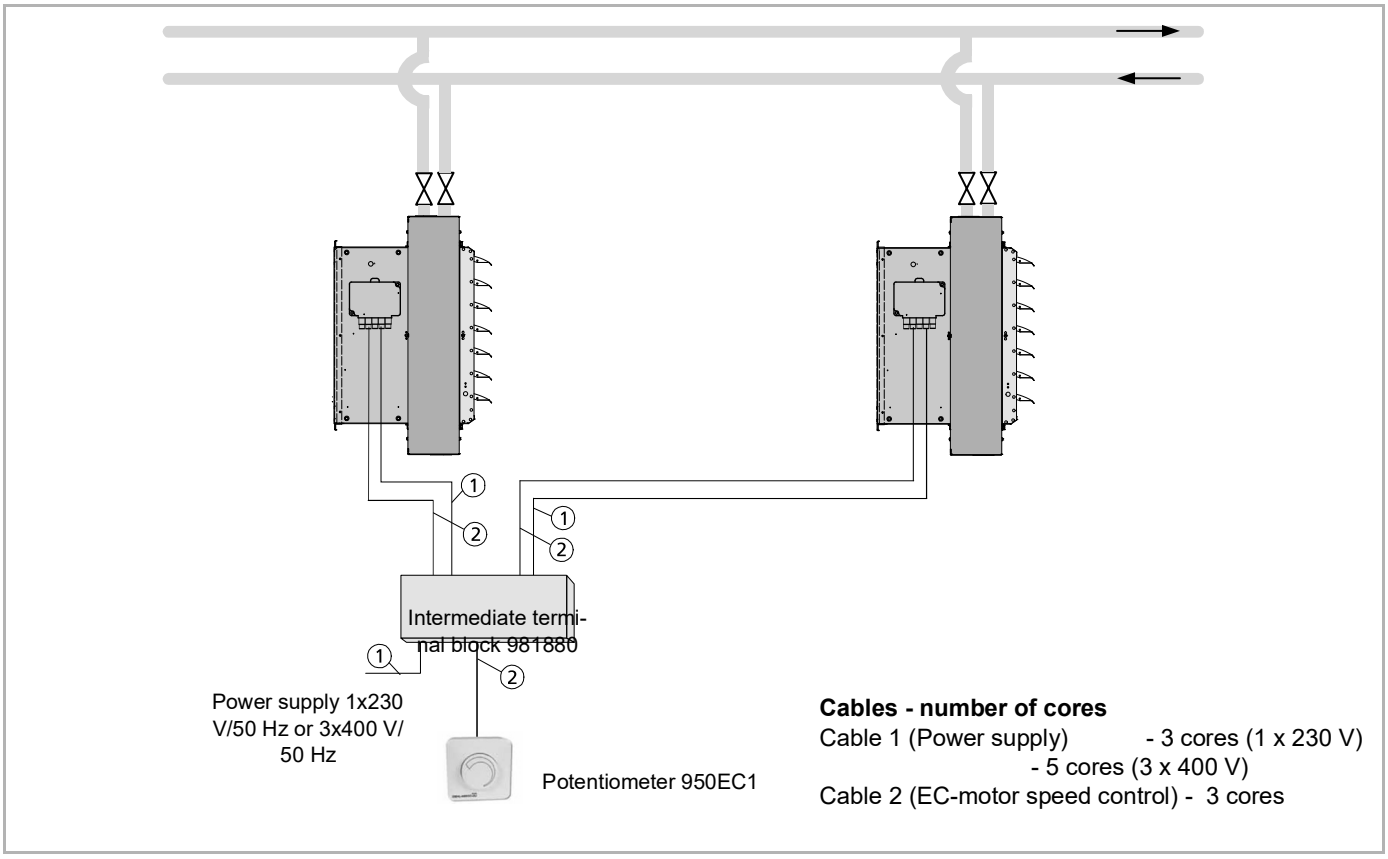


Fig. 6-48: Group of recirculation heating units MultiMAXX HN with speed control by potentiometer

Recommended frost protection connection wiring diagram

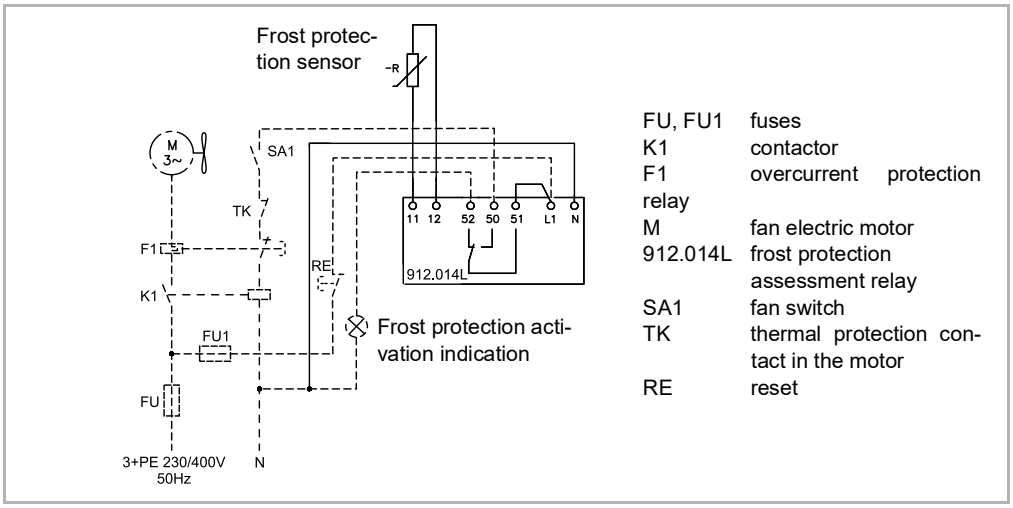


Fig. 6-49: Recommended frost protection connection wiring diagram (the dashed line indicates installation by the site contractor)

6.13 Mixing chamber damper and shut-off damper actuator wiring diagram

The wiring diagram is always shown on the casing of the relevant actuator and mixing chamber.

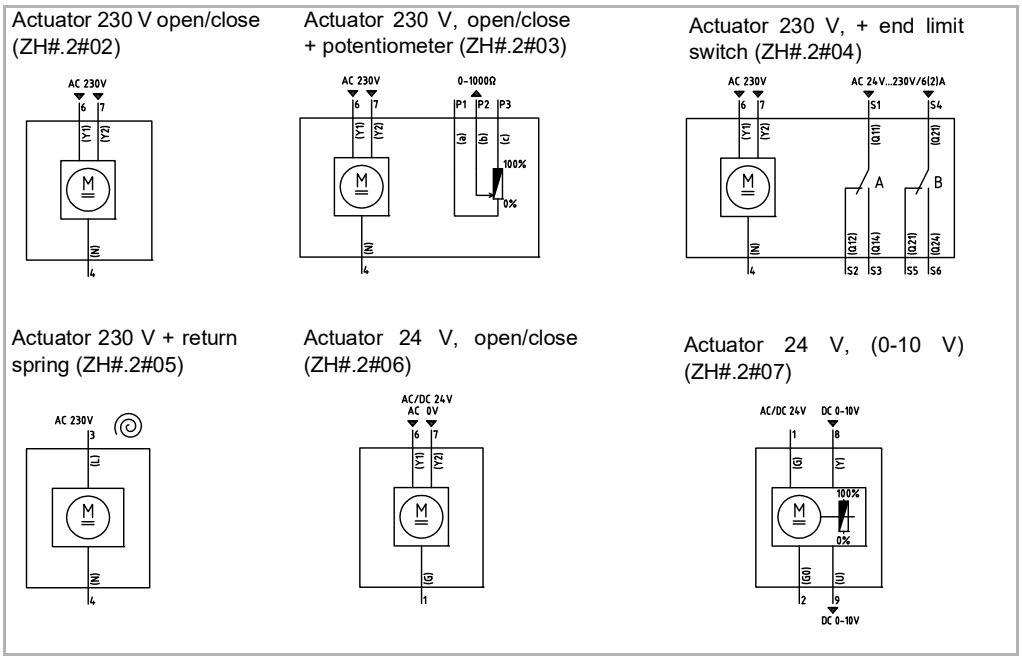


Fig. 6-50: Actuator wiring diagram

6.14 Differential pressure switch wiring diagram

The wiring diagram is always shown on the differential pressure switch box.

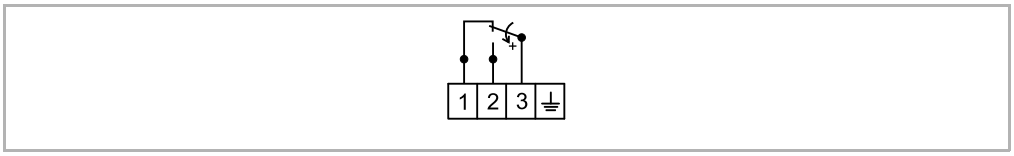


Fig. 6-51: Differential pressure switch wiring diagram

6.15 Louvre actuator wiring diagram

The wiring diagram is always shown on the casing of the relevant actuator.

