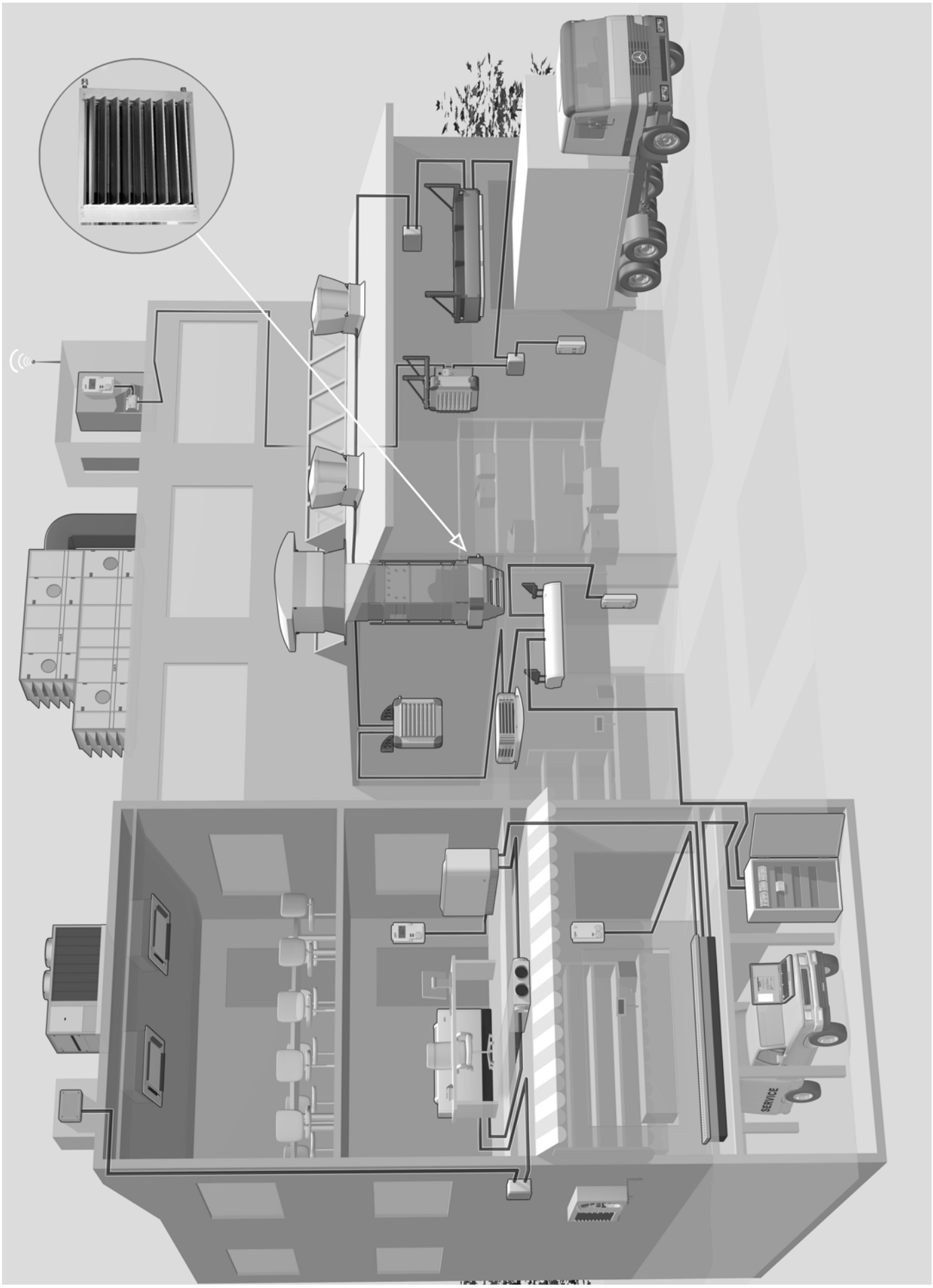
FläktGroup

Multi*MAXX*® HS

OPERATION MANUAL

Product Range

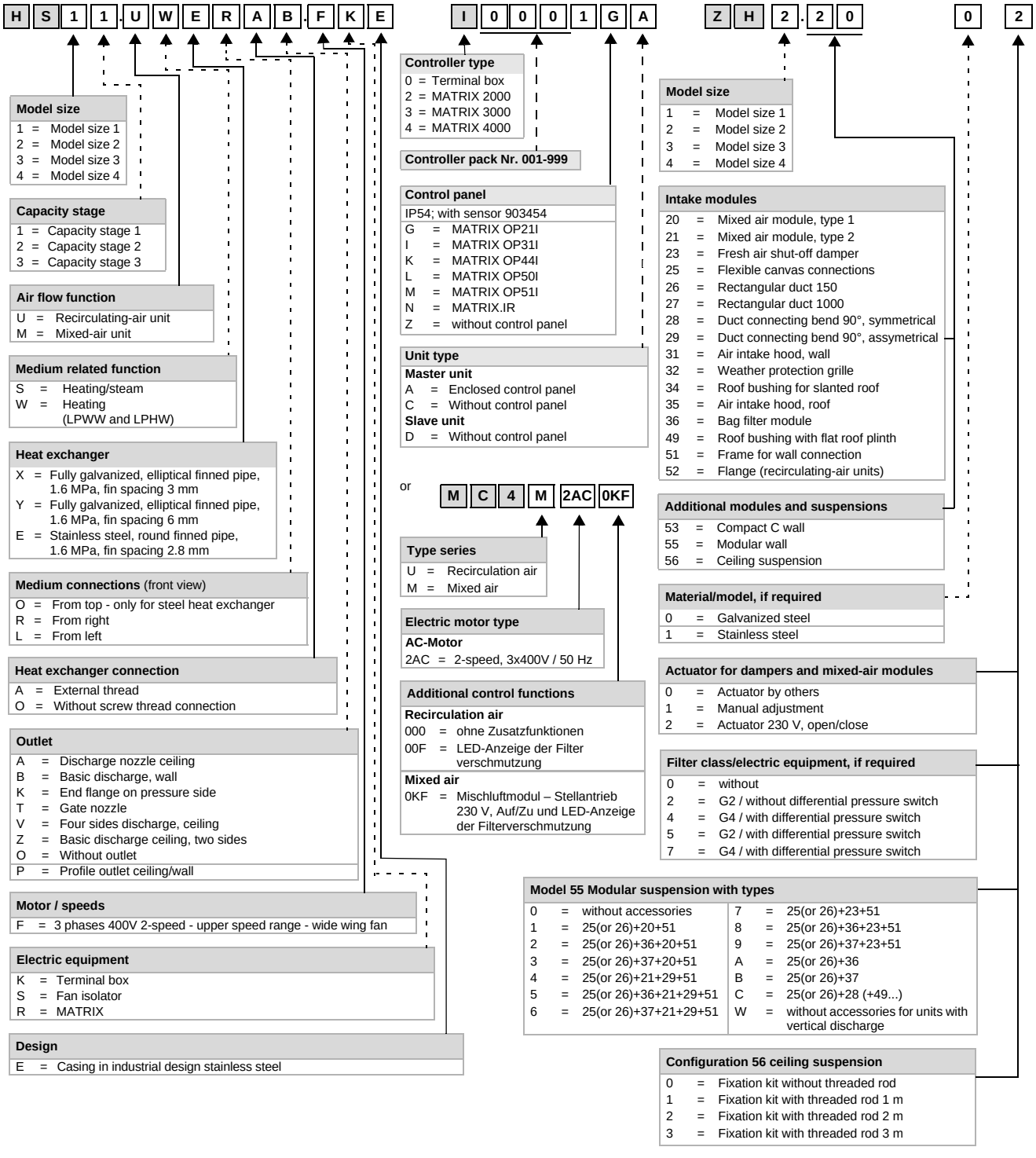


Unit Type Code

Multi*MAXX* HS

Controls

Accessories



1) *MC4 control is not included in base unit*
2) *Only galvanized steel sheet*

1 Safety and User Information

This is an original operation manual verified by the manufacturer.

The Multi*MAXX* unit heaters are designed and manufactured in accordance with the state-of-the-art technological standards, established technical safety codes and EG Directive on Machinery.

Multi*MAXX* unit heaters are highly reliable in operation and meet strict quality standards. This product range combines future-oriented technology with a high level of user friendliness and ease of maintenance.

However, unit heaters could pose unavoidable residual risk of injury or risk of equipment or property-damage only accidents. Therefore your personal safety and the proper operation of the unit depend on the strict observance of the safety instructions. Failure to follow the safety precautions could result in death, serious injury or equipment or property-damage-only accidents.

Observing the safety instructions in the current operation manual will help avoid the risks, ensure economical operation of the unit and enjoy full benefits of the product.

The safety aspects covered by this chapter are valid for the entire operation manual.

1.1 Scope of the operation manual

This operation manual covers critical points on the following subjects:

– Shipping
– Assembly
– Installation
– Electrical connection
– Medium/coil connection
– Commissioning
– Operation
– Maintenance, cleaning and disposal

1.2 Used symbols

The following symbols are used to highlight specific text sections in this operation manual:

– Indicates text paragraphs
• Indicates work steps
✓ Indicates work results

NOTE!

Refer to this section for additional information on energy-efficient operation of the Multi*MAXX* HS unit heater.

RECYCLING!

This symbol clarifies proper procedure for recycling of package material and disused unit components. These components need to be separated according to their featured material type.

The following designations and symbols are used for specifying safety instructions.

RISK OF ACCIDENT DUE TO ELECTRICAL CURRENT!
This symbol indicates a risk of accident due to electric shock.

PERSONAL INJURY!
This section specifies procedures and precautions for preventing personal injury.

DANGER DUE OVERHEAD LOADS!
This symbol warns you about personal injury and damage caused by overhead loads.

DANGER OF HOT SURFACES!
This section specifies procedures and precautions for preventing personal injury resulting from contact with hot surfaces.

DANGER OF SHARP CUTTING EDGES!
This section specifies procedures and precautions for preventing personal injury resulting from cuts on thin metal fins.

HIGH PRESSURE HAZARD!
This section specifies procedures and precautions for preventing personal injury resulting from high pressure.

DANGER OF ROTATING UNIT PARTS!
This section specifies procedures and precautions for preventing personal injury resulting from rotating unit components.

RISK OF ACCIDENT DUE TO HOT MEDIUM!
This section specifies procedures and precautions for preventing personal injury resulting from contact with hot medium.

DANGER OF INFLAMMABLE SUBSTANCES!
This section specifies procedures and precautions for preventing personal injury resulting from fire hazard.

ENVIRONMENTAL DAMAGE!
This symbol warns about damage to the environment and turns attention to all existing national environmental protection regulations.

EQUIPMENT DAMAGE!
This section specifies procedures and precautions for preventing damage to Multi*MAXX* HS unit.

DAMAGE RISK DUE TO STATIC DISCHARGE!
This symbol precedes a warning on static-discharge damage to unit electronic components.

1.3 Safety-conscious working

Observe the following instructions during installation, settings, service and maintenance tasks:

ELECTRICAL HAZARD!

Disconnect all electric power of the unit and ensure the power cannot be inadvertently energised, earth, short-circuit and block off all neighbouring live parts. Non-compliance can lead to death or serious injury.

DAMAGE RISK DUE TO STATIC DISCHARGE!

While carrying out connections or adjustments on the Multi*MAXX* HS unit heater make sure that you discharge yourself statically before touching PC boards and electrical components.

Fluctuations and imbalance in supply voltage must not exceed tolerance limits specified on the unit identification plate; otherwise this could cause severe unit malfunction or failure.

1.4 Proper use

Multi*MAXX* HS unit heaters shall only be used only for heating, filtering and ventilating indoor and outdoor air of industrial facilities, warehouses, sales and exhibition buildings. Filters, mixed-air and air-intake modules, suspension sets, control units and control devices can be supplied as optional accessories.

Proper use also stipulates the observance of the current operation manual as well as adherence to all inspection and maintenance intervals specified by FläktGroup.

Improper use

Any use other than that described above is considered improper. The manufacturer/supplier is not liable for any damages arising from improper use. The user alone bears the risk.

PERSONAL INJURY!

Multi*MAXX* unit heaters shall not be operated:

– in explosion risk areas;
– in rooms with high dust or moisture content
– in rooms with strong electromagnetic fields
– in rooms with aggressive environment that may attack plastics.

The following accident prevention regulations are valid (VBG1, BGV A2 (previously: VBG4), VBG7w, VBG9a) and generally recognized codes for machinery and principles of engineering, in particular DIN VDE 0100, DIN VDE 0105.

1.5 Safety regulations and codes

While performing assembly, electric installation, commissioning, maintenance and service of the Multi*MAXX* units relevant national safety regulations and codes as well as generally established technical practices (e.g. the following CSN norms) shall be considered.

1.6 Modifications and changes

Do not attempt to modify, add components, or convert the Multi*MAXX* unit heater in any way.

Changes or modifications of the unit heater shall invalidate the CE conformity and render and all warranty claims as null and void.

1.7 Spare parts

Only original FläktGroup spare parts are allowed, since FläktGroup is not liable if third-party spare parts are used.

1.8 Personnel selection and qualification

NOTE!

It must be ensured that every person working on the Multi*MAXX* HS unit has read and understood entire operation manual. Please read this document fully before commencing any work, and not while performing a task.

Electrical connection shall only be carried out by qualified licensed staff or other individuals with proper professional training and experience in the following areas:

– Regulations concerning health and safety in the workplace
– Accident prevention regulations
– Directives and recognized codes of practice

All skilled individuals shall be able to assess, what the work entrusted to them entails, and shall be able to recognize and avoid all associated dangers.

2 Technical Description

2.1 Technical description and scope of supply

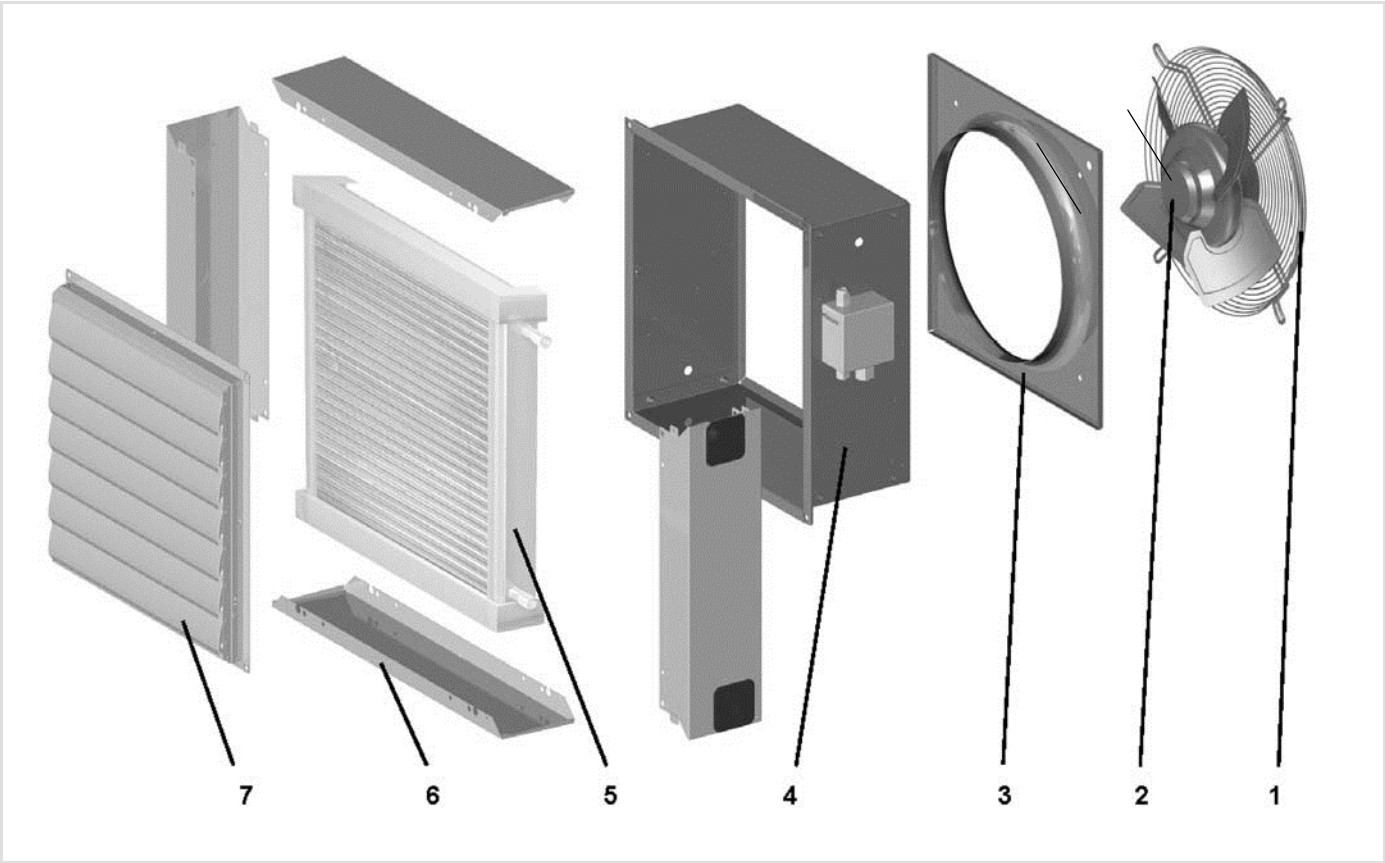


Fig. 2-1: Unit components

1: Contact protection grille
2: Wide wing fan with external rotor motor
3: Air intake nozzle
4: Fan casing
5: Heat exchanger, fully galvanized
6: Heat exchanger casing
7: Basic outlet

2.2 Specification of materials

Unit components	**Material**
Fan with contact protection grille	Various materials
Intake nozzle	Galvanized metal sheet
Fan module	Stainless steel
Heat exchanger	Fe/FeZn or stainless steel
Unit casing	Stainless steel
Outlet	Stainless steel or aluminium lacquered fins
Terminal box / fan isolator	Various materials

Tab. 2-1: Specification of materials

2.3 Unit components

Multi*MAXX* HS unit heater comprises the following parts: fan and heat exchanger with casing performed. The casing is performed in stainless steel sheet. The discharge side can be fitted with a maximum 8 different outlet types. The wide-wing fan is fitted in the fan section on the rear side, with a contact protection grille preventing contact with these components.