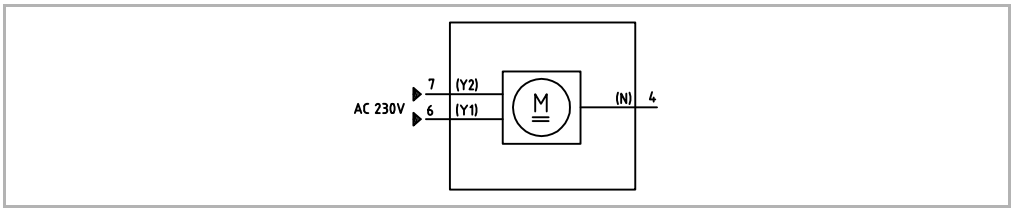


Fig. 6-52: Actuator wiring diagram

6.16 Condensate pump wiring diagram

A detailed condensate pump wiring diagram is shown in pump operation manual SI1805.

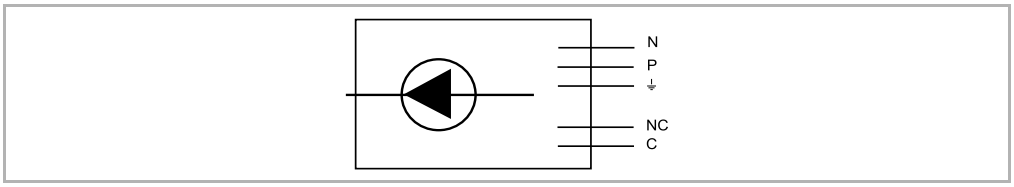


Fig. 6-53: Condensate pump wiring diagram

7 Commissioning

Risk of electrocution!
Before carrying out any work on the unit, ensure that the unit is disconnected from the power supply.
Ensure that the unit is secured against being reconnected at an appropriate point on the power supply system!

Risk of scalding!
Before commencing work on heating units:
Before any work on valves or inlet or outlet medium connection close the heating medium supply. Secure the stop valves against inadvertent opening.
Do not start work until the heating medium has cooled down.

Risk of injury from rotating parts!
A risk of injury from the rotating impeller! Before carrying out any work on the unit, ensure that the unit is disconnected from the power supply.

Attention!
Before commissioning the following must be clean:
– the outlet of the unit (heat exchanger)
– the condensate pan (if included)
– and the filter (if included)
If necessary, these parts must be cleaned / filters replaced. Protect electrical equipment and furniture from splashing water.

7.1 Commissioning prerequisites

– The entire system this heating unit (including accessories) is part of must be properly mechanically and electrically installed.
– The system and consequently the Multi*MAXX* HN unit, is deenergised.
– All media lines have been flushed and are free of residue and foreign objects.
– The system is properly filled with the medium (see “Medium connection” on page 31).

7.1.1 Before commissioning, the following inspection must be carried out:

- Check all threaded joints for tightness and that the heating unit is secure and undamaged.
- The fan impeller must rotate freely and have the same distance from the inlet nozzle along its entire perimeter.
- Open the pipe valves.
- If the medium lines/heat exchangers were drained after installation, have a specialist fill them and bleed air from them (see Chapter 7.2).
- Ensure that all air has been bled out so that no air bubbles form inside the heat exchanger.
- Check all pipes and fittings for tightness.
- Check the wiring for proper installation according to the wiring diagrams in this operation manual or the ones on the unit’s terminal block or MC4 control unit.
- Check that the direction of air flow is correct (in keeping with the correct direction of rotation of the fan). The fan's direction of rotation is correct if air is being discharged by the unit’s outlet louvre into the room.
- Set the louvres to achieve the required air flow direction. The air flow should be set in such a way to avoid undesirable draughts in occupied areas.
- Check the function of protective features (supply air thermostat - shut-off valve).
- After completing the checks, close the plastic terminal block enclosure.
- Before commissioning a unit with a fan switch, turn it to the ON position.

7.2 Bleeding air from the system

- Open all shut-off and control valves.
- Open the system air bleed screw.
- Once only the heating/cooling medium flows out, close the air bleed valve.

7.3 Condensate drain and condensate pump inspection

Attention!
The cooling operation causes the formation of condensate, even on non-insulated medium lines.

If the condensate is self-draining, check:

– The condensate pan for cleanliness and proper installation (see the “Louvres” installation manual provided).
– Gradually pour water into the condensate pan; it must freely flow out through the plastic drain outlet. The water volume poured in is to correspond to the maximum volume of condensate, i.e. 12 l/h.

If a condensate pump is used, switch on the power supply and check its function:

– Pour water into the condensate pan. Check that the pump starts and then stops when the water level starts falling . To check the high level alarm continue to pour water into the pan until the alarm contact closes.

Attention!
Before putting operating the condensate pump, it is necessary to remove the float switch blocking system by pulling out the paper safety tab on the side of the condensate pump, see Fig. 7-1).
The pump must be installed horizontally (see the “Louvres” operation manual supplied).

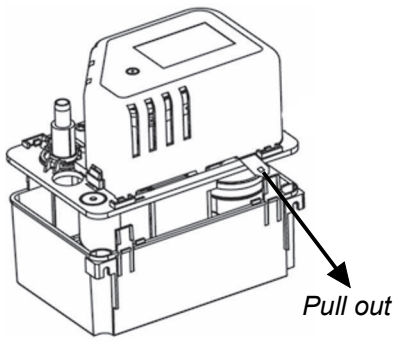


Fig. 7-1: Condensate pump paper safety tab

7.4 Operational inspection of frost protection (only for mixing units)

Units with outdoor air supply are fitted with a frost protection thermostat. With the recommended installation set-up, according to Fig. 6-49, the frost protection sensor and assessment element shuts off the actuator's power supply at temperatures below approx. 5 °C. In systems with a mixing chamber (shut-off damper) connected to a MC4M###.#KF control system the mixing chamber closes.

The mixing chamber damper closes.

- If the power supply is not switched on yet, switch it on.
- Check whether the external mixing chamber damper closes properly.
- Check whether the actuator switches off and the damper closes at temperatures below 5 °C. Spray the sensor with synthetic ice spray. The sensor is placed at the outlet.
- Check the control valve for opening.
- Check whether the fan stops.
- After the test switch the unit off.

7.5 Operation

7.5.1 Fan

The unit's fan is started and stopped via the I/O switch on control unit MC4, the room thermostat, potentiometer 950EC1 or a switch supplied by the site contractor.

7.5.2 Controlled mixing chamber damper

The mixing chamber damper is controlled by the switch on control unit MC4 in a 0% to 100% range.

7.5.3 Condensate pump

The condensate pump is used to remove condensate generated by cooling units. If necessary, the condensate pump is started by level floats.

7.5.4 Frost protection

The frost protection feature is used to prevent damage to air mixing unit heat exchangers caused by frost. Frost is detected by a sensor integrated in the heating unit. With the recommended installation set-up, according to Fig. 6-49, the frost protection sensor and assessment element shuts off the actuator's power supply at temperatures below approx. 5 °C. In systems with a mixing chamber (shut-off damper) connected to a MC4M###.#KF control system the mixing chamber closes.

7.5.5 Secondary louvre

The secondary louvre supplies air treated by the heating unit to the room being heated in an optimum manner. With control unit MC4####.Z## it is possible to set the optimum angle of air discharge using the secondary effect. The room can thus be heated without a draught while at the same time minimizing the stack effect.

Secondary louvre adjustment:

– For manual adjustment see Fig. 7-2
– Using an actuator to move it to the required position using the switch on control unit MC4

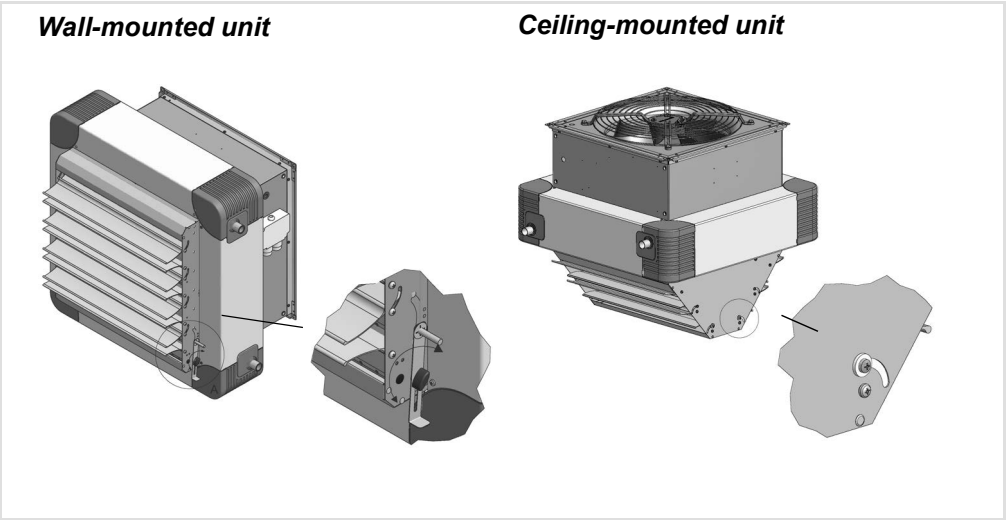


Fig. 7-2: Manual adjustment of the secondary louvre

7.5.6 Differential pressure switch

The differential pressure switch is activate when the final filter pressure drop setpoint is reached, and the indicator on control unit MC4#####.##F indicates that the filter is clogged and needs replacement.

7.6 Operating instructions

Attention!
Ensure the free passage of air through the unit and free distribution of air from the outlet.
The air flow should be set so as to avoid undesirable draughts in occupied areas.
The fan switch on the unit is only used to disconnect the fan.
The fan switch is not the main or emergency switch.

7.7 Shutting off the unit

Shut off the heating unit using the I/0 switch (the LED goes off) on control unit MC4.

7.8 Termination resistors

MATRIX			
200 #	300 #	400 #	400#+IO
✓			

The printed circuit boards of the MATRIX 2000 control system are not equipped with termination resistors.

The termination resistors on the OP21 controller must only be switched on or off if a MATRIX.Net network is being built, or an additional module such as clock, input or output modules is being connected.

The termination resistors are connected at the beginning and end of the line (see Fig. 7-3):

- For both participants (e.g. controllers, modules) move the DIP switch into the “ON” position.

The line start and line end correspond to the start and end of the bus cable. Terminating resistors must also be switched on in stand-alone units.

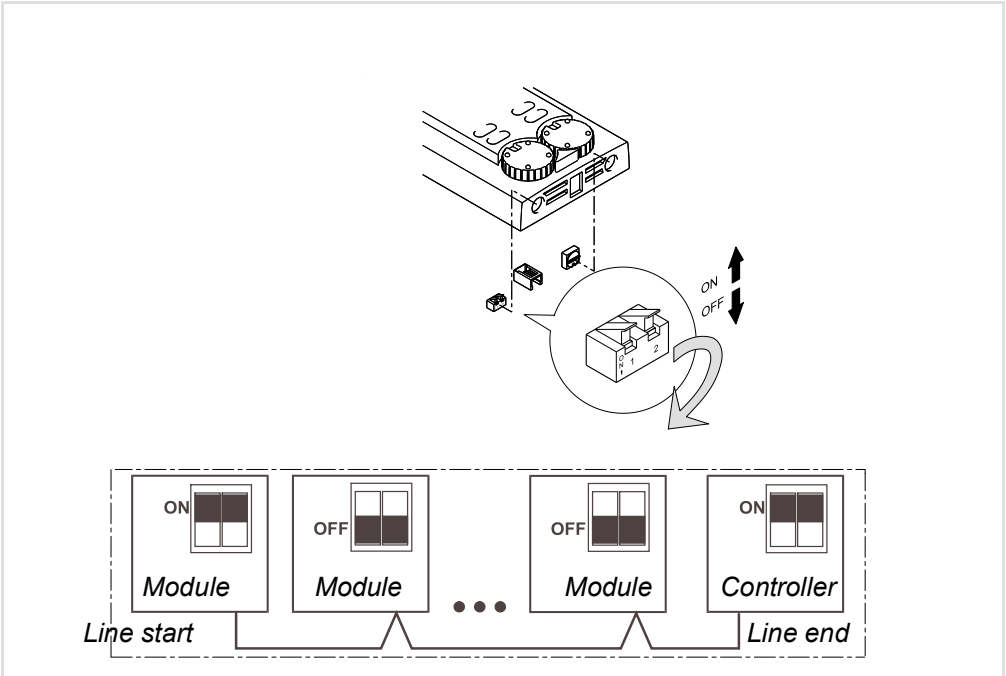


Fig. 7-3: Setting terminating resistors

DIP switch		Function
1	2	
OFF	OFF	Terminating resistor OFF
ON	ON	Terminating resistors ON (when supplied)

Attention!
When supplied, the DIP switches are set to the “ON/ON” position. If they are not connected at the beginning or end of the line, they must be set to the OFF/OFF position.

MATRIX			
200 #	300 #	400 #	400#+IO
	✓	✓	✓

MATRIX 300#/4000# control system PCBs and MATRIX OP3#/44/5# controllers have termination resistors.

The termination resistors are connected at the beginning and end of the line (see Fig. 7-4):

- Turn the DIP switch of both users (e.g. control panels, PCBs or modules) to “ON”.

The line start and line end correspond to the start and end of the bus cable. Terminating resistors must also be switched on in stand-alone units.

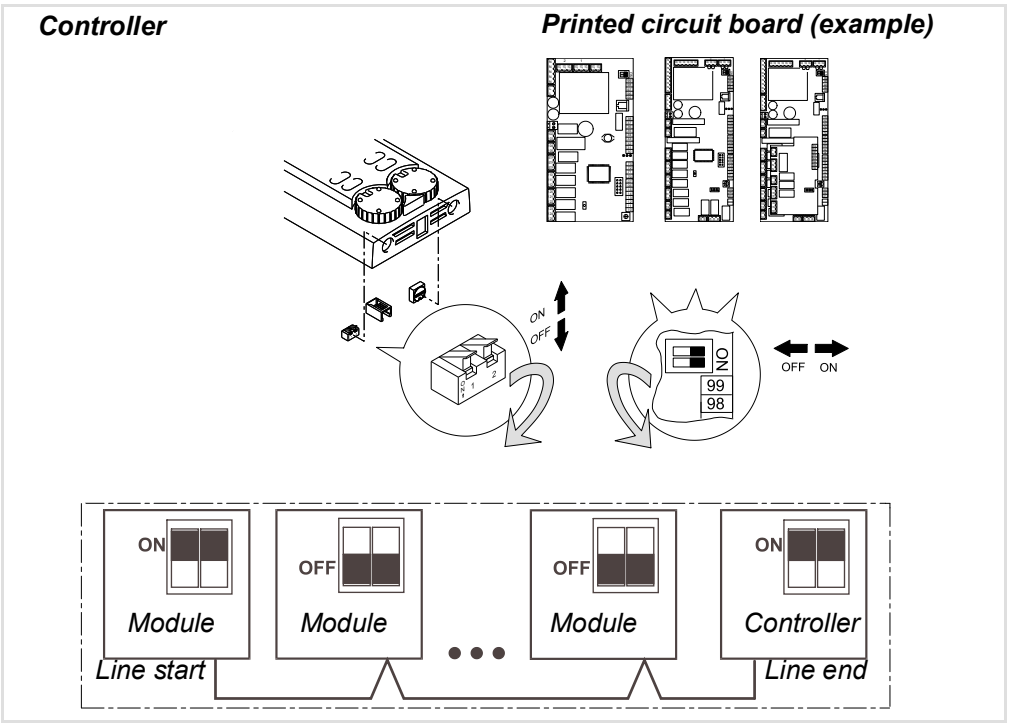


Fig. 7-4: Setting terminating resistors

DIP switch		Function
1	2	
OFF	OFF	Termination resistor OFF
ON	ON	Termination resistors ON (when supplied)

Attention!
When supplied, the DIP switches are set to the “ON/ON” position. If they are not connected at the beginning or end of the line, they must be set to the OFF/OFF position.

7.9 Address settings

MATRIX			
200 #	300 #	400 #	400#+IO
✓			

The printed circuit boards of the MATRIX 2000 control system are not equipped with termination resistors.

The appropriate group address must be assigned on the control panel.

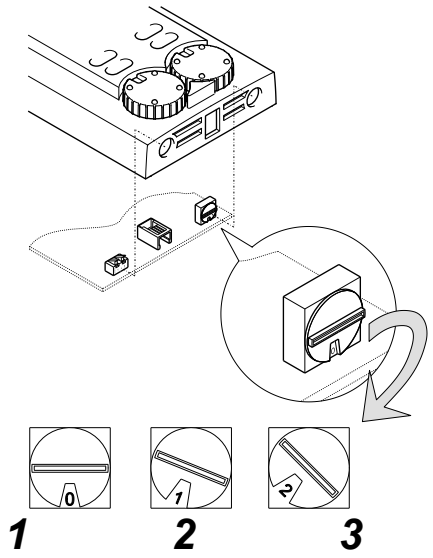
Single group (without networking multiple unit groups)

- On the control panel, set the address to “0” (factory default setting).

Networking multiple groups

- On the controllers set addresses 0 - 15. Each group is assigned its own address. The labels A to F correspond to the addresses 10 to 15.

Attention!
Assigning duplicate addresses will cause a malfunction.
The default setting for the group address switch is “0” and must be changed if required.



Group addresses:

0	Group 0	8	Group 8
1	Group 1	9	Group 9
2	Group 2	A	Group 10
3	Group 3	B	Group 11
4	Group 4	C	Group 12
5	Group 5	D	Group 13
6	Group 6	E	Group 14
7	Group 7	F	Group 15

Fig. 7-5: Setting the address on the controller

Pos. 1: Group 0 controller (address 0)
Pos. 2: Group 1 controller (address 1)
Pos. 3: Group 2 controller (address 2) etc.

MATRIX			
200 #	300 #	400 #	400#+IO
	✓	✓	✓

The appropriate group address must be assigned on the control panel and the units of a group.

Single group (without networking multiple unit groups)

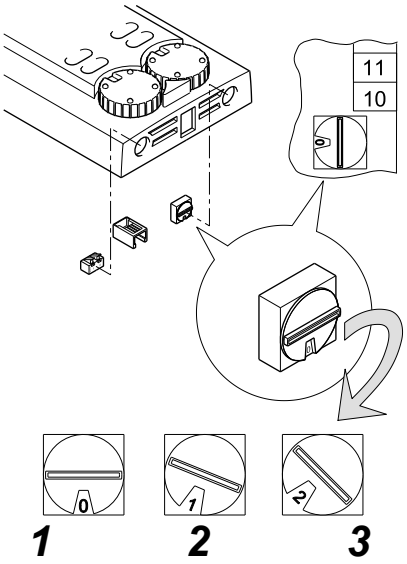
- On the control panel, set the address to “0” (factory default setting).
- On the PCB set address “0” (default setting).