Unit rear side provides connections for air-supply accessories. The side of the fan section is used to secure the unit with brackets or suspensions on the wall or below the ceiling.

2.4 Operating conditions

Medium types The unit is not designed for medium types that can damage or destroy the surface coating due to corrosive, chemical or abrasive effects. Only non-corrosive and non-combustible liquids or steam shall be used as a medium.

2.5 Unit dimensions Multi*MAXX* HS and arrangement of heat exchangers connections

2.5.1 Medium function - W

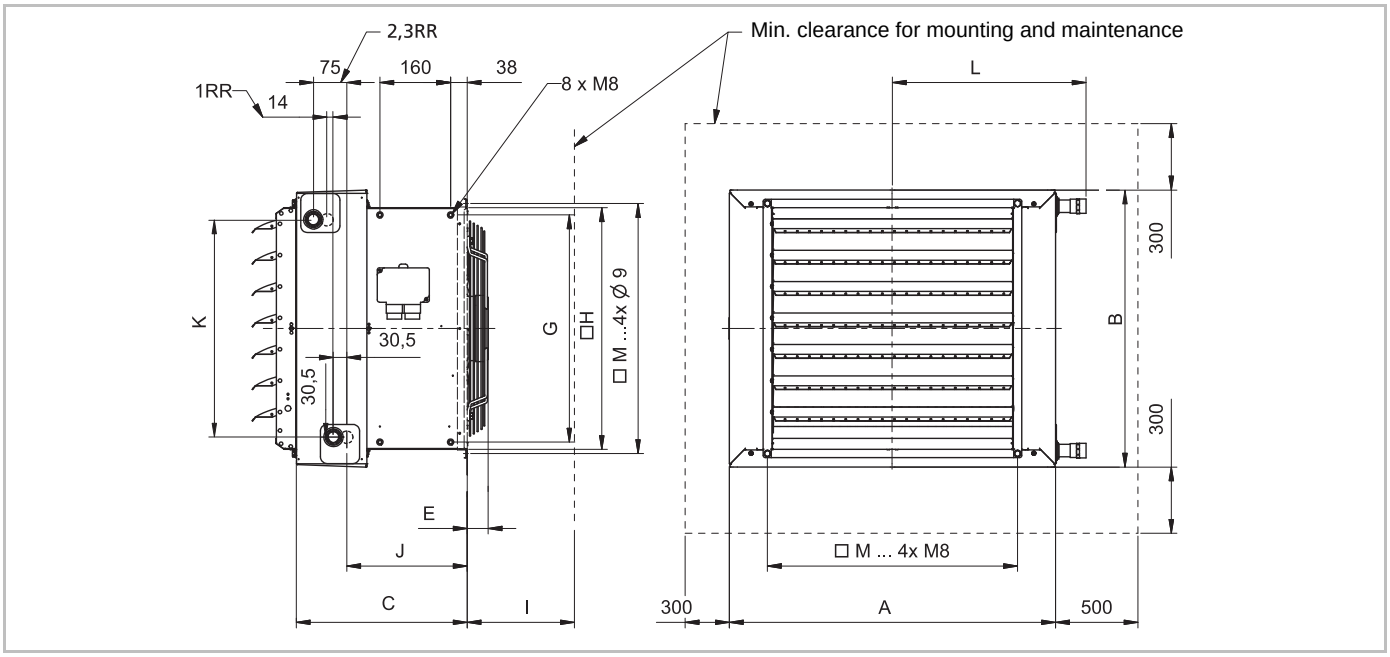


Fig. 2-2: Dimension of unit heater and arrangement of heat exchanger connection fitting

Unit dimensions table for function W:

Dimensions [mm] / Unit size	1	2	3	4
A	642	738	866	1026
B	520	616	744	904
C	387	387	387	452
E	60	81	100	112
G	418	514	642	802
H	451	547	675	835
I	300	300	400	400
J	273	273	273	348
K	396	492	620	780
L	361	409	473	553
M	470	566	694	854

Tab. 2-1: Unit dimensions

2.5.2 Medium function S - only heating/steam

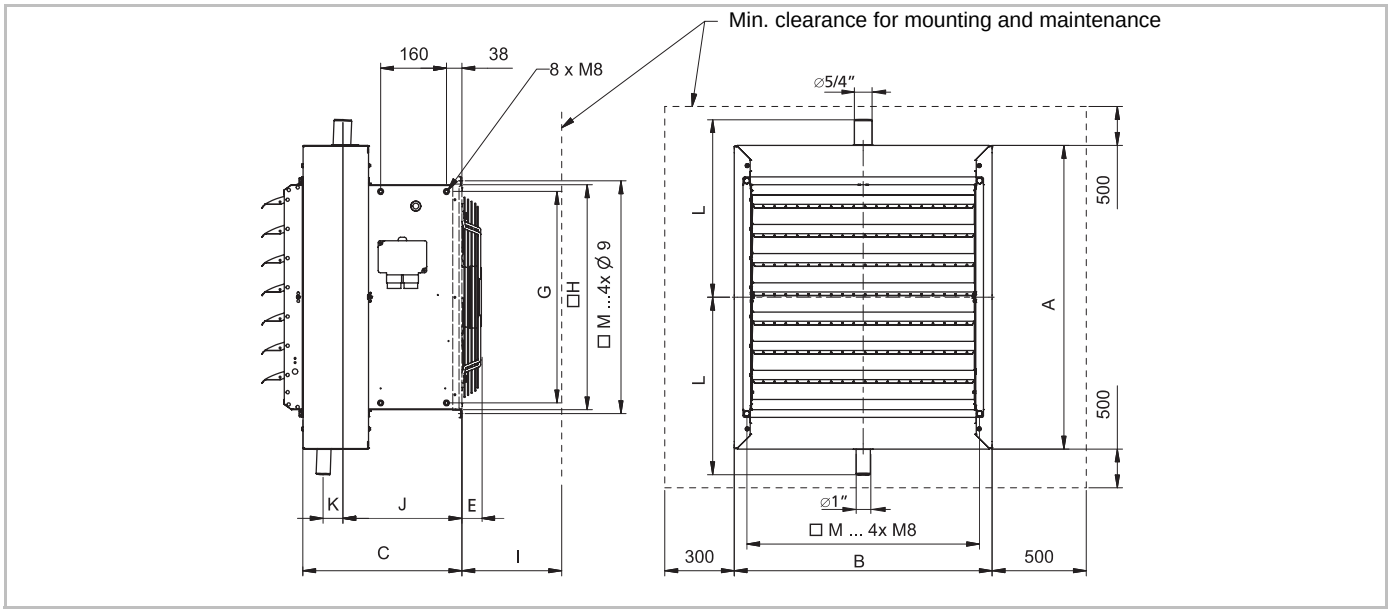


Fig. 2-3: Dimension of unit heater and arrangement of heat exchanger connection fittings

Unit dimensions table for function S

Dimensions [mm] / Unit size	1	2	3	4
A	642	738	866	1026
B	520	616	744	904
C	387	387	387	452
E	60	81	100	112
G	418	514	642	802
H	451	547	675	835
I	300	300	400	400
J	273	273	273	348
K	41	45	49	55
L	361	409	473	553
M	470	566	694	854

Tab. 2-2: Unit dimensions

2.6 Heat exchangers connections

Unit size		1			2			3			4		
Rows		**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Pipe connections													
Stainless steel (water)	Threaded pipe / A (external thread)	-	R 1"		-	R 1"		-	R 1 1/4"		-	R 1 1/4"	
	Smooth bore pipe / O *	-	33,8		-	33,8		-	42,4		-	42,4	
Stainless steel (steam)	Smooth bore pipe / O *	33,8		-	33,8		-	42,4		-	42,4		-
Gealvanized steel (water)	Threaded pipe / A (external thread)	R 1"		-	R 1"		-	R 1 1/4"		-	R 1 1/4"		-
	Smooth bore pipe / O *	33,8		-	33,8		-	42,4		-	42,4		-
Gealvanized steel (steam)	Smooth bore pipe / O *	42,4 (inlet) 33,8 (outlet)	-	-	42,4 (Vorlauf) 33,8 (outlet)	-	-	42,4 (Vorlauf) 33,8 (outlet)	-	-	42,4 (Vorlauf) 33,8 (outlet)	-	-

Tab. 2-3: Heat exchangers connections (external ∅ d [mm])*

2.7 Unit weight and water charge of heat exchanger

Unit size	Weight with heat exchanger			Water chanrge of heat exchanger	
	Stainless steel (E) 2,8 mm kg	Fe/Fe Zn (X) 3 mm kg	Fe/Fe Zn (Y) 6 mm kg	Stainless steel (E) l	Fe/FeZn (X, Y) l
HS11	46	55	43	-	3,8
HS12	67	77	-	6,8	7,2
HS13	71	-	-	9,5	10,1
HS21	63	72	54	-	5,2
HS22	90	102	-	9,8	10,1
HS23	96	-	-	13,9	15,3
HS31	88	100	80	-	7,4
HS32	127	139	-	13,2	14,4
HS33	140	-	-	19,8	21,5
HS41	123	144	114	-	10,7
HS42	177	198	-	19,2	20,9
HS43	197	-	-	28,5	30,1

Tab. 2-4: Weight data include basic discharge and 2-speed fan motor

2.8 Operating limits

NOTE!
All other important data about unit capacity, weights, connections and sound power is specified in the „Data and Facts Multi*MAXX* HS".

Unit

Max. allowed ambient temperature	-20°C to +40°C
Operating voltage	3 x 400 V, 50 Hz
Protection class	IP54
Power consumption	refer to type code

Heat exchanger Fe/FeZn

Max. operating temperature	160°C (water) 180°C (steam)
Max. medium pressure	1 row - 1.6 MPa, 2 rows - 1.0 MPa (water) 1 row - 0.8 MPa (steam)

Stainless steel heat exchanger

Max. operating temperature	160°C (water, steam)
Max. medium pressure	2 rows - 1.2 MPa, 3 rows - 1.0 MPa (water) 1 row - 1.6 MPa, 2 rows - 1.2 MPa (steam)

2.9 Sound and electric data

Unit size	Speed	A-rated sum level		Max. power draw kW	Max. current draw A
	RPM	Sound power dB(A)	Sound pressure dB(A)		
AC-Motor F - 3 x 400 V 2-speed (high speed range)					
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	62	0.31	0.86
	660	69	55	0.20	0.50
4	910	81	66	0.51	1.31
	760	76	61	0.37	0.76

Tab. 2-5: Sound and electric data

** Sound pressure: standard values at 5 m distance to the unit side, at maximum air flow rate and low reflection room. Industrial hall volume 1,500 m3, absorption surface 200 m2 Sabin, hemi-spherical radiation = direction coefficient 2. These values can be significantly influenced by the indoor characteristics in a positive or negative way.*

2.10 Air side accessories

The following accessories can be supplied for the Multi*MAXX* HS unit heater

Description	Order-Nr.	Design
Mixed air module, type 1*	ZH#.201#	Recirculating and outside air offset by 90°, stainless steel, Al profil
Mixed air module, type 2*	ZH#.211#	Recirculating and outside air opposite at 180°, stainless steel, Al profil
Blocking damper outside air*	ZH#.231#	Stainless steel
Flexible canvas connections	ZH#.2510	Elastic spacer, max. overall length 150 mm, stainless steel
Rectangular duct 150	ZH#.2610	Spacer, overall length 150 mm, stainless steel
Rectangular duct 1000	ZH#.2710	Overall length 1000 mm, stainless steel
Duct connecting bend 90°, symmetrical	ZH#.2810	90° symmetrical, tapers to a peripheral mounting frame, stainless steel
Duct connecting bend 90°, asymmetrical	ZH#.2910	90° symmetrical, tapers to a peripheral mounting frame, stainless steel
Air intake hood, wall	ZH#.3100	Galvanized metal sheet
Weather protection grille	ZH#.3200	Galvanized metal sheet, overall depth 45 mm
End grille for accessories	ZH#.3310	for connecting accessories to intake side, stainless steel
Duct through slanted roof	ZH#.3400	Galvanized metal sheet
Air intake hood, roof	ZH#.350#	Painted metal sheet in RAL 9002 with bird protection grille, without filter set or with filter set
Bag filter for roof air intake hood	ZH#.3802 ZH#.3804	Filter G2 Filter G4
Bag filter module	ZH#.361#	Module with filter
Spare bag filter for module „36“	ZH#.3902 ZH#.3904	Filter G2 Filter G4
Duct through roof with flat roof plinth	ZH#.4900	Galvanized metal sheet
Frame for wall connection	ZH#.5110	As spacer for wall opening
Flange	ZH#.5210	Only for recirculating air units, stainless steel
Suspension type compact C	ZH#.5310	For recirculating air units, stainless steel
Modular type suspension	ZH#.550#	Only wall mounting
Ceiling suspension	ZH#.5600 ZH#.5601 ZH#.5602 ZH#.5603	Installation without threaded rod Threaded rod 1 m - M10 Threaded rod 2 m - M10 Threaded rod 3 m - M10

Tab. 2-6: Air side accessories

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

NOTE!
For all other data on air-side accessories refer to „Data and Facts – Multi*MAXX* HS Unit Heater“.

2.11 Specification for the Ecodesign Directive passed by the EU Commission 2016/2281

The values presented in the table below are provided to ensure the implementation of the EU Directive 2016/2281. This Directive sets the framework for the requirements to the environmentally-friendly design of energy-related products such as air heaters, air coolers, units for air cooling in industrial processes with high operating temperature and fan coil units.

Unit size	Unit code	Type of electric motor	Speed	Heating capacity	Total power consumption	Air volume flow	Sound power level (depending on speed)
				$P_{rated,h}$ [kW]	P_{elec} [kW]	V [m^3/h]	L_{WA} [dB(A)]
1	HS13.#W####	AC	1	4,4	0,090	1340	67,0
			2	5,0	0,140	1730	71,0
2	HS23.#W####	AC	1	6,7	0,190	2010	69,0
			2	8,0	0,290	2800	76,0
3	HS33.#W####	AC	1	10,9	0,200	3100	70,0
			2	12,5	0,310	4020	76,0
4	HS43.#W####	AC	1	18,5	0,370	5520	76,0
			2	20,3	0,510	6740	81,0

Tab. 2-7: Values according to the EU Directive 2016/2281
Specified values valid for 2-pipe systems - water temperature 45/40°C, air inlet temperature +20°C. rel. humidity 50%

3 Shipping and Storage

3.1 Shipping

Manufacturer's instructions regarding transporting and storing the unit must be followed (see labels on the packing).

NOTE!

- When the unit heater is delivered and unpacked, check that the delivery is correct according to the despatch note, and also check for completeness and transit damage.
- Ship and store unit heaters in original packing.

EQUIPMENT DAMAGE!

- After the shipment ensure that the unit is not damaged.

NOTE!

Claims for damage or missing parts can only be filed with the insurance company only if shipping damage is confirmed by an authorized worker of the transportation company.

3.2 Transport and handling of unit

- Attach lifting gear to the designated points of the assembly unit. Chains/slings should not be knotted and/or be exposed to sharp edges. Special attention must be given to equal weight distribution.

Only lifting gear with sufficient load carrying capacity is allowed.

DANGER OF SUSPENDED HEAVY OBJECTS!

Do not raise units overhead with personnel below units.

PERSONAL INJURY!

Do not use damaged transport devices.
Use a fork lift truck only if the unit is placed on a pallet.

DANGER – SHARP CUTTING EDGES!

Use personal protective equipment such as safety gloves, footwear and clothes for unit shipping.

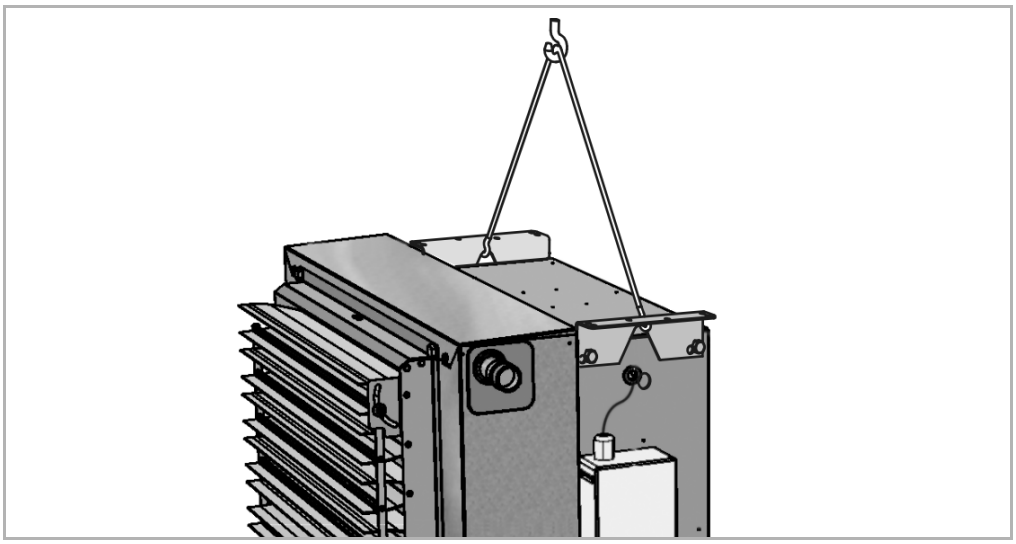


Fig. 3-1: Transport of unit

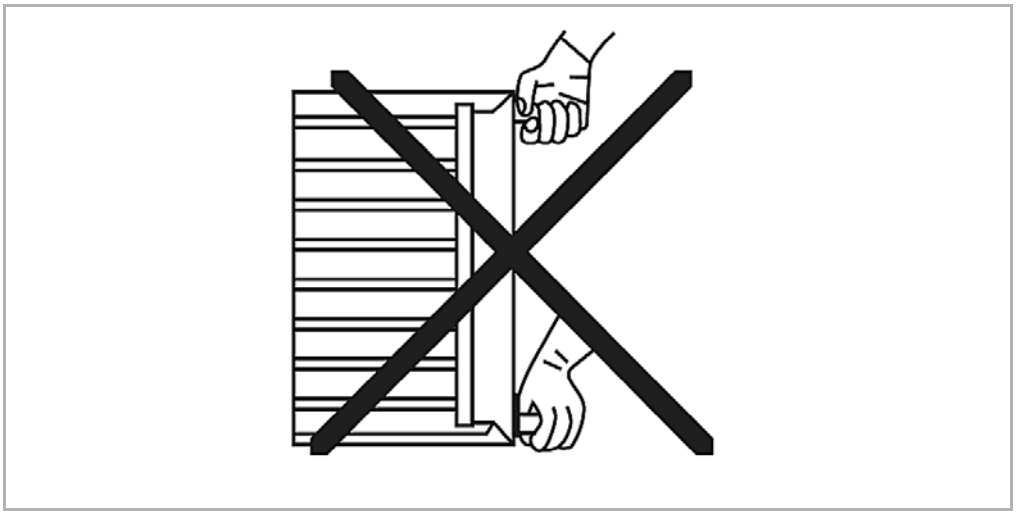


Fig. 3-2: Shipping

3.3 Storage

The Multi*MAXX* HS unit heater must be protected from humidity and dirt. Store the unit in rooms that meet IE 12 standards and EN 60 721-3-1 requirements.

NOTE!
Allowed storing conditions:
Air temperature: -25 °C to +40 °C
Air humidity: between 50 and 85 % (relative humidity with no condensation)

4 Assembly

4.1 Load-bearing capacity of the installation site

NOTE!

The assembly site must be vibration-free and suitable for permanently supporting the weight of the unit heater. If necessary, the approval of a structural engineer or architect must be received.

For mounting the unit, 2 sets with M10 nuts are placed on the fan module – refer to Fig. 2-2 and Fig. 2-3. The fixing material is enclosed with suspensions.

4.2 Ceiling installation

It is necessary to consider the suspension height, the distance between the units and minimum distance from the ceiling.

Table with suspension height of unit for ceiling mounting

Unit size	Suspension max. (m)
HS11	11.5
HS12	9.8
HS13	9.0
HS21	14.0
HS22	13.0
HS31	13.0
HS32	12.0
HS33	11.0
HS41	14.5
HS42	13.0
HS43	12.0

The data in the chart are standard values and apply to the discharge temperature, if the latter exceeds indoor temperature by 15 - 20 K.

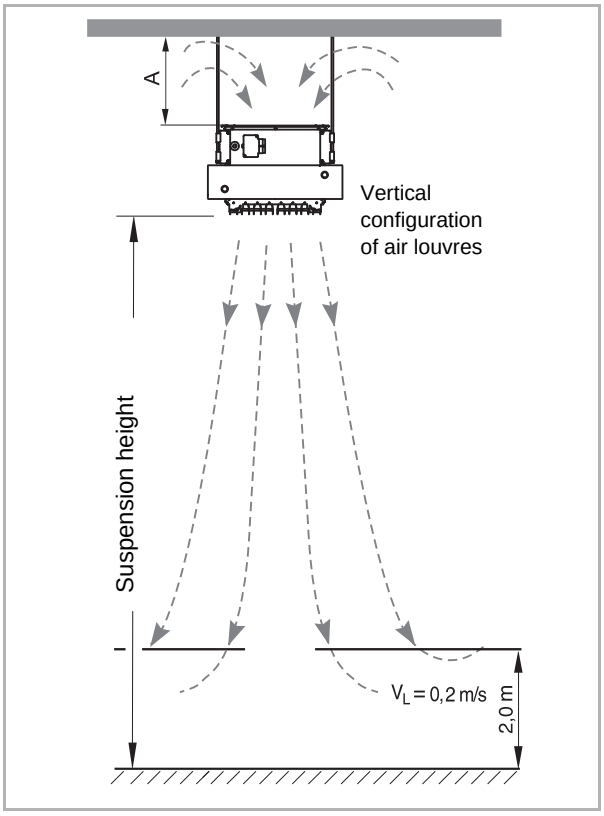


Fig. 4-1: Suspension height for ceiling installation

NOTE!

The maximum height of the unit ceiling installation varies depending on the discharge temperature, reduced speed and air volume flow due to accessories.

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

It is necessary to keep the minimum distance to allow sufficient air intake and provide sufficient access for maintenance.

Model size	1	2	3	4
Clearance A (mm)	300	300	400	400

Unit clearance with ceiling installation (refer to Fig. 4-2)

In order to provide favourable air distribution pattern in the occupied zone we recommend that the following distances between units are maintained:

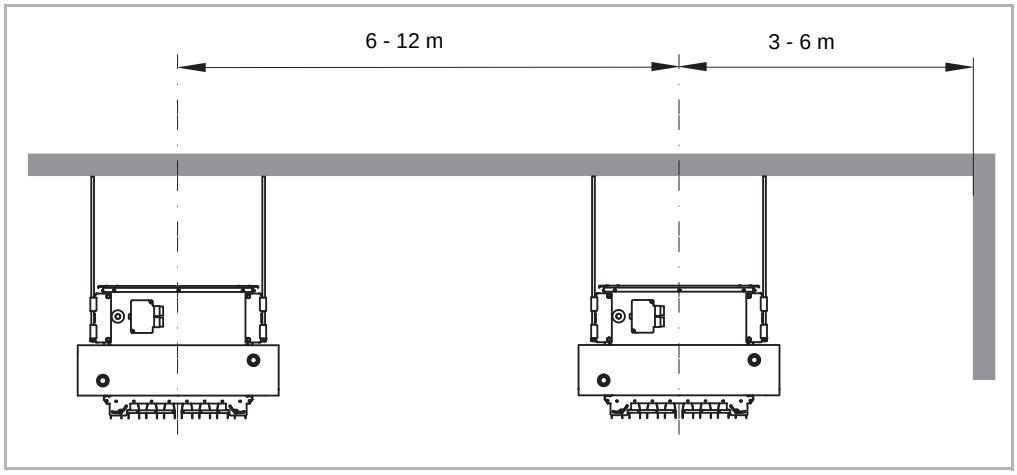


Fig. 4-2: Distance between units with ceiling mounting

The ceiling installation for recirculating air units with suspension „ceiling“ (ZH#.560#) is given in Fig. 4-6 and for mixed air units - refer to Fig. 4-8.

4.3 Wall installation

It is necessary to consider the minimum height, the direction of discharged air flow, distance between units and minimum distance from the wall (refer to Fig. 4-3).

PERSONAL INJURY!
The minimum permissible height above the floor amounts to 2.7 m.

NOTE!
The wall mounted unit heaters should not be placed too high above the floor in order to ensure that the air near the floor is well mixed.

Direction of discharged air flow

Discharge air flow should be directed as to avoid air draughts in the room. The primary air flow must not be directed against walls, beams, cranes, shelves, columns or similar obstacles!

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

The distances between units depend on the heat demand, number of units and their arrangement.

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

It is necessary to keep the minimum distance to allow sufficient air circulation and provide adequate access for maintenance.

Model size	1	2	3	4
Clearance A (mm)	300	300	400	400

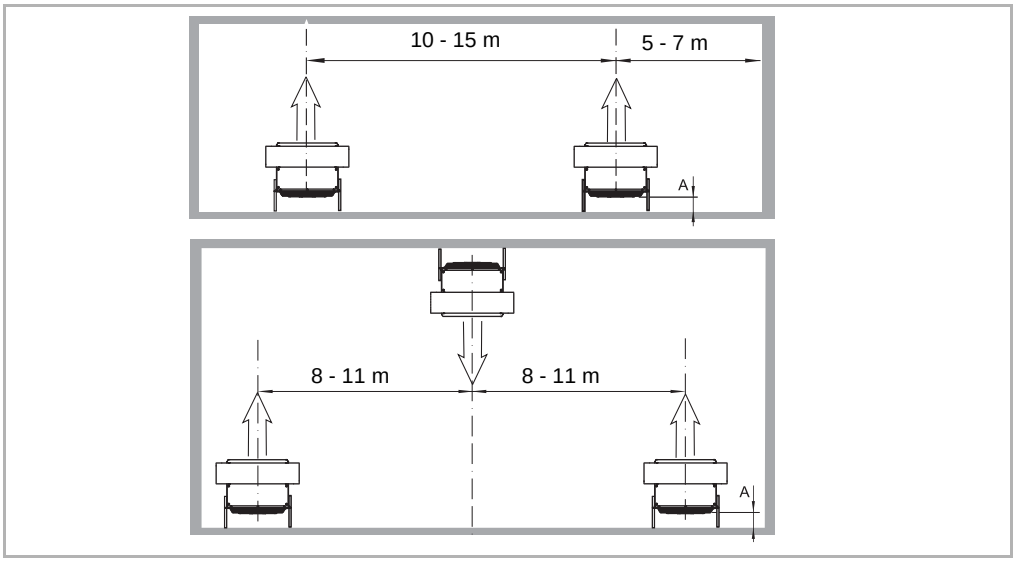


Fig. 4-3: Distance between units with wall mounting

Air throw

Air throws are specified in the following table:

Unit model	Air throw max. (m)
HS11	8.2
HS12	7.7
HS13	7.1
HS21	9.5
HS22	9.1
HS23	8.7
HS31	9.3
HS32	8.9
HS33	8.1
HS41	10.8
HS42	10.2
HS43	9.6

The data in the chart are standard values and apply to the discharge temperature if the latter exceeds indoor temperature by 15 - 20 K.

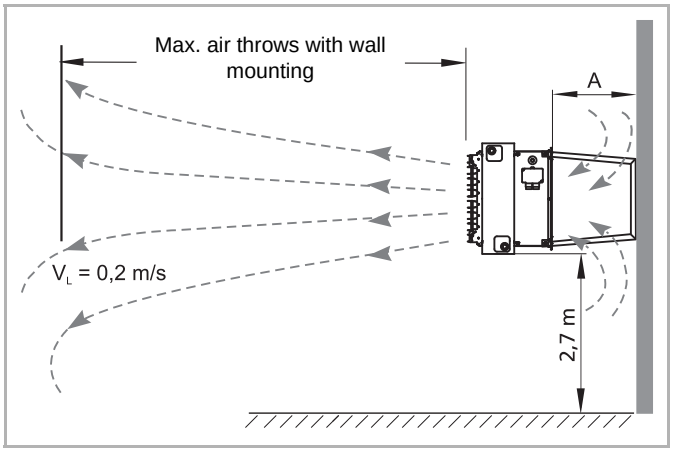


Fig. 4-4: Air throws with wall mounting

For wall mounting of a recirculating-air unit with „Compakt C“ suspension (ZH#.5310) refer to Fig. 4-6, with "Modular" suspension (ZH#.551#) - refer to Fig. 4-5, with "ceiling" suspension (ZH#.570#) - refer to Fig. 4-7.

4.4 Sicherheitsabstand

NOTE!
When installing your unit heater. the following safety clearances must maintained: at least 400 mm from unit sides and 1.000 mm in air flow direction.

4.5 Unit installation

NOTE!
Units should be installed in a safe, reliable and visually correct manner. For these reasons, it is recommended to use manufacturer's suspensions.

EQUIPMENT DAMAGE!
The unit must be installed in a stain-free, vibration-free and twist-free way.

NOTE!
Units must be fitted level to the ceiling to allow access for air venting and bleeding of heat exchanger.
Fixation points: unit heaters are secured in at least 4 fixation points. Screws of the transport safety device shall be used. The casing of the heat exchanger must be protected during soldering of connection fittings.

4.6 Montage der Geräteverkleidung

Heizgeräte Multi*MAXX* HS werden komplett einschließlich der montierten Verkleidung geliefert.