Networking multiple groups

- On the controllers and all PCB of the respective groups set addresses 0 - 15. Each group is assigned its own address. The labels A to F correspond to the addresses 10 to 15.

Attention!
Assigning duplicate addresses will cause a malfunction.
The default setting for the group address switch is “0” and must be changed if required.

Controller *Printed circuit board*



Group addresses:

0	Group 0	8	Group 8
1	Group 1	9	Group 9
2	Group 2	A	Group 10
3	Group 3	B	Group 11
4	Group 4	C	Group 12
5	Group 5	D	Group 13
6	Group 6	E	Group 14
7	Group 7	F	Group 15

Fig. 7-6: Setting the address on the controller and PCB

Pos. 1: Group 0 controller (address 0)
Pos. 2: Group 1 controller (address 1)
Pos. 3: Group 2 controller (address 2) etc.

7.10 Starting the unit

Risk of electrocution!
The terminal box is open.
Tampering with the terminal box is prohibited!
Before starting the unit the electrical enclosure must be properly closed.

- Switch on the power supply.
- The unit is started using a MATRIX series controller, a 983... series controller or an external controller. The way of controlling the unit is described in the controller's operation manual.
- Start the unit using the controller.
- Test the fan speed.

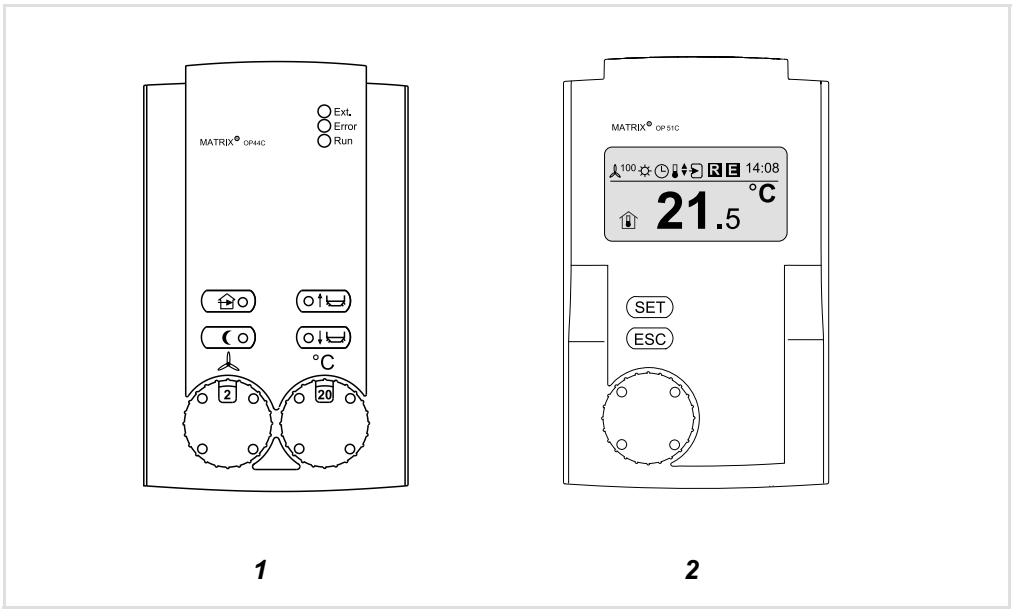


Fig. 7-7: Starting the unit on the controller

Pos. 1: MATRIX OP44I controller
Pos. 2: MATRIX OP51I controller

Attention!
The speed selector position (only OP5#/OP21#/OP3##/OP4##) can be mechanically limited.
This limitation is set by making the maximum available fan speed match the speed of the unit.
For instructions on how to set this limit see the user manual for your controller.

7.11 Data connectivity check

Risk of electrocution!
Before remedying a data connectivity fault, disconnect the entire system from the power supply. Ensure that the unit is secured against being reconnected at an appropriate point on the power supply system.

7.11.1 Checking control cables

MATRIX			
200 #	300 #	400 #	400#+IO
✓	✓		

The data/commands are transmitted via control cables. They must be connected and checked depending on the unit's features according to the wiring diagram in the electrical enclosure (see "Power supply connection" on page 48).

The yellow LED on the PCB indicates the power supply to the electronics.

- If this LED is off, check the 230 V power supply on the unit.

7.11.2 Checking data lines

MATRIX			
200 #	300 #	400 #	400#+IO
	✓	✓	✓

Data communication takes place via a 2/4-core data cable. This must be connected and checked according to the wiring diagram in the electrical enclosure (see "Bus system connection" on page 51).

There are 3 LEDs on the PCB to indicate the operation status of the unit.

LED colour	LED status -	Operation status	Action/remedy
Yellow	On	Power supply to electronics OK	–
	Off	Power supply to electronics not OK	Check the 230 V power supply on the unit
Green	On	The operating system and controller software have been started and are working properly	–
	Off	Defective software or processor	Replace PCB
Red	Permanently on	Electronics fault	Disconnect the PCB from the power supply and wait for a while. Reconnect the PCB. If the fault message remains active, replace the PCB.
	Flashing	Data bus fault	Check the connection of data cables and the setting of the termination resistor in all units.

Fig. 7-8: Operation status and help with data connectivity faults (MATRIX 3000/4000)

7.12 Checking control inputs and outputs

MATRIX 3000/4000 control systems have control inputs and outputs.

When checking control inputs and outputs, pay attention to the factory settings.

The type of function a control system features is indicated in the unit's wiring diagram (located in the electrical enclosure).

Any configuration changes to be made on site (using the MATRIX-PDA service tool or MATRIX.PC service software) are not covered here.

7.12.1 Functional input

MATRIX			
200 #	**300 #**	**400 #**	**400#+IO**
	✓	✓	✓

The input can be assigned to the following functions as required:

Unit off

- Connect the input terminals using a jumper.
- Switch on the unit and adjust the temperature setting as required to activate the fan.
- Open the jumper.

✓ The fan must stop, valves close
(the unit is still controlled by the frost protection feature).

Door contact

- Connect the input terminals using a jumper.

✓ The unit starts at the set speed.

- Open the jumper.

✓ The unit switches over to the operation mode set previously.

Economy mode

- Start the unit and, if necessary, change the required temperature setting once the fan starts running.
- Connect the input terminals using a jumper.

✓ The fan must stop, valves close,
assuming that the required economy mode value is properly set (the unit is still controlled by the frost protection feature)

Attention!
If more inputs of various configurations are used in a single group, the "economy mode" input takes precedence over the "door contact" input.

7.12.2 Enabling external control of the exhaust fan

MATRIX			
200 #	**300 #**	**400 #**	**400#+IO**
		✓	✓

Procedure

- Start the unit and, if necessary, change the required temperature setting once the fan starts running.
- Start the mixing chamber damper control. The damper opens.

7.12.3 Operation modes

MATRIX			
200 #	**300 #**	**400 #**	**400#+IO**
			✓

The following operation modes can be activated using the 4 auxiliary inputs and 2 outputs.

Activating the “Normal mode”

- Start the unit.
- Set it to normal mode (see the controller operation manual).
- Connect the input terminals using a jumper.

✓ The unit switches over to normal mode.

Activating the “Free mode” or “Economy mode”

- Start the unit.
- Connect the input terminals using a jumper.

✓ The unit switches over to “Free mode” / “Economy mode”

Activating the “Unit OFF” mode

- Start the unit.
- Connect the input terminals using a jumper.

✓ The unit switches off (Attention: the frost protection feature is off).

Activating the “Heating request” mode

- Start the unit and increase the temperature setting until the unit starts heating.

✓ The “Heating request” contact closes.

Activating the “Cooling request” mode

- Start the unit and lower the temperature setting until the unit starts cooling.

✓ The “Cooling request” contact closes.

7.13 Functions when used with MATRIX

7.13.1 Fan for MATRIX 200# to 400#

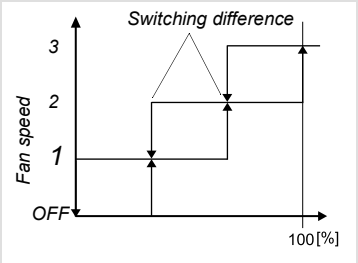
MATRIX			
200 #	300 #	400 #	400#+IO
✓	✓	✓	✓

Fan control depends on the configuration of the control system and the selected unit's control mode. The following fan modes can be set:

– Manual fan control
– Automatic fan control
– Automatic fan control in economy mode

The fan switches off irrespective of the selected mode if one of the following faults occurs:

– Electric motor thermal protection activation
– Insufficient operating data due to a sensor fault
– Defective hardware



Automatic control

Fan control is based on deviation from the required level (temperature). The highest ventilation level is blocked in “Economy” mode.

Fan speed levels are adjusted based on deviation between requested and actual values. Both the duration and degree of deviation affect the way control is applied. The number of fan speed levels available depends on the type of the unit.

Parameters:

– Number of levels: 0..3 – speed-level fan
– EC-motor (only with MATRIX 3001 and 4004)

Manual control

The fan runs at a set ventilation level. The setting can be made via a controller, a control unit or external modules such as a digital input module.

Airing function (only in mixing units)

This function supplies a maximum amount of outdoor air into the room for a limited period of time. The function is available in combination with a MATRIX OP50 / MATRIX OP51 controller.

Recirculation function

This function starts heating units regardless of the control setting selected. The ventilation level is selected manually (no automatic operation). This is meant to achieve optimum room airing. The function is available only in combination with a MATRIX OP50 / MATRIX OP51 controller or service software.

Unblocking

Certain faults shut off the unit, blocking its operation. When there is a risk of frost for example. To unblock the unit, once the fault has been remedied, turn the speed select switch to position 0 or OFF, wait for a few seconds and start the unit again at the required speed.

Delayed start function

MATRIX			
200 #	**300 #**	**400 #**	**400#+IO**
		✓	✓

In air mixing units the fan starts after a delay and the valve opens immediately provided that the outdoor temperature exceeds a certain level (default 10 °C). An outdoor temperature sensor is required for this function.

7.13.2 Valves

MATRIX			
200 #	**300 #**	**400 #**	**400#+IO**
✓	✓	✓	✓

Depending on the selected MATRIX control system features, 2-way or 3-way valve control is supported.

Valve control is available in the following operating modes:

– heating
– cooling
– heating or cooling

All connected valves (only with 3-point control) are synchronized by the manufacturer to OPEN or CLOSE at the same time every 12 hours to achieve a joint starting position.

7.13.3 Controlled mixing chamber damper

2-point manual operation

The mixing chamber damper is controlled by the switch on the MATRIX OP44 controller or is set as a required value 0% and 100% on a MATRIX OP50 / MATRIX OP51 controller.

3-point operation controlled via the fresh air flow rate

The position of the damper is calculated based on the fresh air flow rate requirement and current fan speed.

Temperature-based control

The position of the damper is regulated based on the current heating demand of the room and supply air control and the current outdoor temperature (external potential). Under favourable temperature conditions, the temperature is controlled exclusively by the mixing damper (passive mode).

Energy saving control

The functions are the same as for temperature-based control but, in addition, when relevant temperature ratios are achieved and the damper is fully open, fan speed increases to take more significant advantage of the outdoor air energy potential for control.

7.13.4 Condensate pump

MATRIX			
200 #	**300 #**	**400 #**	**400#+IO**
✓	✓	✓	✓

The condensate pump is used to drain the condensate which is formed in cooling units.

The condensate pump is started as necessary by the float switch integrated with the condensate pan.

When the limit is exceeded, the fan stops and the controller displays a fault message (fan).

7.13.5 EC-motor (only with MATRIX 4004)

The EC motor is an electronically commutated motor. The speed of such a motor can be steplessly controlled. The speed of the electric motor is set by entering the required value between 0 and 100% on the controller.

7.13.6 Frost protection of the unit (only MATRIX 400# and 400#+IO)

This feature is used to prevent damage to air mixing unit heat exchangers caused by frost. Frost is detected by a sensor integrated in the heating unit. In the event of a fault, the fan stops and the mixing air damper closes and moves to the recirculation position.

7.13.7 Limiting function setting

MATRIX			
200 #	**300 #**	**400 #**	**400#+IO**
	✓	✓	✓

For heating and cooling it is possible to set supply air temperature limits.

– Heating:
  Min. and max. limits (limits are fixed or variable)
– Cooling:
  Min. limits

These limiting values and the type of limit can be set using the MATRIX.PDA service tool and MATRIX.PC service software (see the online help for service software).

When controllers with a display (MATRIX.OP50 or OP51) are used, it is also possible to set limiting values (see the MATRIX OP50/OP51 operation manual).

When MATRIX OP30 to OP44 controllers are used, it is necessary to use the service software to make these settings.

General supply air temperature limit functions

When the supply air temperature limit is not reached or is exceeded, the controller automatically switches over to supply air control mode. This adjusts the temperature and all other parameters of supply air to this limit value.

In “room temperature control” and “cascade control” modes this temporary supply air control remains active until the main control goal is achieved, i.e. when a specific room temperature level is reached. After that, the main control type is re-activated.

Heating - minimum temperature

If this function is activated, and if a supply air temperature sensor is available, a temperature limit under which the temperature of supply air cannot drop (fixed limit) or can drop conditionally (variable limit) must be set.

Default settings and inlet limit values:

- Pre-set air temperature: 18.0°C
- minimum inlet air temperature: 10.0°C
- maximum inlet air temperature: 35.0°C

With room temperature control it is also necessary to select whether the limit is fixed or variable.

Heating - minimum temperature (fixed limit):

If the temperature does not drop below the minimum temperature limit value set.

- Advantage: A draught is prevented as much as possible.
- Disadvantage: The room can get slightly overheated, especially when the set temperature is high, as the controller cannot prevent this by bringing in cool air.

Heating - minimum temperature (variable limit):

A temperature drop below the set value of the minimum temperature limitation can occur if the actual room temperature is higher than the desired temperature by a value that corresponds to the room temperature deviation multiplied by the determining coefficient.

- Advantage: Overheating in the room may be eliminated or minimized using a minimum temperature limit.
- Disadvantage: Supply air temperature dropping below the minimum temperature limit.

Default settings and inlet limit values of the affecting coefficient:

- Pre-set value: 1.0
- minimum inlet value 0.4
- maximum inlet value 4.0

Heating - maximum temperature

If this function is activated and a supply air temperature sensor is available, a temperature value must be set below which the supply air temperature must not fall.

Default settings and inlet limit values:

- Pre-set temperature 60.0 °C
- Minimum inlet temperature 25.0 °C
- Maximum inlet temperature 60.0 °C

Cooling - minimum temperature

If this function is activated and a supply air temperature sensor is available, a temperature value must be set below which the supply air temperature must not fall.

Default settings and inlet limit values:

- Preset temperature 10.0 °C
- minimum inlet temperature 10.0 °C
- maximum inlet temperature 20.0 °C

7.13.8 Standby mode

MATRIX			
200 #	300 #	400 #	400#+IO
	✓	✓	✓

Standby mode is only available with room temperature control. This does not regulate the temperature to a fixed setpoint but to a pre-set range instead. This pre-set range can only be changed by using MATRIX.PC servicing software . Standby mode is active

if an internal room temperature sensor is connected but no required room temperature is available, i.e. there is no controller (e.g. when the construction site is being dried). “Standby mode” is interrupted once the required room temperature is entered.

7.13.9 Room frost protection

MATRIX			
200 #	300 #	400 #	400#+IO
✓	✓	✓	✓

Attention!
This function applies only to units with a heating function.

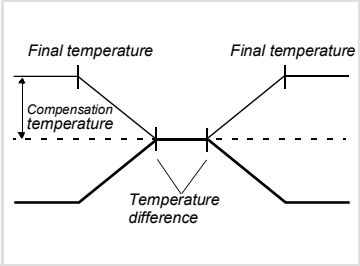
It provides protection against frost in the room when the unit is off.

When room temperature is < 4 °C, the valve fully opens and the fan starts at the lowest speed level regardless of the inlet medium temperature.

Once room temperatures reaches > 6 °C, the valve closes and the fan stops. The unit switches back to normal mode.

7.13.10 Summer/winter offset

MATRIX			
200 #	300 #	400 #	400#+IO
		✓	✓



This function requires an outdoor temperature sensor. This function compensates the required room temperature in relation to outdoor temperature.

Example of application:

The room temperature should be increased by 0.5 °C when the outdoor temperature of 26 °C increases by 1 °C.

Once the outdoor temperature reaches 32 °C, the room temperature should no longer increase. Therefore, 26 °C must be entered as the starting temperature and 32 °C as the final temperature. The required temperature offset is calculated as follows: (final temperature – starting temperature) * 0.5 °C (increase in °C against outdoor temperature)

(32 - 26) * 0.5 = 6 * 0.5 = 3

The factory settings may be changed using MATRIX.PC servicing software.

7.13.11 Filter replacement indication

This function calculates the degree of filter contamination using the time of operation of each of the fan speed levels. When the filter needs replacing, this is indicated as a warning message displayed or confirmed on the display of the MATRIX OP50 / MATRIX OP51 controller. The “Filter replacement” indication appears once the filter’s service life has expired, the minimum service interval has been exceeded or by a contact signal from a differential pressure switch. After this warning message has been confirmed, a new filter service life count begins.

When the filter has been replaced, the operation time counter is reset using the menu on the controller.

7.13.12 Secondary louvre

The secondary louvre supplies air treated by the heating unit into the room being heated in an optimum manner.

The secondary louvre control function sets the optimum angle of discharge of the relevant air flow rate (fan speed) at the current temperature. The room can thus be heated without a draught while at the same time minimizing the stack effect.

Manual control

The secondary louvre moves to the angle set by the controller.

Control by the control system

The optimum position of the secondary louvre is calculated from the fan speed level and required temperature. This function can be adapted by adjusting it to local conditions.

Control system functions

The input parameters of the control system are the fan speed level and required temperature (supply air temperature - room temperature). The following applies to the required temperature:

When the required temperature is low, the supply air temperature is only slightly above the room temperature. The “cold” air flow is set to such a level so as to be no longer perceived in the room. If the required temperature is high, the supply air temperature is significantly above the room temperature. The warm air flow is set to a more downward direction to counteract the strong thermal upward pressure. This moves the point at which the warm air starts rising again to the very top of the occupied area. This means that the flow of air will no longer be perceived.

The following applies to the fan speed and subsequent air discharge velocity:

– At low air discharge velocities the flow of air is directed more steeply downwards.
– At high air discharge velocities the flow of air is directed horizontally sideways.