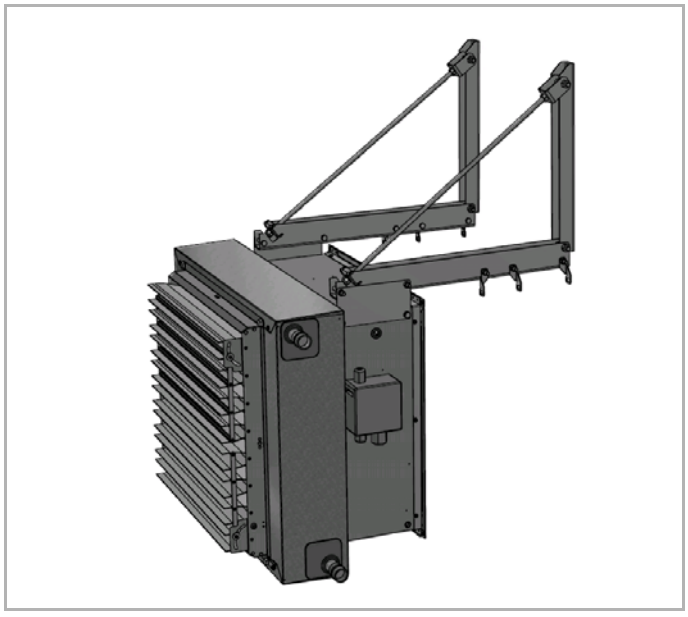


Fig. 4-5: Wall mounting of a recirculating air unit with „Modular" suspension (ZH#.550#)

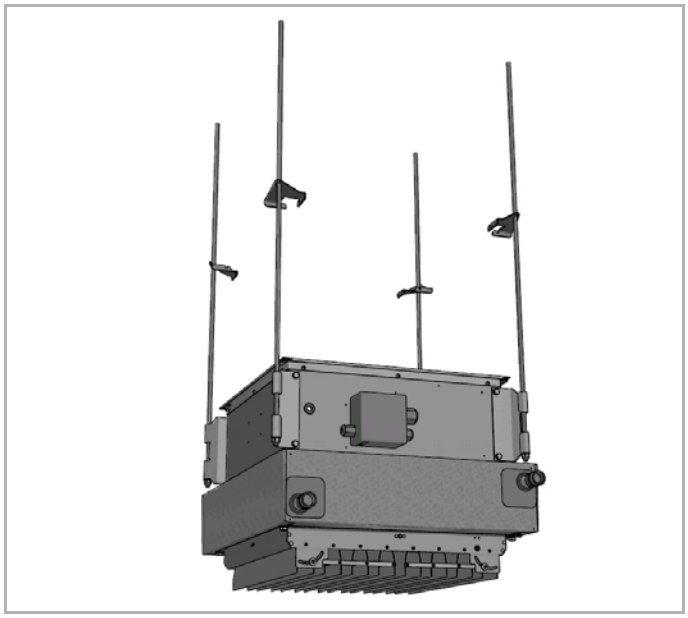


Fig. 4-7: Ceiling mounting of a recirculating air unit with „ceiling" suspension (ZH#.570#)

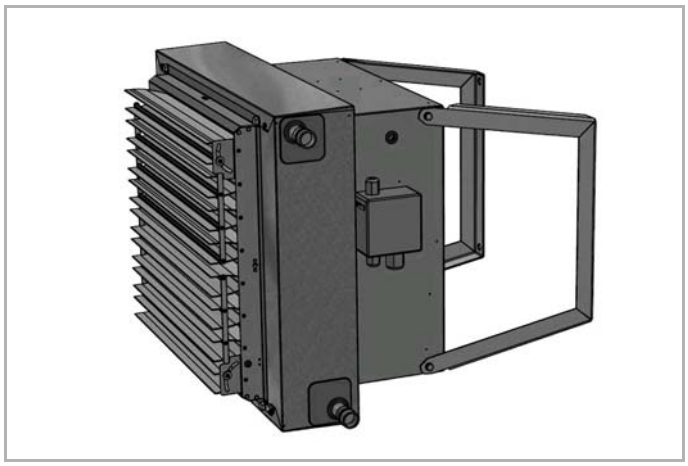


Fig. 4-6: Wall mounting of a recirculating air unit with „Compakt C" suspension (ZH#.530#)

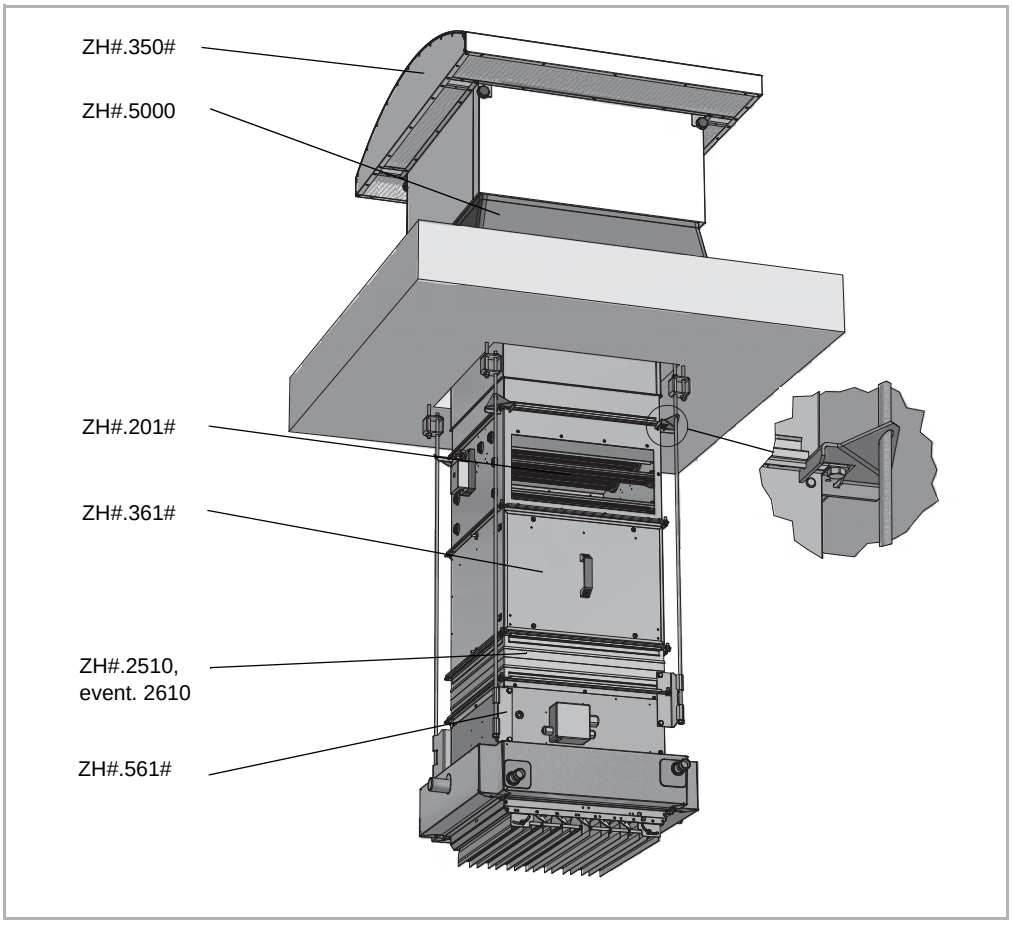


Fig. 4-8: Ceiling mounting of a mixed air unit with „ceiling“ suspension (ZH#.560#)

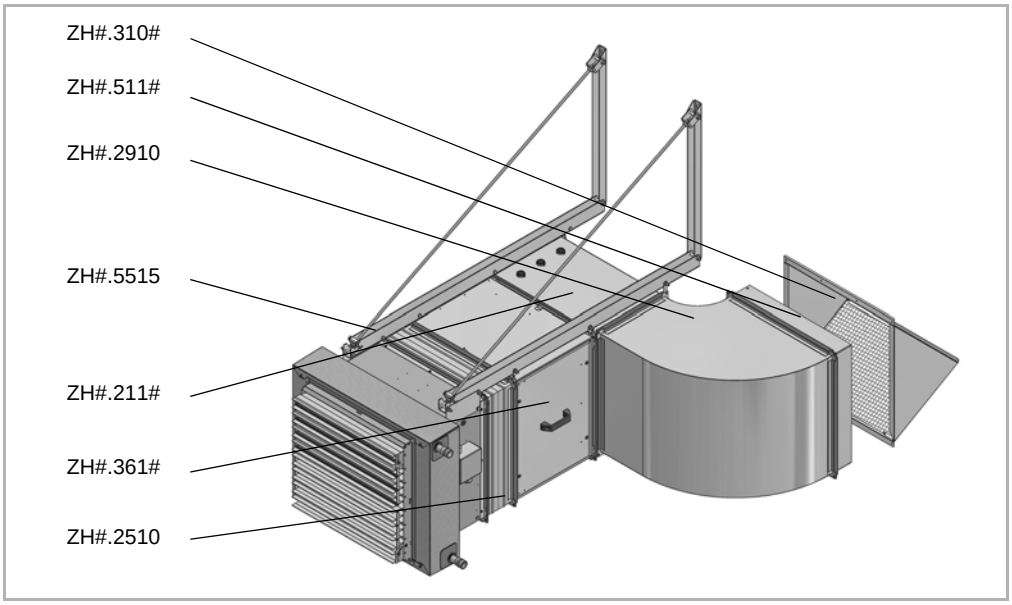


Fig. 4-9: Wall mounting of a mixed-air unit with „Modular“ suspension (ZH#.550#)

With mixed air units the flange for mounting accessories is fitted by the manufacturer; with recirculating air units the flange (ZH#.5210) must be ordered as an accessory and fitted by others on site.

For wall arrangement the mixed air section ZH#.20## must be fitted as to provide side suction of recirculating air (refer to Fig. 4-9).

Flexible canvas connection (ZH#.2510) or rectangular duct 150 (ZH#.2610) must be fitted as the first add-on module for a mixed air unit.

5 Coil Connection

5.1 Pipe connections

NOTE!
The supply and return piping should be run in such a way as to prevent mechanical stress and without placing a strain on the heat exchanger with sufficient clearance around the unit to allow for maintenance and servicing.

Connected piping: pipe and heat exchanger venting must be performed by others on site!

Attention! Inlet and outlet heating coil connections: give special attention to fitted labels!

EQUIPMENT DAMAGE!
Use a pipe wrench when attaching piping to coil fittings to prevent damage (refer to fig. 5-1).

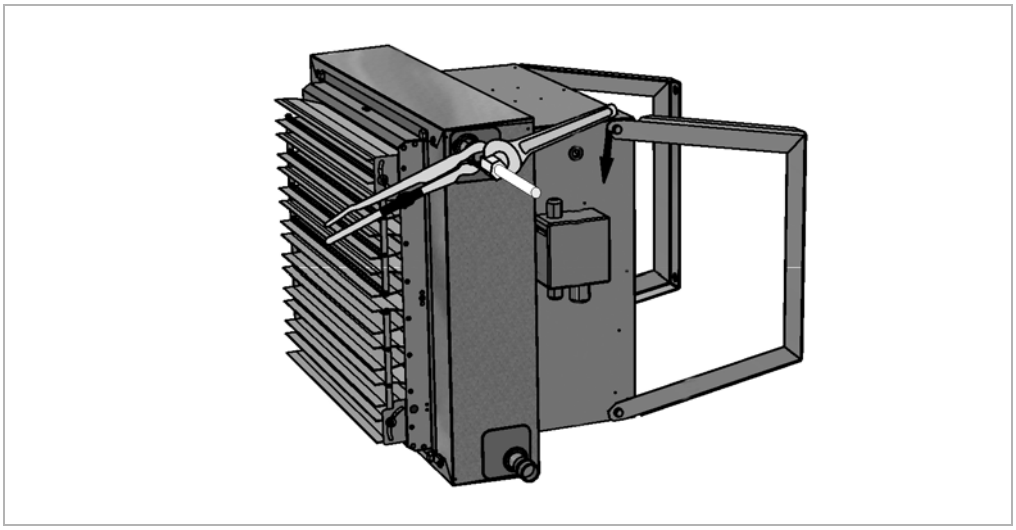


Fig. 5-1: Connecting unit heaters to pipework

5.2 Dimensions of heat exchanger connections

For dimensions refer to fig. 2-2 and fig. 2-3 on page 11 and page 12 as well as heat exchanger connections in tab. 2-3.

6 Electrical Connection

HAZARDOUS VOLTAGE!

The electrical installation of the Multi*MAXX* HS unit heaters shall only be carried out by qualified licensed electrical engineers in compliance with this operation manual and the current regulations:

– VDE regulations, including safety regulations
– Accident prevention regulations
– Installation instructions

6.1 Connection diagrams

The electrical connection of Multi*MAXX* HS unit heaters shall be performed in accordance with the valid wiring diagrams. The wiring diagram is attached to the inside cover of the unit connection box or is enclosed separately.

HAZARDOUS VOLTAGE!

The wiring diagrams do not contain any protective measures.
Currently valid standards and regulations must be observed and checked with the local power company.

Control/power electronics	Fusing
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
Control	B 6 A

Tab. 6-1: Fusing

6.1.1 Cable connections

The cable connections shall be performed in compliance with the local regulations and code of practice.

The selection of cable type and cable cross section shall be performed by a qualified electrical engineer. Addition of components by others and field line runs must be designed for high temperatures and fitted with spacers.

Electrically screened line shall be used for the PTC thermistor. whereas earth screen shall be connected on one side to the protective conductor terminal (PE) in the control unit. The decision to attach earth screen at both ends shall only be made on site (e.g. in case of severe interference). whereby the relevant applicable local regulations and codes shall be observed.

After successful cable installation all cable entry points shall be sealed in a splash-proof manner.

6.1.2 Motor protection using thermal contact

Multi*MAXX* HS fan motors are standard fitted with thermal contacts.

Fan fusing and over-temperature protection as well as unit deactivation in case of malfunction is performed by connecting a thermal contact in the control cabinet.

If the unit is operated via external control. the thermal contact must be integrated in the safety circuit.

In this case FläktGroup can not assume any warranty obligations for such unit.

6.1.3 Operation of basic unit

Unit heaters (both recirculating and mixed air units) can be operated with control units (refer fig. 6-37 and fig. 6-38). Operation with frequency converters or switch units with voltage reduction (e.g. transformer) is not possible.

6.2 Terminal box or electrical switch box

Depending on the model type, Multi*MAXX* units are fitted with:

— Plastic terminal box or

— Stainless steel sheet electrical control box.

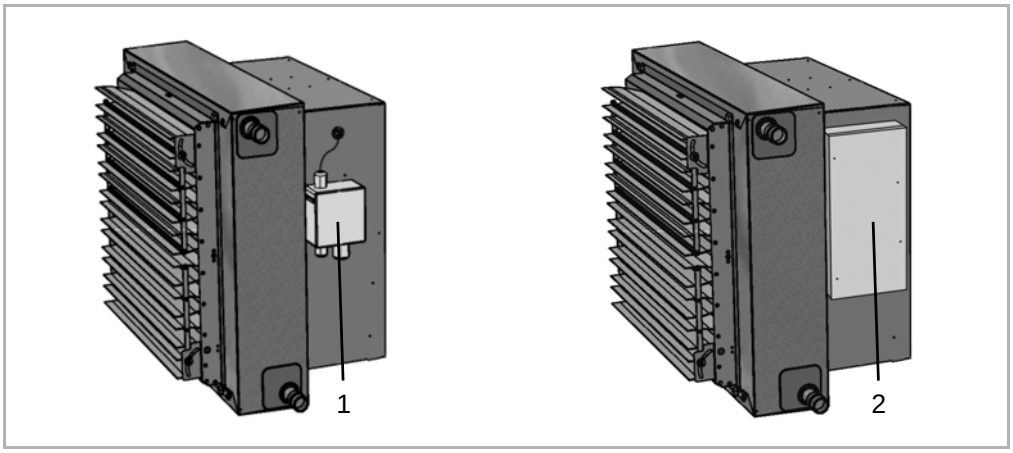


Fig. 6-1: Pos. 1: Plastic terminal box / electric control box
Pos. 2: Stainless steel sheet el. control box

Plastic terminal box

The terminal box contains a terminal strip and, depending on the model, may also contain additional electrical parts.

Metal steel electric control box

The metal sheet electric control box contains control / power electronics (MATRIX 2001/3001, 2002/3002/4002, 2003/3003/4003, 4004).

NOTE!
In some cases free terminals for connecting electrical equipment are not available in the terminal box and fan isolator. An additional terminal strip by others is required.

6.3 Connection with control units MC 4

The components are connected via a terminal strip. Depending on a particular model and coil connections, the terminal strip is placed in a plastic terminal box and mounted on the right or left side of the fan casing.

ATTENTION! CONTROL UNITS!

Connection diagrams are enclosed with the relevant control unit or intermediate terminal box.
Use the following control cables for connection:
— Control cable, depending on the unit configuration and local codes and regulations
— Thermal contact connection using 0.5 mm control cable with screen performed as aluminium clad sleeve, e.g. J-Y(ST)Y 2x2x0.8.

6.4 Connection with controls provided by others

The components are connected via a terminal strip. Depending on the particular model and coil connections, the terminal strip is placed in a plastic terminal box and mounted on the right or left side of the fan casing.

NOTICE ON CONTROLS BY OTHERS!

For details on connecting individual assemblies (e.g. fan, anti-freeze facility, etc.) refer to the unit-specific wiring diagram enclosed with the main unit.
Before commencing electrical connection, check that the order code of the unit electrical equipment matches the wiring diagram.

Give special attention to the left rotary field while connecting 2-speed motors!

HAZARDOUS VOLTAGE!

Before opening the connection box, the unit heater must be de-energised and isolated at all poles.
• Connections must only be performed in accordance with the unit-specific wiring diagram.

NOTICE ON FUSING!

Consider the maximum current consumption of the relevant fan motor (see Chapter 2.9)

6.5 Motor terminal diagram for 2-speed three-phase external rotor motor

- With thermal contacts
- Winding Δ/Y
- Without voltage switch-over!
- Operating voltage: 3 x 400 V

6.5.1 2-speed operation at operating voltage 3 x 400 V

- With two-speed control unit MC 4
- Connection cable: 6 + PE = 7 wires
- Electrically screened cable: 2 TK connecting wires

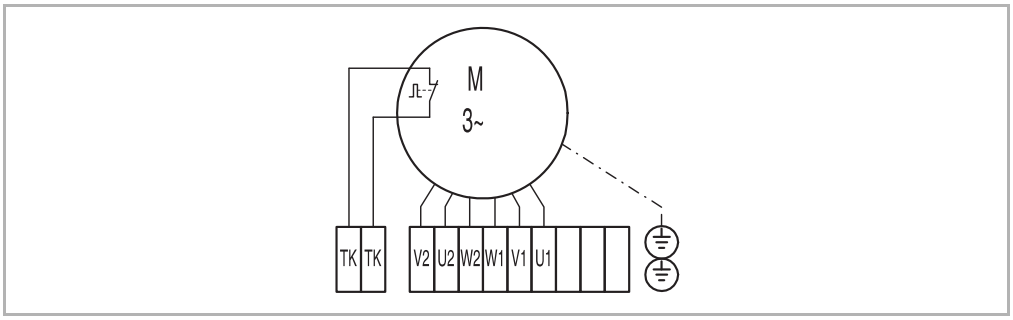


Fig. 6-2: Motor terminal diagram - 2-speed operation

6.5.2 1-speed operation at operating voltage 3 x 400 V

- Connection cable: 3 + PE = 4 wires
- Electrically screened cable: 2 TK connecting wires

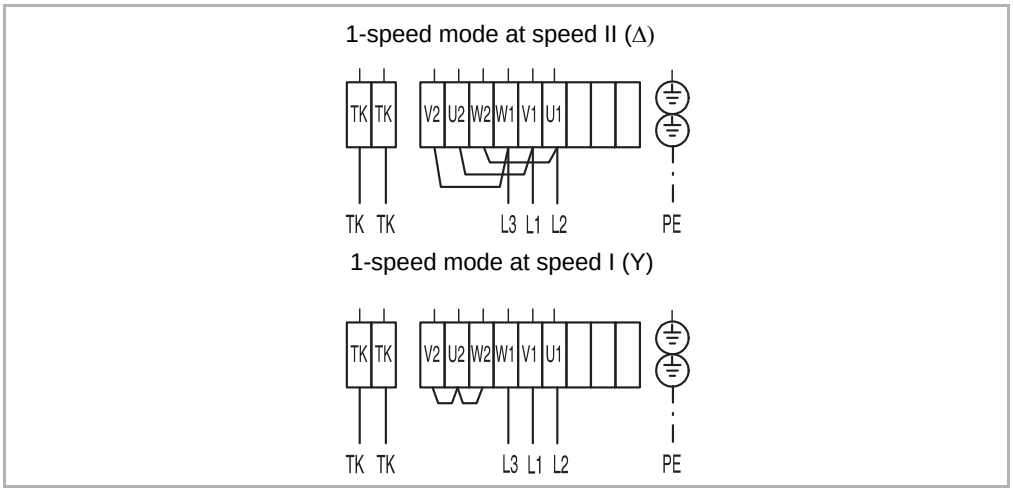


Fig. 6-3: Motor terminal diagram - 1-speed operation

NOTE!

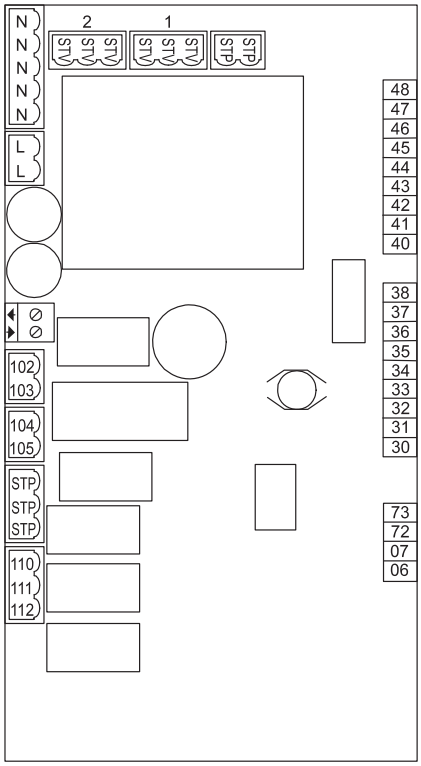
In order to ensure proper operation of the unit, rotation direction marked with an arrow on the fan impeller must be maintained. If the fan is rotating in the wrong direction, the reversal is carried out by changing 2 phases.

6.6 Overview of the MATRIX control electronics

MATRIX control electronics is built into an electrical control box. The following overview illustrates different control PCBs. In order to enable necessary connections, the following PCB layouts show the relevant controller type. You can also check the controller type (e.g. MATRIX 3001) in the wiring diagram attached to the inside of control box cover or on the PCB sticker.
For each connectable component an individual table indicates possibilities of connecting electric equipment to the supplied controller hardware.

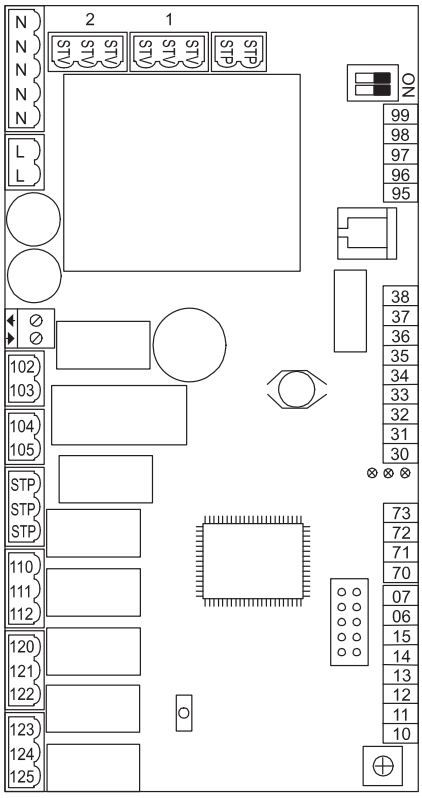
6.6.1 Controller type MATRIX 2001 and MATRIX 3001

MATRIX	
2001	3001
✓	



- Power supply
- Control panel connection
- Connection of other units with MATRIX 200#
- External room sensor

MATRIX	
2001	3001
	✓

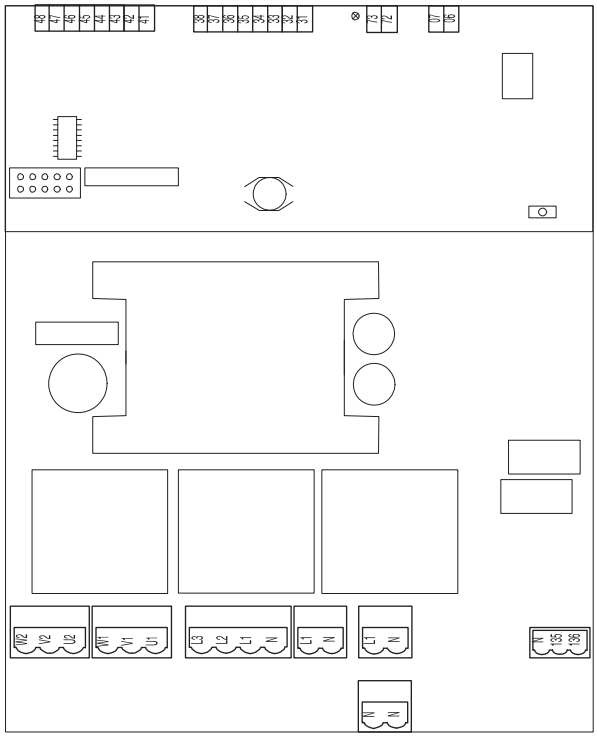


- Power supply
- Connecting secondary air louvres
- Control panel connection
- Connection of other units with MATRIX 200#/300#
- Inlet temperature sensor
- External room sensor
- Supply air sensor
- Status and error messaging
- External control input

Fig. 6-4: Controller type MATRIX 2001 and MATRIX 3001

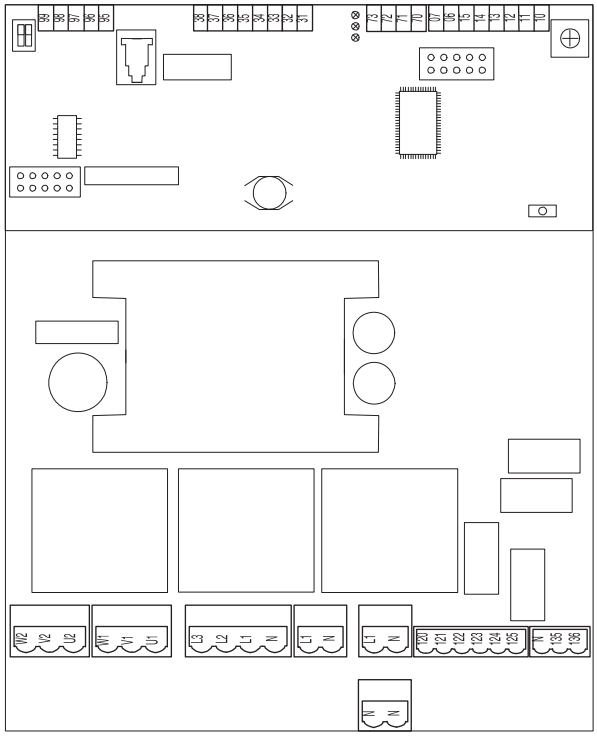
6.6.2 Controller type MATRIX 2002 and MATRIX 3002

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



- Power supply
- Secondary air louvre (in combination with MATRIX 3000 system)
- Control panel connection
- Connection of other units with MATRIX 200#
- External room sensor

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

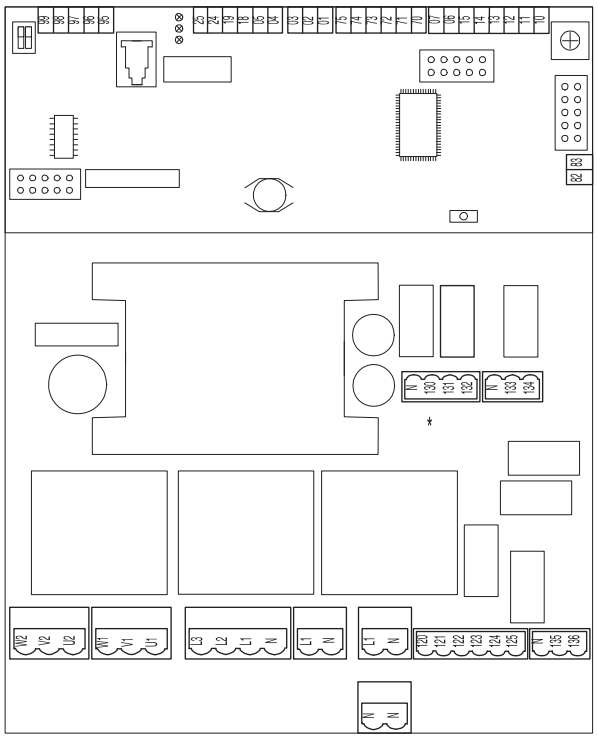


- Power supply
- Secondary air louvre
- Control panel connection
- Connection of other units with MATRIX 200#/300#
- Inlet temperature sensor
- External room sensor
- Supply air sensor
- Status and error messaging
- External control input

Fig. 6-5: Controller type MATRIX 2002 and MATRIX 3002

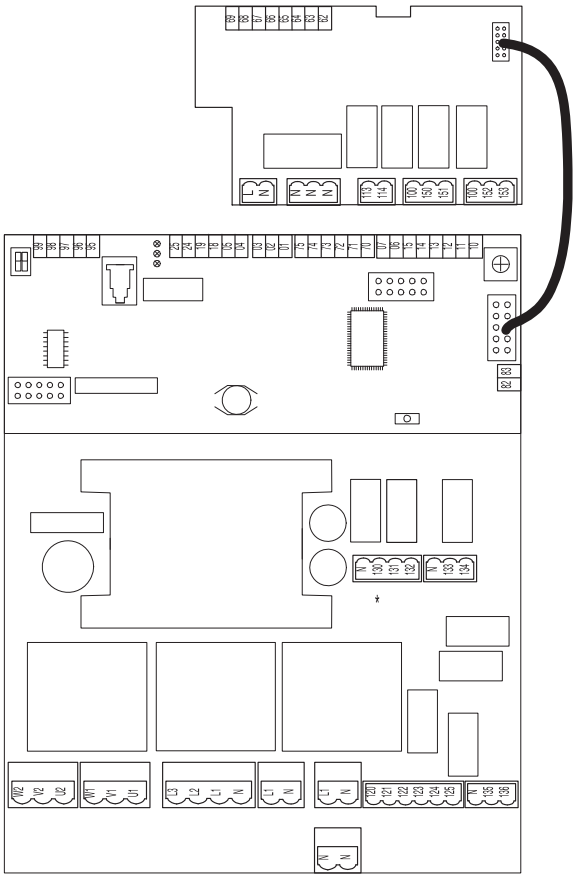
6.6.3 Controller type MATRIX 4002 and MATRIX 4002+IO

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



- Power supply
- Secondary air louvre
- Actuator of mixed air damper
- Control panel connection
- Connection of other units with MATRIX 300#/400#
- Inlet temperature sensor
- External room sensor
- External sensor
- Supply air sensor
- Status and error messaging
- External control input
- External extract air fan

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

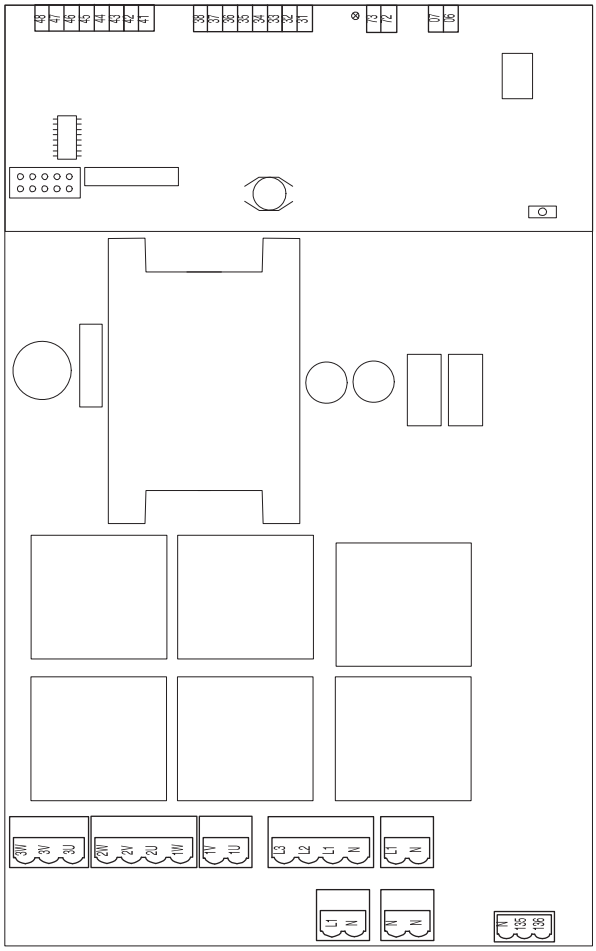


- Power supply
- Secondary air louvre
- Actuator of mixed air damper
- Control panel connection
- Connection of other units with MATRIX 300#/400#
- Inlet temperature sensor
- External room sensor
- External sensor
- Supply air sensor
- Status and error messaging
- External control input
- External extract air fan
- External control inputs of IO boards
- Controller demand heating or cooling (volt free contact)