Once the fan stops, the secondary louvre moves to the top end position after approx. 240 seconds.

Setting the secondary louvre

The secondary louvre is adjusted when a room with air conditioned by heating units should be draught-free.

This adjustment can be done using OP50 and OP51 controllers or the MATRIX.PC service tool.

The absence of draughts in a occupied room depends to a large degree on the fan speed, medium temperature, louvre position and suspension height.

Settings made using controllers are only possible in groups. In this case all units should be at the identical suspension height.

Settings must be made separately for groups consisting of wall-mounted and ceiling-mounted units.

Using the MATRIX.PC service tool it is possible to set each unit in a group individually, even when they are mixed.

Apart from other seasonal factors, the temperature of the media also changes depending on the season. We therefore recommend making settings for various operation points.

Make the setting as follows:

- Switch two-stage and three-stage fans to stage 2.
- Switch stepless EC motors to stage 2 or set the fan speed (on the controller with display) to 66%.
- Set the secondary louvre in the fine-adjustment menu until you reach the required draught-free condition.
- Save the setting.

7.13.13 Air quality control (only MATRIX 400# and 400#+IO)

With air quality control the air flow rate automatically changes depending on air quality in the room. Using the MATRIX.PC service software it is possible to determine whether the increase should be executed by changing the fan speed and/or damper position.

The following settings are available:

– Deactivated: The air quality control function is deactivated
– Fan only: Air quality control only affects fan speed
– Damper only: Air quality control only affects the damper position
– Fan -> damper: Air quality control first affects the electric motor speed up to 100% and subsequently the damper position up to 100% (default setting)
– Damper -> fan: Air quality control first affect the damper position up to 100% and then the electric motor speed up to 100%.

The air quality sensor input is factory set with a 0-10 V output signal and a 0-2000 ppm detection area. If a short circuit or a fault occur at the sensor, the air quality control function will be deactivated.

8 Maintenance and troubleshooting

8.1 Maintenance

Attention!
We recommend commissioning a service contractor trained by the manufacturer to carry out maintenance.

Risk of electrocution!
Disconnect the heating unit from the power supply and secure it against inadvertent reconnection!

Risk of injury from rotating parts!
Wait until the fan stops moving!

Risk of scalding!
Wait until the heat exchanger and heating unit cool down!

Attention!
The maintenance of the heating unit consists of periodic inspection and the remedying of defects (see Table 8-1). Maintenance may only be carried out when the heating unit has been disconnected from the power supply and by qualified personnel.

Inspections must include a functional test of the fan and an inspection of the heat exchanger. The heat exchanger is to be cleaned if necessary. The fan impeller must rotate freely and have the same distance from the inlet nozzle along its entire perimeter.

Regular maintenance interval schedule

The following maintenance must be carried out at the intervals specified:

	Maintenance intervals				
Components	**Quarterly**	**Every 6 months**	**Annually**	**Before cooling period**	**Before winter**
Filter inspection	x				
Air intake inspection*		x			
Outlet louvre inspection*		x			
Fan/fan area inspection*		x			
Inspection of hydraulic line screw connections**			x		
Checking electrical connections			x		
Earthing inspection			x		
Air bleeding the heat exchanger**			x		
Inspection of the heat exchanger and main condensate pan for contamination/clogging and pathogen contamination. Cleaning/disinfection if necessary			x		
Condensate pan cleaning **				x	
Condensate drain/trap inspection on site **			x		
Checking all valves for settings and function **			x		
Operational inspection of the condensate pump (cleaning the condensate pump pan)				x	
Checking the antifreeze in the medium (if used) **					x
** Clean and remove any dirt if necessary* *** Depends on the model*					

Tab. 8-1: Maintenance interval overview

8.2 Quarterly maintenance

8.2.1 Filter replacement

If the unit has a filter module, it is necessary to check the filter for cleanliness. When the pressure drop increases to the maximum level defined in the design, the filter must be replaced.

If a unit with a filtration module has a differential pressure switch, this switch must be set to the value defined in the design. The switch is not factory set. If the pressure drop of the filter reaches the set value, the indicator light on the MC4 control unit indicates the need to replace the filter.

To order spare filter ZH#.38## use the type code of accessories on page 3/

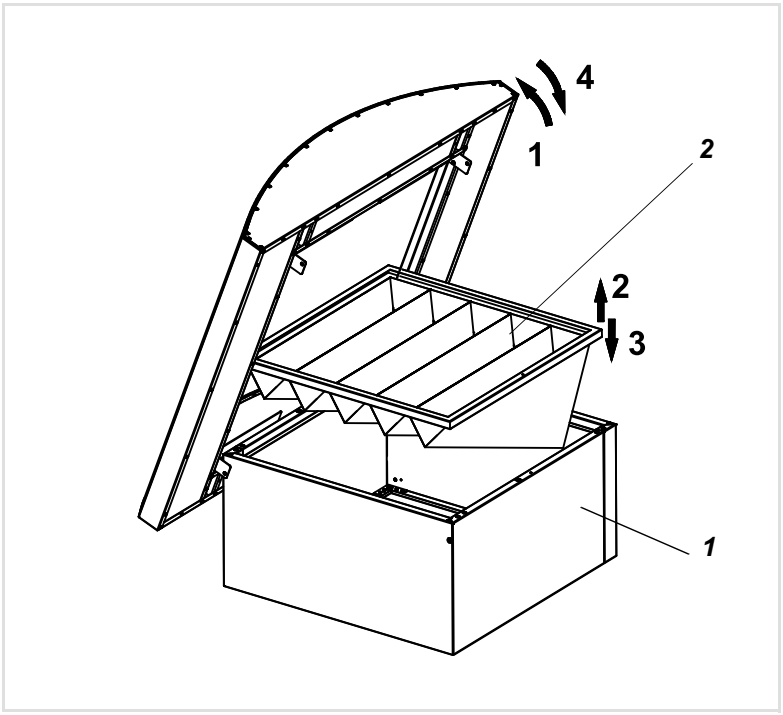


Fig. 8-1: Replacing the filter of roof hood ZH#.35##

Pos. 1: Roof air intake hood
Pos. 2: Bag filter G2, G4 or F7

Unscrew the two bolts with plastic heads on the sides and open the top of the roof outlet hood. Remove the bag filter and replace it. Close the roof hood and screw the bolts with plastic heads back on.

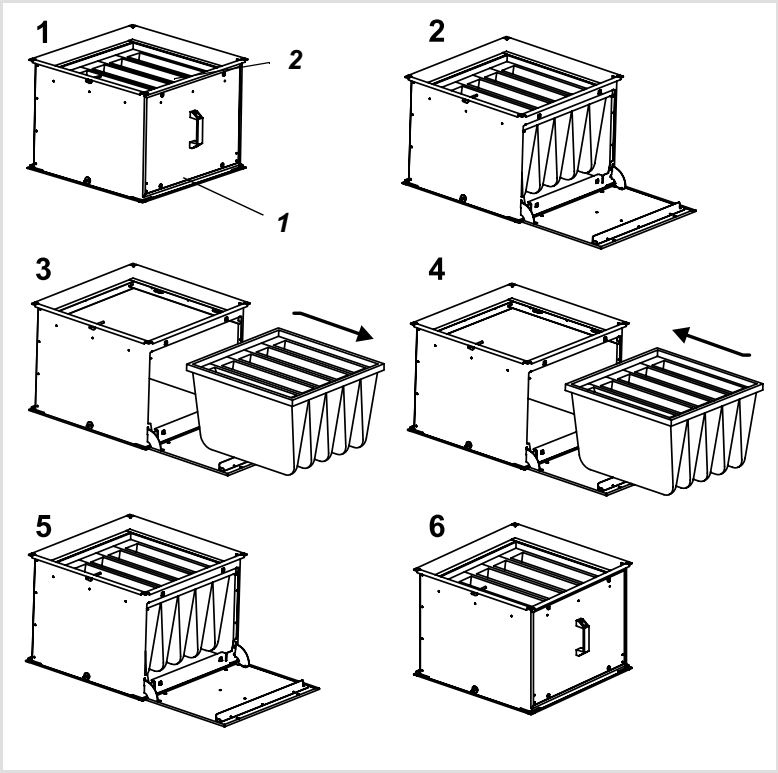


Fig. 8-2: Replacing the filter in bag filter ZH#.36##

Pos. 1: Filter chamber
Pos. 2: Bag filter G2, G4 or F7

Loosen the filter chamber side panel (1) by turning the quick-release locks by 90°, tilt the side panel out, pull out the bag filter and replace it (2). Slide the bag filter into the filter body, close the filter chamber side panel and secure it by turning the quick-release lock by 90°.