Fig. 6-6: Controller type MATRIX 4002 and MATRIX 4002+IO

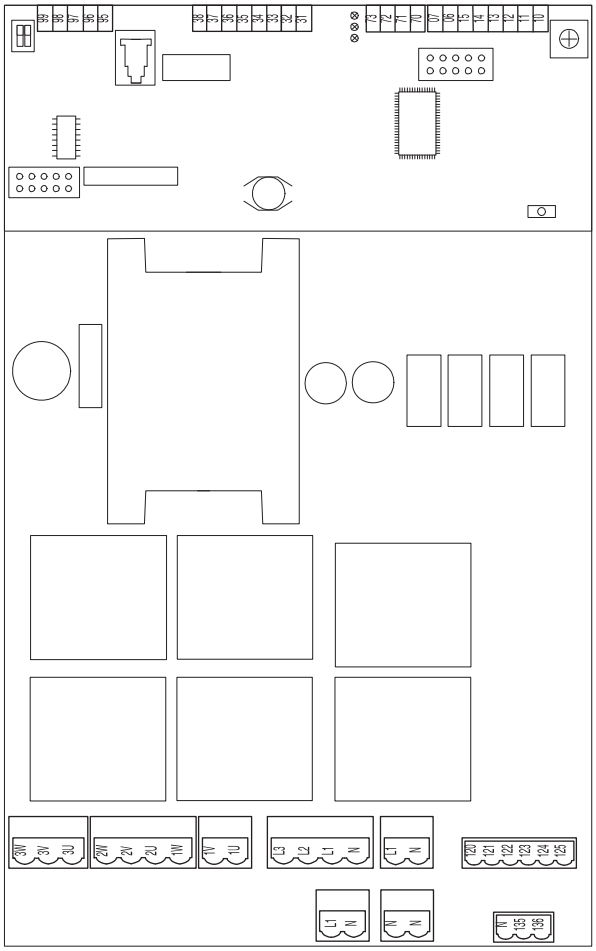
6.6.4 Controller type MATRIX 2003 and MATRIX 3003

MATRIX			
2003	**3003**	**4003**	**4003+IO**
✓			



- Power supply
- Secondary air louvre (in combination with MATRIX 3000 system)
- Control panel connection
- Connection of other units with MATRIX 200#
- External room sensor

MATRIX			
2003	**3003**	**4003**	**4003+IO**
	✓		

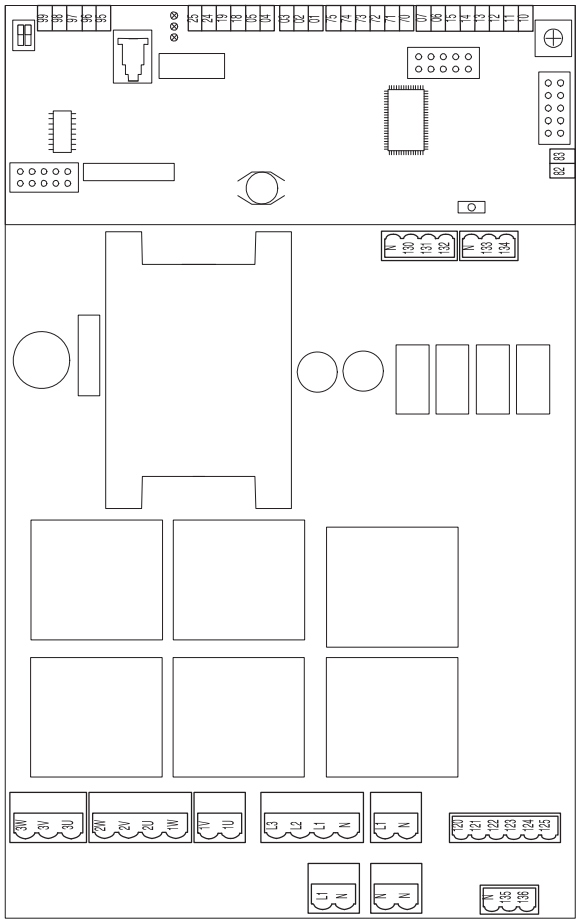


- Power supply
- Secondary air louvre
- Control panel connection
- Connection of other units with MATRIX 200#/300#
- Inlet temperature sensor
- External room sensor
- Supply air sensor
- Status and error messaging
- External control input

Fig. 6-7: Controller type MATRIX 2003 and MATRIX 3003

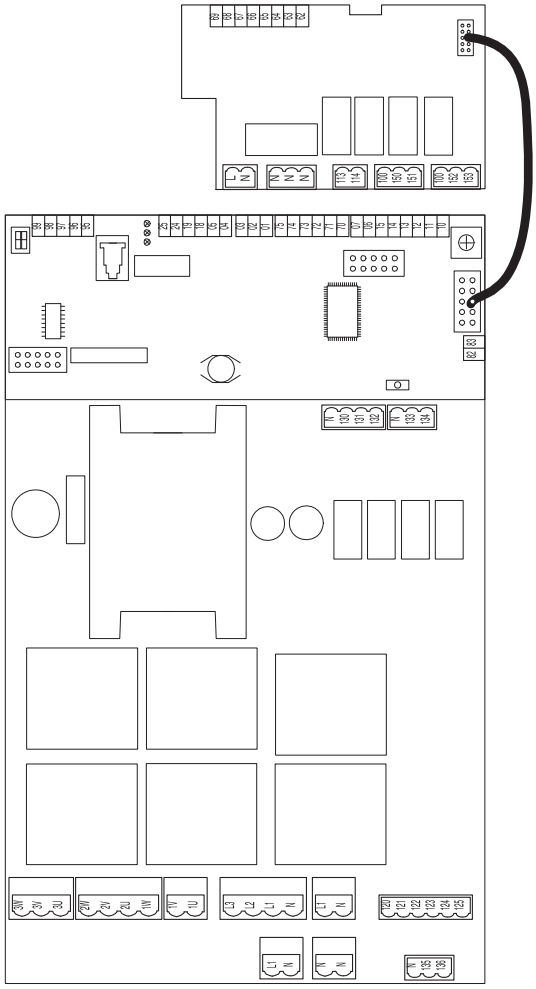
6.6.5 Controller type MATRIX 4003 and MATRIX 4003+IO

MATRIX			
2003	**3003**	**4003**	**4003+IO**
		✓	



- Power supply
- Secondary air louvre
- Actuator of mixed air damper
- Control panel connection
- Connection of other units with MATRIX 300#/400#
- Inlet temperature sensor
- External room sensor
- External sensor
- Supply air sensor
- Status and error messaging
- External control input
- External extract air fan

MATRIX			
2003	**3003**	**4003**	**4003+IO**
			✓

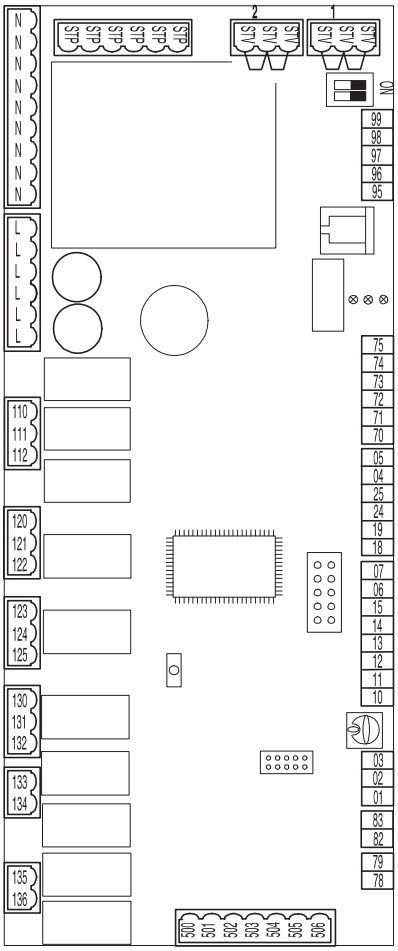


- Power supply
- Secondary air louvre
- Actuator of mixed air damper
- Control panel connection
- Connection of other units with MATRIX 300#/400#
- Inlet temperature sensor
- External room sensor
- External sensor
- Supply air sensor
- Status and error messaging
- External control input
- External extract air fan
- External control inputs of IO boards
- Controller demand heating or cooling (volt free contact)

Fig. 6-8: Controller type MATRIX 4003 and MATRIX 4003+IO

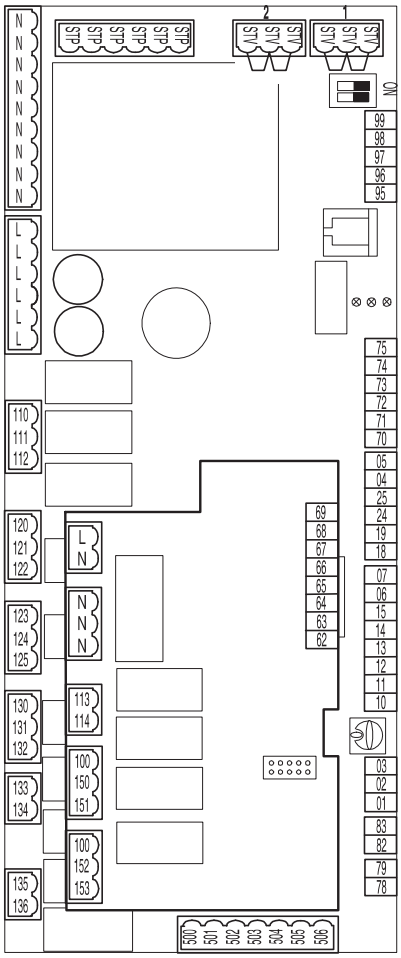
6.6.6 Controller type MATRIX 4004 and MATRIX 4004+IO

MATRIX	
4004	**4004+IO**
✓	



- Power supply
- Secondary air louvre
- Actuator of mixed air damper
- Control panel connection
- Connection of other units with MATRIX 300#/400#
- Inlet temperature sensor
- External room sensor
- External sensor
- Supply air sensor
- Status and error messaging
- External control input
- External extract air fan

MATRIX	
4004	**4004+IO**
	✓



- Power supply
- Secondary air louvre
- External valve
- Actuator of mixed air damper
- Control panel connection
- Connection of other units with MATRIX 300#/400#
- Inlet temperature sensor
- External room sensor
- External sensor
- Supply air sensor
- Status and error messaging
- External control input
- External control inputs of IO boards
- Controller demand heating or cooling
- External extract air fan

Fig. 6-9: Controller type MATRIX 4004 and MATRIX 4004+IO

6.7 Mounting site of control panel / room sensor

All control panels are supplied in IP54 protection class. External room temperature sensor is enclosed.

NOTE!

The location where the sensor is fitted is crucial for precise control of indoor temperature. Therefore the indoor temperature sensor (see fig. 6-10) should:

- not be fitted next to doors, windows, hatches etc. as intense movement of air can cause incorrect measurements,
- not be fitted on hot or cold walls (e.g. chimney, outside wall), as wall temperature can cause incorrect measurements.
- not be fitted behind curtains and net curtains as the insulating layers of air can cause incorrect measurements.
- not be fitted adjacent to unit discharge grilles as discharge temperature can cause incorrect measurements.

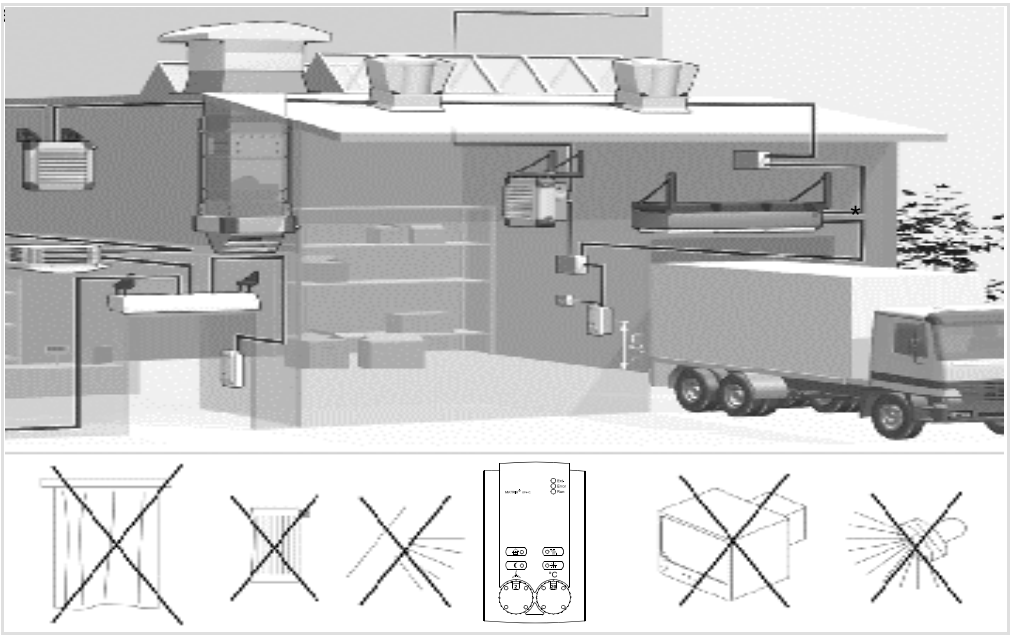


Fig. 6-10: Mounting control panel and room temperature sensor

For mounting your control panel on the wall, refer to the operation manual for the relevant control panel. There you will also find the right drilling template.

6.7.1 Connecting cable to control panel

NOTE!
An additional sensor is required.

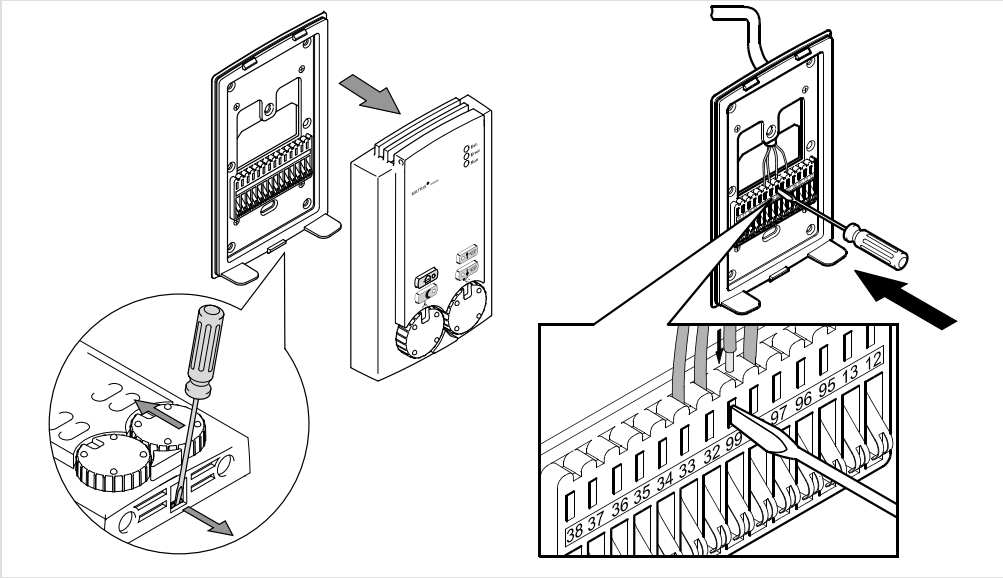


Fig. 6-11: Opening control panel

Pos. 1: Mounting plate
Pos. 2: Front panel

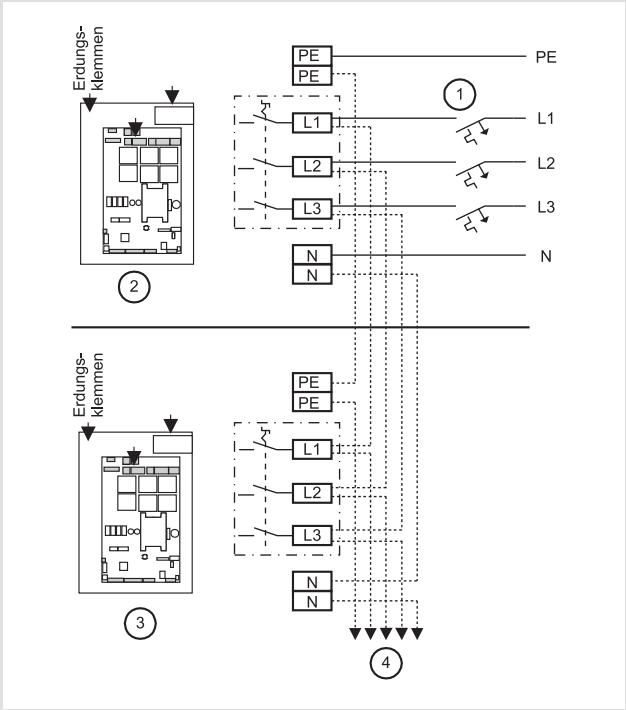
- Use a screwdriver to lock out the front panel and remove the latter to top of the mounting plate, as shown in fig. 6-11.

NOTE!
Depending on the MATRIX control system, different cables types with different number of wires is used.
For unit-related assignment of terminals as well as data on cable type refer to section „Electrical connection with MATRIX from page 36.
Run the low voltage and mains power supply cables separately at a minimum distance of 150 mm.

- Run the connection cable to the electrical control box of the unit through a diaphragm nose of the bottom section and the opening in the mounting plate of control panel (refer to fig. 6-11), the cable should then be wired to the terminals.
- Use a screwdriver to loosen the terminal (refer to fig. 6-11) and run the relevant wire into the required terminal opening. As soon as the screwdriver is removed, the spring-loaded terminal will ensure the needed grip.

6.8 Electrical connection with MATRIX

6.8.1 Connecting mains supply voltage for 400 V units



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

Pos. 1: Power supply 400 V AC / 50 Hz, fusing by others max. B 16 A
Pos. 2: Connection on 1st unit; L1, L2, L3 at fan isolator
Pos. 3: Connection on 2nd unit; L1, L2, L3 at fan isolator
Pos. 4: To further units

- Apply the mains supply voltage in accordance with the wiring diagram.

Fig. 6-12: Connecting mains supply voltage

NOTE!
Power supply for slave units can be provided by the master unit (refer to fig. 6-12, Pos. 3 and Pos. 4). Consider total current consumption of units (see Tab. 6-1). If required, an auxiliary power supply must be applied.
According to the relevant regulations, an all-pole isolating device must be field provided by others on site.

6.8.2 Connecting control cables

NOTE!
Use the following control cables for connection:
– for short cable lengths and/or locations not prone to interference:
multi-core control cable, 0.5 mm^2, screened with aluminium-clad plastic sleeve e.g. J-Y(ST)Y 1x2x0.8 / 3x2x0.8 / 4x2x0.8
– with long cable lengths and/or location prone to interference:
multi-wire control cable 0.5 mm^2 with copper-weave shielding

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

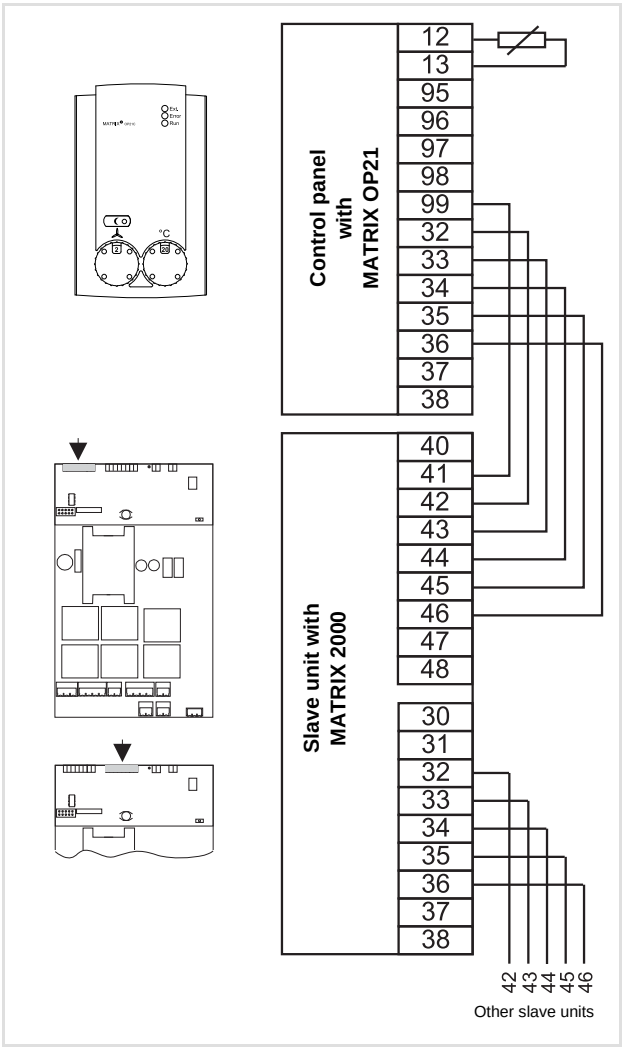


Fig. 6-13: Connecting control panel – units

Connecting control panel – unit - other slave units (without valve regulation)

Control panels MATRIX OP21 can only be operated with units fitted with MATRIX 200x controller.
A maximum of 16 units can be connected to OP21.

- Connect the control cables in accordance with the wiring diagram.

– Control cable: see note on page 36.

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

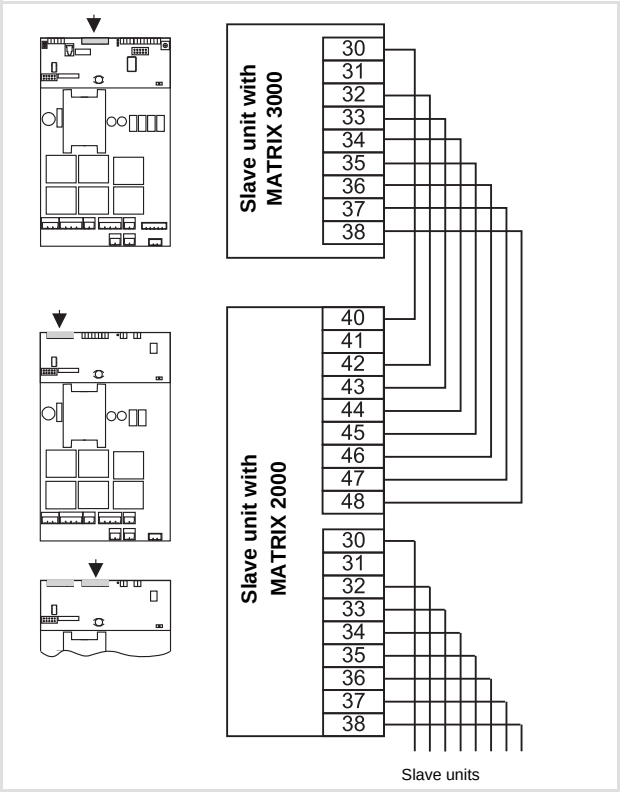


Fig. 6-14: Connecting master unit – slave units

Connecting master unit MATRIX 3000 – slave units MATRIX 2000

Units with MATRIX 300# can be connected to units fitted with MATRIX 200#.

- Connect the control cables in accordance with the wiring diagram.

– Control cable: see note on page 36.

6.8.3 Completing bus connection

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

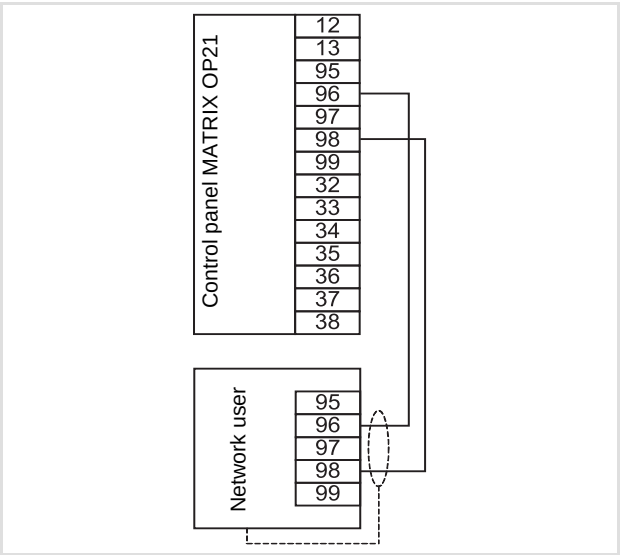


Fig. 6-15: Connecting control panel – network participant

Connecting control panel – network participant

When connecting control panel MATRIX OP21 to MATRIX.Net network, 2-wire bus line should be used.

- Connect the control cables in accordance with the wiring diagram.

– The following cable is recommended for the bus line:
Manufacturer: HELUKABEL
Type: CAN-BUS flexible 2 x 2 x ... mm^2:
(refer to page 35 at the bottom)

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

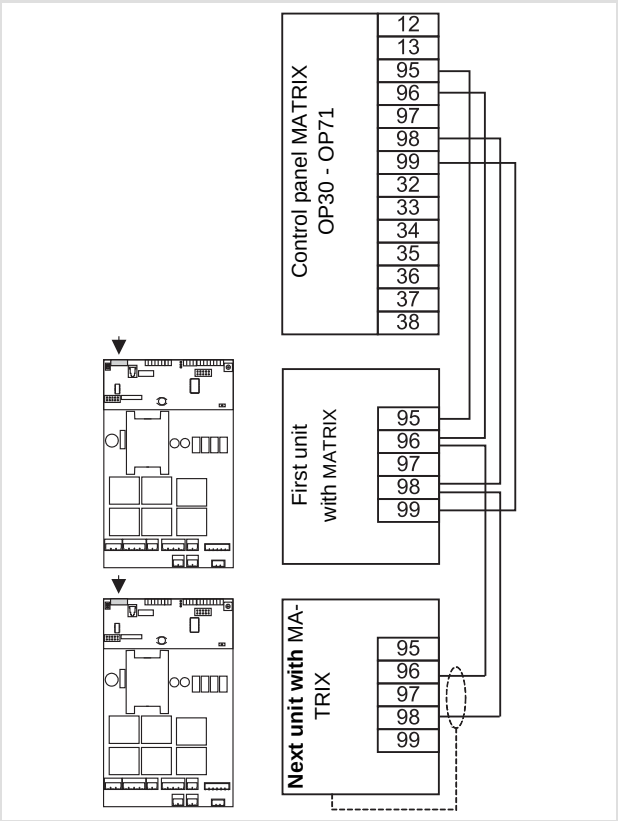


Fig. 6-16: Control panel connection – air treatment unit

Control panel connection – air treatment unit

Control panels MATRIX OP3#/44/5# can be only operated with units fitted with MATRIX 3000/4000.

- Connect the control cables in accordance with the wiring diagram.

– The following cable is recommended for the bus line:
Manufacturer: HELUKABEL
Type: CAN-BUS flexible 2 x 2 x ... mm^2:
(refer to page 35 at the bottom)

NOTE!
For connecting the MATRIX.Net use only twisted-pair wire with braided shield certified according to DIN 19245 T3 and EN 50170.

6.8.4 Connecting outside sensor (option)

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

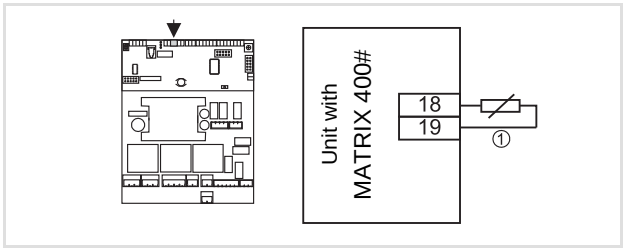


Fig. 6-17: Connecting outdoor sensor

Pos. 1: Connection cable (refer to notice on page 36)

- Connect the outside sensor according to the wiring diagram.

6.8.5 Connecting inlet sensor (option)

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

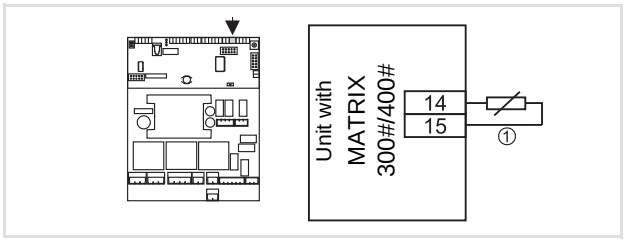


Fig. 6-18: Connecting inlet sensor

Pos. 1: Connection cable (refer to notice on page 36)

- Connect the inlet sensor according to the wiring diagram. Supply terminals are located on the MATRIX 300#/400# printed circuit board.

6.8.6 Connecting room temperature sensor

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

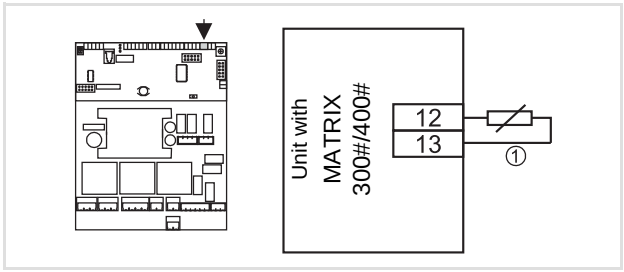


Fig. 6-19: Connecting room temperature sensor

Pos. 1: Connection cable (refer to notice on page 36)

- Connect the room temperature sensor according to the wiring diagram.
- Connection can
- be performed with MATRIX 200# using control panel OP21 (terminals 12-13) or with MATRIX 300#/400# directly on the controller or control panel OP3#/OP44/OP5#.
- bei MATRIX 300#/400# direkt am Regler oder am Bedien-gerät OP3#/OP44/OP5# erfolgen.

6.8.7 Connecting anti-freeze sensor

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

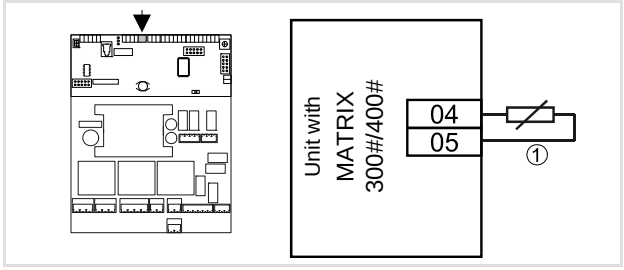


Fig. 6-20: Connecting anti-freeze sensor

Pos. 1: Connection cable (refer to notice on page 36)

- Connect the anti-freeze sensor according to the wiring diagram.

6.8.8 Connecting supply air sensor

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

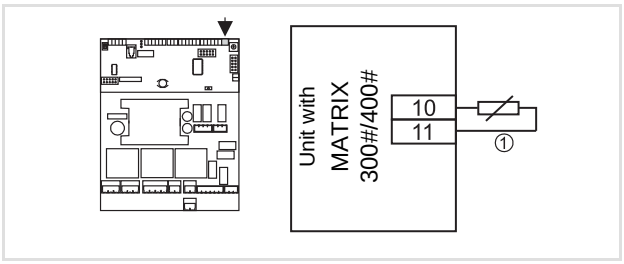


Fig. 6-21: Connecting supply air sensor

Pos. 1: Connection cable (refer to notice on page 36)

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

NOTE!
Connect the shielding of sensor lines with the cable shield grounding clamp to a large earth surface area!