To order spare filter ZH#.39## use the type code of accessories on page 3/

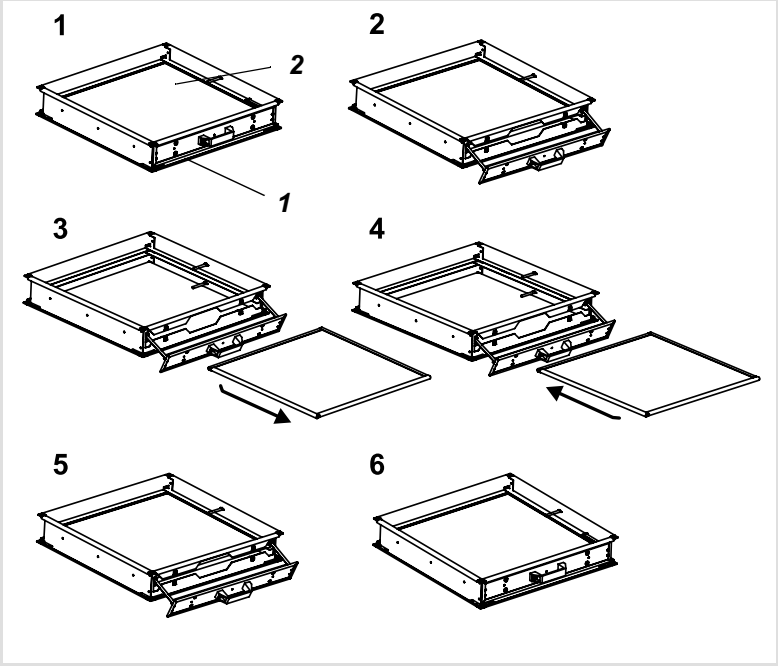


Fig. 8-3: Replacing the filter in flat filter ZH#.370#

Pos. 1: Filter chamber
Pos. 2: Filter G2, G3 or G4

Loosen the filter chamber side panel (1) by turning the quick-release locks by 90° and pull it out. Pull out the filter and replace it (2). Slide the filter into the filter body, close the filter chamber side panel and secure it by turning the quick-release lock by 90°.

To order spare filter ZH#.400# use the type code of accessories on page 3/

8.3 Six-monthly maintenance

8.3.1 Fan inspection

Inspect the following:

- the fan impeller for free movement
- electric motor power supply cable to make sure it is not damaged
- connection of the electric motor power supply cable in the unit's terminal block

8.4 Annual maintenance

8.4.1 Cleaning the heat exchanger

The heat exchanger can be cleaned using a jet of pressurized air or by washing using water with detergent.

To clean the heat exchanger remove some parts of the unit in the sequence (1-3) shown in Fig. 8-4. Clean the heat exchanger by washing its louvres with a jet of warm water (4). Assemble the unit in the sequence (5-7) shown in Fig. 8-4. To commission the unit follow the steps in Chapter 7 "Commissioning".

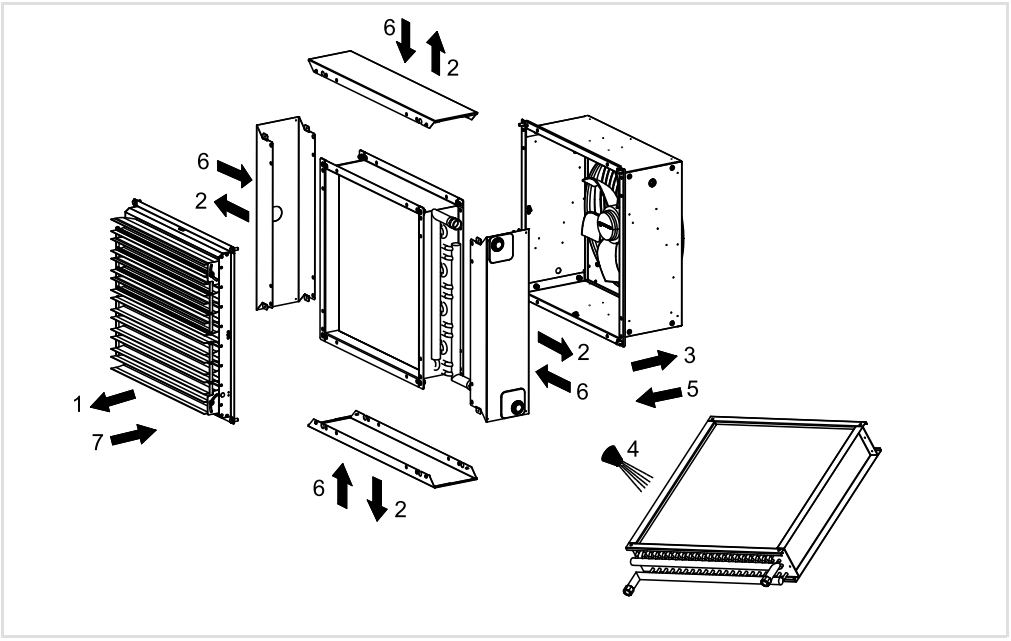


Fig. 8-4: Cleaning the heat exchanger

Damage to the unit!
Do not damage or deform the louvres during cleaning. This will negatively impact heating capacity otherwise. If the heating unit is out of operation in winter, it is necessary to drain water from the heat exchanger. Otherwise, the heat exchanger could be damaged by frost.
When cleaning using a jet of water, this jet must not be directed at the electric motor or electrical components; alternatively, the fan electric motor must be removed.

8.5 Before a period of cooling

8.5.1 Condensate pan cleaning

Only for cooling units

- Clean the condensate pan.
- Check the condensate pan drain and clean if necessary.
- Check whether condensate is draining from the pan properly and check the trap installed on site.

8.5.2 Condensate pump cleaning and operational inspection

This only applies to units with a condensate pump.

The inside of the pump must be cleaned regularly. Before any maintenance, disconnect the pump from the power supply; we also recommend removing it from the holder. Disconnect the suction hose (beware of the residual condensate). Unscrew the pump's locking screws and press down on the 4 plastic latches to disconnect the pan from the pump. We recommend opening it gradually, pressing the two latches on one side first (see Fig. 8-5). Remove the pan and clean it using a weak cleaning solution. Also check that the float is clean and uncontaminated. Replace the pan and check the operation of the unit, including the starting, stopping and alarm activation of the condensate pump (see Chapter 7.3).

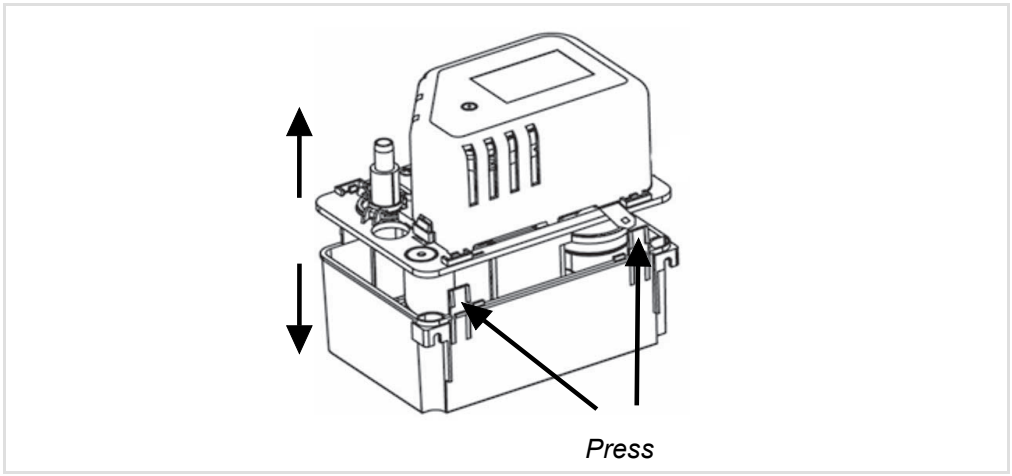
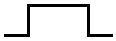


Fig. 8-5: Condensate pump cleaning

8.6 Troubleshooting

Fault	Possible cause	Action
The fan is not working The fan switch (optional) is on The fan speed switch (1-2-3) and I/0 switch LED on control unit MC4 is not on	The unit has not been started	Start the unit
	No power supply	Check the circuit breaker/power supply connection **(only qualified personnel)**
	Electrical cables not connected	Connect the power supply **(only qualified personnel)**
	Faulty circuit breakers	Replace the circuit breakers **(only qualified personnel)**
	The controller disconnected the fan once room temperature has been reached	See the operation manual
The fan is not working The fan switch (optional) is on The Error (!) LED on control unit MC4 is on	Electric motor protection response	Check the temperature of the electric motor and let it cool down if necessary, then start it again* (if this is a recurring problem, determine the cause of overheating)
The unit is excessively noisy	Set speed too high	Reduce speed settings
	Blocked air intake or outlet	Remove narrow or bent sections from the air outlet/intake duct
	Fan bearing noise	Replace faulty fan **(only qualified personnel)**
	Clogged filter	Replace/clean the filter
The unit is not heating/is not heating sufficiently	The fan has not been started	Start the fan
	Low air flow rate	Increase the speed
	Air intake/discharge outlet clogged	Free up and clean the air ducts
	The fan is blocked/faulty	Check the fan and replace it if necessary **(only qualified personnel)**
	Clogged filter	Replace/clean the filter
	Heating medium not hot	Switch on the heater
		Start the circulation pump
		Bleed air from the system
	Low medium flow rate	Check the pump power **(only qualified personnel)**
		Check that the lines run parallel and compensate for the calculated pressure drop
	Required temperature on the controller/ thermostat is set too low	Set the required temperature on the controller/thermostat to a higher level
	The controller/thermostat or the sensor are located above a heat source or exposed to direct sunlight	Move the controller/thermostat/sensor to a more suitable location **(only qualified personnel)**
	The control valve fails to open	Replace the faulty valve **(only qualified personnel)**
The unit is not cooling/is not cooling sufficiently (cooling medium)	The fan has not been started	Start the fan
	Low air flow rate	Increase the speed
	Air intake/discharge outlet clogged	Free up and clean the air ducts
	The fan is blocked/faulty	Check the fan and replace it if necessary
	Clogged filter	Clean/replace the filter (see page 44)
	The cooling medium is not chilled	Start the chiller
		Start the circulation pump
		Bleed air from the system
	Low medium flow rate	Check the pump power **(only qualified personnel)**
		Check line balancing and compensate for the calculated pressure drop **(only qualified personnel)**

Fault	Possible cause	Action
The unit is not cooling/is not cooling sufficiently (cooling medium)	The required temperature level set on the controller/thermostat is too high	Set the required temperature on the controller/thermostat to a lower level
	The controller/thermostat or the sensor is placed in the flow of cool air such as by the door	Put the controller/thermostat or the sensor at a more suitable location **(only qualified personnel)**
	The control valve fails to open	Replace the faulty valve **(only qualified personnel)**
Liquid leaking near the unit	The condensate pan drain is blocked	Clean the condensate pan and condensate drain
	Condensate pump intake line clogged	Clean the condensate pump intake line
	The cooling medium line is not (properly) insulated	Insulate the cooling medium line **(only qualified personnel)**
	The condensate pan is not installed horizontally	Level the condensate pan off **(only qualified personnel)**
	The condensate pump head is too high	Lower the pump head
	The condensate pump pressure hose is clogged	Clean or replace the hose
	Medium or heat exchanger connection fittings are not tight	Check the heat exchanger, air bleed screw and valve connection fittings for tightness
		If necessary, tighten the connection fittings, clean the contact surfaces of the threaded joints or re-seal the fittings **(only qualified personnel)**
		Check valve threaded joints for tightness, clean the sealing surfaces and replace the seals if necessary **(only qualified personnel)**
		Check the welded joints between heat exchanger pipes; if they leak, replace the heat exchanger **(only qualified personnel)**
The controller keeps starting	The controller/thermostat or the sensor is located at an unsuitable place (e.g. near an open door or in the unit's air discharge zone)	Put the controller/thermostat or the sensor at a more suitable location where room temperature can be measured **(only qualified personnel)**
	Heating medium temperature too high/low	Adjust the external temperature curve on the boiler controller Check the control process and adjust it as necessary **(only qualified personnel)**
	Cooling medium temperature too high/low	Adjust the external temperature curve on the chiller controller Check the control process and adjust it as necessary **(only qualified personnel)**
	Other heaters with their own dedicated control system share the same line (branch) (e.g. a heater with thermostatic valves)	Disconnect the medium line if necessary. Check the control system and adjust it as necessary**(only qualified personnel)**

Fault	Possible cause	Action
The fan is not running The red controller LED is flashing: ***Flashing code:***  *= Electric motor fault (TC)*  *= condensate pump fault*  *= frost protection activation*	The thermal protection contact (TC) of the electric motor or the condensate pump alarm contact has opened The fan was disconnected Power electronics/controller and/or fan fault	Check the fan motor thermal protection contact (connection) Replace the power electronic/controller and/or fan motor **(only qualified personnel)** Turn the fan speed selector to position “0”, wait for 3 seconds and start it again
	The T630 mA fuse is defective	Replace the fuse **(only qualified personnel)**
	Condensate pump electric motor is defective	Replace the condensate pump **(only qualified personnel)**
	Pump overheat protection is damaged	**Restore overheat protection (only qualified personnel)**
	Pump intake line clogged	Clean the pump intake line
	Pump floats are dirty	Clean the pump floats
	Supply air temperature dropped to or below 4 °C	Provide a sufficient volume of heating medium
Leak in the area around the unit, no fault reported	The T630 mA fuse is defective	Replace the fuse (**only qualified personnel**)
	Supply air temperature dropped to or below 4 °C	Provide a sufficient volume of heating medium
Leak in the area of the unit, the condensate pump (almost) always running	Pump head too high	Lower the pump head
	The pump pressure hose is clogged	Clean or replace the hose
Condensate pump not running	Faulty electrical connections	Repair the electrical connections **(only qualified personnel)**
	The pump thermal protection contact is faulty	Replace the condensate pump (**only qualified personnel**)
	Faulty condensate pump	Replace the condensate pump (**only qualified personnel**)
	Loose electrical connections	Restore the electrical connections **(only qualified personnel)**
The condensate pump is unusually noisy	The pump is not taking in condensate	Replace the condensate pump (**only qualified personnel**)
	Pump intake line clogged or very dirty	Clean the intake line
	The intake or pressure line is not properly fitted	Properly fit the hoses
	The pump has come loose	Tighten the pump attachment
	The pump insulation is faulty or loose	Replace or tighten the pump insulation
The condensate pump run time too short, too little condensate drawn in	The thermal protection contact switches over due to pump overheat	Replace the pump (only qualified personnel)
The unit and pump are too noisy (vibrations)	Loose	Tighten the pump attachment
	The pump insulation is faulty or loose	Replace or tighten the pump insulation
	The pump is drawing in air	Properly position or clean the suction hose/suction line

** Restart after removing the fault:*
Switch off the unit using the I/O switch at control unit MC4 and then switch it back on.

Tab. 8-2: Faults and troubleshooting

If a fault cannot be rectified by maintenance personnel, contact an authorised service centre.

9 Dismantling and disposal

Damage to the environment!
Multi*MAXX* HN heating units can be dismantled and disposed of only by qualified personnel!

9.1 Dismantling

When dismantling a Multi*MAXX* HN, proceed as follows:

Risk of electrocution!
Before starting any work, disconnect the unit with from the power supply to prevent electric shocks. Ensure that the unit is isolated from the power supply and secured against being switched back on at an appropriate point of the on-site power supply.

Risk of injury from high pressure!
Before decommissioning and dismantling the unit, close and empty all connection lines to achieve atmospheric pressure. This could otherwise result in injury.

- Disconnect all connections, while ensuring that there is no media leakage.
- Disconnect the earthing conductor.

Injury to persons!
Secure the unit against sliding. Comply with the transport guidelines.

9.2 Disposal

Recycling
Ensure that operating supplies, packaging and replacement parts are disposed of in a safe and environmentally-friendly manner. Carry this out in accordance with local recycling options and regulations.
For disposal the parts must be separated as well as possible and sorted according to material type (see the Material Specifications on page 11).

Damage to the environment!
All parts and operation substances such as oil, cooling medium and water-glycol mixture must be ecologically disposed of following local legislation and regulations.

The disposal of the unit and its components must be carried out by a authorised specialist firm. This firm must make arrangements for the following:

– Separation of the parts of the unit according to material type
– Separation of the operating media according to their properties
– Compliance with all local and international regulations and rules regarding material disposal:
  – Waste Electrical and Electronic Equipment Directive (OEEZ) 2012/19/EU
  – Directive on Waste 2008/98/EC

EC DECLARATION OF CONFORMITY

pursuant to Directive 2006/42/EC of the European Parliament and of the Council (government regulation No. 176/2008 Coll.)
(original EC Declaration of Conformity) 2020/043/5AB15601

Manufacturer:
FläktGroup Czech Republic a.s., Slovanská 781, 463 12 Liberec XXV – Vesec, Czech Republic, IC (Company ID): 46708375

Entity authorized to compile technical documentation:
FläktGroup Czech Republic a.s., Slovanská 781, 463 12 Liberec XXV – Vesec, Czech Republic, IC (Company ID): 46708375

Description and identification of machinery:

Heating units

SAHARA® *MAXX/*Multi*MAXX®*

Model type **HN**##.#######.###; **HS**##.#######.###; **HD**##.#######.###; **HB**##.#######.###
Incl. accessories

Ventilation units

SAHARA® *Vent/MAXX®* Vent

Model type **VN**##.#######.###; **VS**##.#######.###
Incl. accessories

SAHARA® *MAXX/*Multi*MAXX®* heating units are used for the heating, ventilation, cooling or filtration of indoor or outdoor air. SAHARA® *Vent/MAXX®* ventilation units are used for the ventilation or filtration of indoor or outdoor air. They are intended for installation in industrial, storage, retail or exhibition premises. SAHARA® *MAXX/*Multi*MAXX®* heating units and SAHARA® *Vent/MAXX®* ventilation units are designed for mounting on the wall or ceiling. The heating and ventilation units consist of a load bearing frame with casing, a heat exchanger (only in heating units), air outlet louvres, a ZIEHL-ABEGG fan with protective grille and electrical components.

Declaration:
This unit complies with all relevant provisions of European Community Directives 2006/42/ES, 2014/30/EU and 2014/35/EU.

List of harmonized standards applied in conformity assessment:
CSN EN ISO 12100:2011, CSN EN ISO 14120:2017, CSN EN ISO 13857:2020, CSN EN ISO 11202:2010, CSN EN ISO 3746:2011, CSN EN 60335-1 ed.3:2012, CSN EN 60335-2-40 ed.2:2004, CSN EN 61000-6-2 ed.3:2006, CSN EN 62233:2008, CSN EN 55014-2:2017

This declaration applies exclusively to the machinery in the condition in which it is being introduced into the market and does not include parts added by the end user at a later date or subsequent modifications made by the end user.

Issued in Liberec on: 19/ 05/ 2020

Name, position: Ing. Eduard Horbal', Chairman of the Board

Signature

Year of manufacture:

FläktGroup

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Air Treatment | Air Movement | Air Diffusion | Air Distribution | Air Filtration
Air Management | Air Conditioning & Heating | Controls | Service

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