6.8.9 Connecting air quality sensor

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

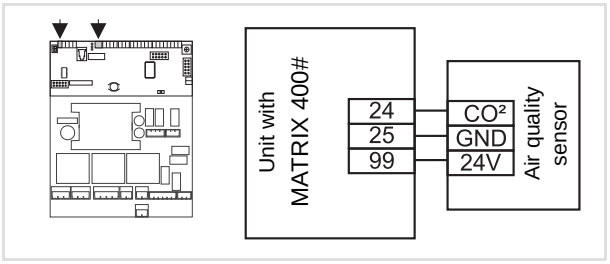


Fig. 6-22: Connecting air quality sensor

- Connect air quality sensor 903WRF04CO2V in accordance with the wiring diagram.

6.8.10 Connecting status and fault messaging

MATRIX			
2001	**3001**	**4001**	**4001+IO**
	✓	✓	✓

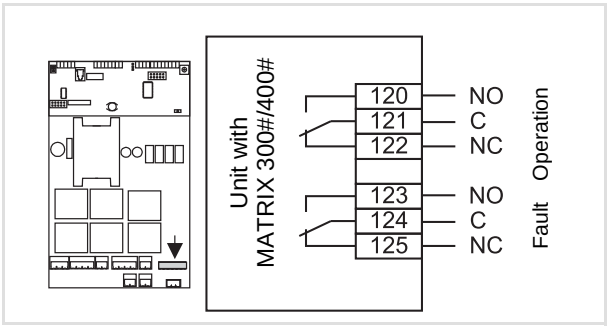


Fig. 6-23: Connecting operation and fault messaging

The controller PCB enables to tap status and alarm messages using a volt free contact. The contact load at 230 V AC amounts to a maximum of 4 A ohmic / 2 A inductive.

- Connect in accordance with the wiring diagram.

Operation:
contact closed on terminal 120 -121

Fault:
contact closed on terminal 124 - 125

6.8.11 Connecting functional inputs and outputs

MATRIX			
2001	**3001**	**4001**	**4001+IO**
	✓	✓	✓

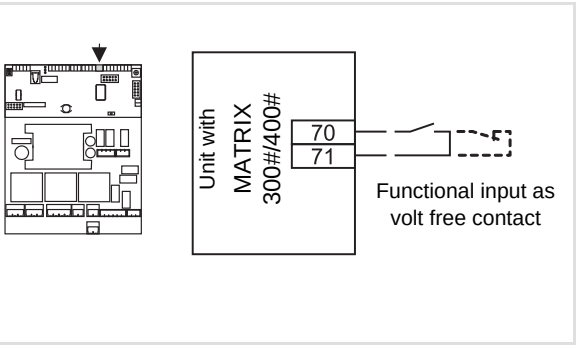


Fig. 6-24: Connecting functional input

Functional input can be assigned with different functions depending on the supplied control equipment.

To activate the function the contact has to be:
– closed for economy mode operation
– open for unit OFF with frost protection
– closed with gate contact.

Changing this function is possible using our MATRIX.PC service software.

- Connect in accordance with the wiring diagram.

The loop resistance may not exceed 500 Ω (max. 24 V).

MATRIX			
2001	**3001**	**4001**	**4001+IO**
			✓

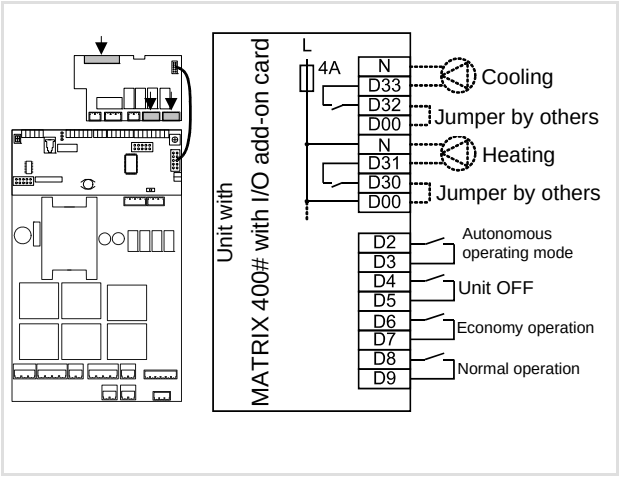


Fig. 6-25: Connecting function inputs and outputs

Function inputs

Functional inputs can be assigned with different functions.

– Normal Operation
– Economy mode
– Free operating mode (the functions of these operating modes can be programmed using the service software MATRIX.PC)
– Switching the unit off (without frost free condition in room)

Function outputs

The controls contains 2 function outputs:

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

If no jumpers are set at D00-D30 and D00-D32, outputs D30-D31 and D32-D33 can be used as volt free outputs (max. 2 A).

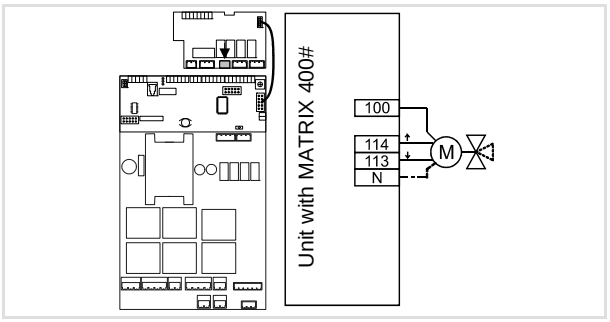
– Internal fusing for all outputs of I/O module amounts to 4 A

- Connect in accordance with the wiring diagram.

The loop resistance may not exceed 500 Ω (max. 24 V).

6.8.12 Valve connection on unit

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



- Connect the valve of series 934.### according to the wiring diagram.
- Supply terminals are located on the I/O module.
- With an external valve without 230 V continuous supply (terminal 100) connection is performed using terminal 113-114-N.
- Valve opens - terminal 114
- Valve closes - terminal 113

Fig. 6-26: Valve connection

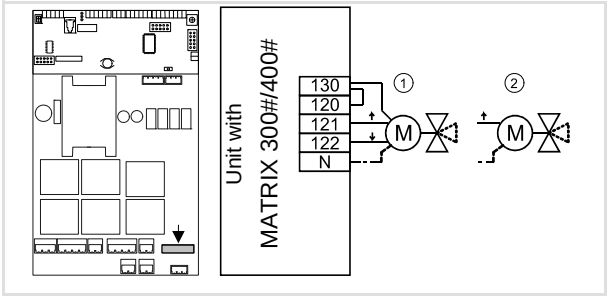
6.8.13 Valve connection using valve module

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

NOTE!
For connecting valve actuators to the valve module MATRIX.V refer to the relevant operation manual on „Global Modules“.

6.8.14 Connecting shut off valve

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



1 = 230 V valve of series 934###.

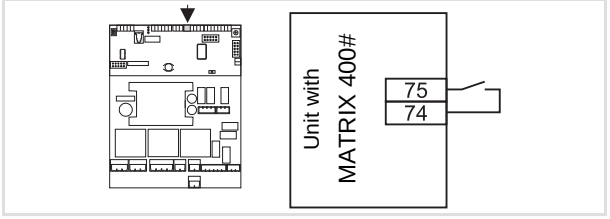
2 = 230 V valve with spring return

- Connect the shut off valve in accordance with the wiring diagram.
- For an external valve without 230 V continuous supply (terminal 130) connection is performed using terminal 121-122-N.
- Jumper 120-130 must be set externally.
- Valve opens - terminal 121
- Valve closes - terminal 122

Fig. 6-27: Valve connection

6.8.15 Connecting differential pressure switch

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



- Connect the differential pressure switch according to the wiring diagram. (With open contact filter contamination below limit value.)

Fig. 6-28: Connecting differential pressure switch

6.8.16 Connecting mixed air damper

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

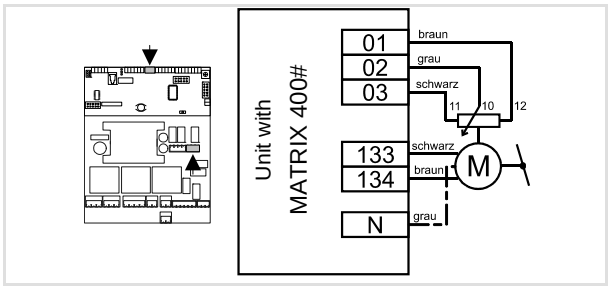


Fig. 6-29: Connection for damper actuator

- Connect the mixed air damper according to the wiring diagram.
  - Terminal 133 closes mixed air damper
  - Terminal 134 opens mixed air damper.
  - Signal tapping of potentiometer has to be made on terminal 02, external tapping is arbitrary.

6.8.17 Connecting extract air fan control

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

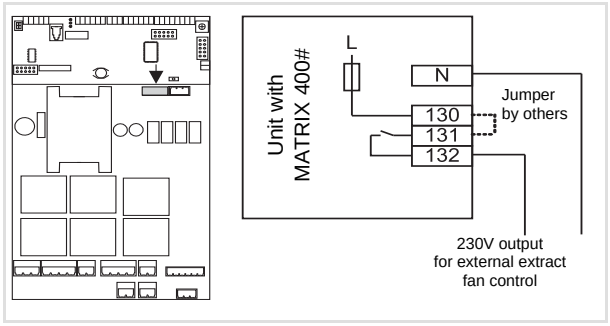


Fig. 6-30: Connecting extract air fan control

Connecting external extract air fan is done in fresh air mode.

- After jumper is set on terminals 130 and 131, terminal 132 is supplied with 230 V control voltage, which can be used for extract air fan isolator by others on site.
- Relay contact 4 A ohmic / 2 A inductive.
- Internal fusing for all outputs of controller amounts to 4 A.
- Connect the extract air fan according to the wiring diagram.

6.9 MATRIX.NET network and shielding connection

This section contains information about the MATRIX.Net and the correct network setup. The MATRIX.Net is a network through which various components of the control system (network users) are connected via a data bus. The bus enables to exchange all information required for control and regulation between the users.

Network user may include the following:
– Controller
– Control panels
– Global modules
– Control with display
– LON® interface
– Service software.

6.9.1 Group structure

A group consists of a minimum 2 and maximum 20 users (control panel, 16 air treatment units, valve module, DV module and LON module). This means, for example, that a control panel and a controller/unit form a group. However, a group can also be made up of a LON module and a controller/unit. The LON module transmits setpoints and current readings into the group. With units fitted with MATRIX 3000 and MATRIX 4000, a group can also be formed by replacing the control panel by a global module, such as MATRIX.LON.

Group structure with the MATRIX 2000 system

A group can be formed with the MATRIX 2000 system, as illustrated in fig. 6-31.

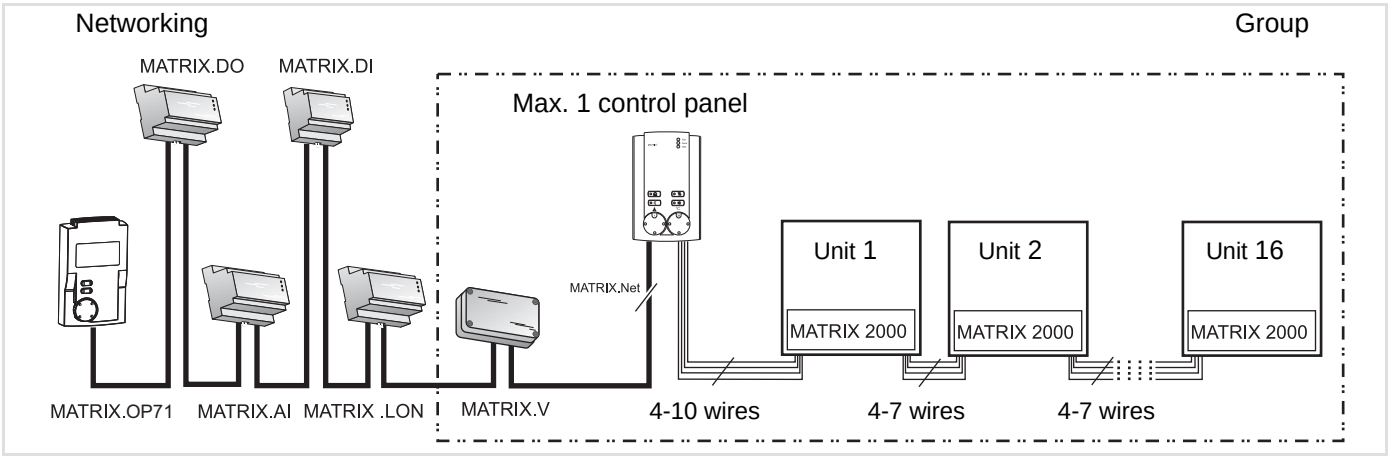


Fig. 6-31: Group structure with MATRIX 2000 controller type

The group address is assigned via the group address switch on the control panel – refer to the “Commissioning and Testing” chapter in the operation manual for “MATRIX control panels”. The assignment of modules MATRIX.V, MATRIX.LON to this group is completed with MATRIX.V via the group address switch or with MATRIX.LON - via software – refer to the “Commissioning” section in this operation manual or corresponding manual for MATRIX Global modules.
Network connection for MATRIX.Net is carried out on the control panel.

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

A group may be formed using the MATRIX 2000 and MATRIX 3000 systems. The fig. 6-32 shows an example of a network consisting of a control panel, MATRIX 2000 system, MATRIX 3000 system and various global modules.

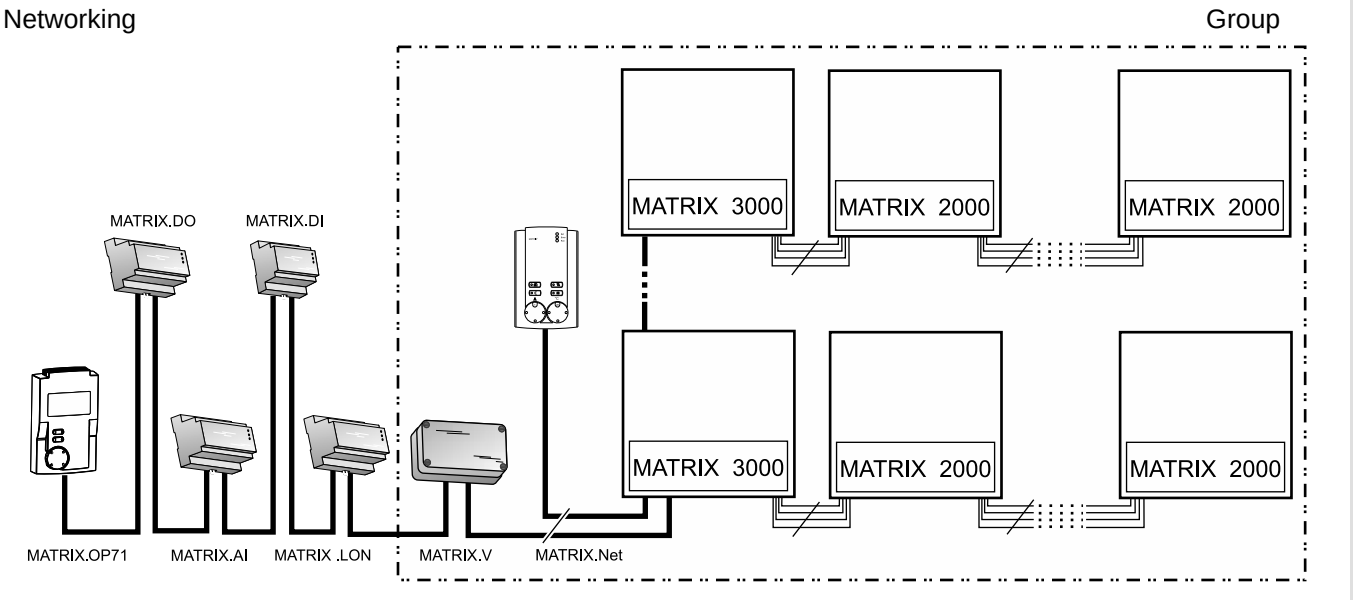


Fig. 6-32: Combined group structure of controller types MATRIX 2000 and MATRIX 3000

The group address is assigned:

– via the group address switch on the control panel – refer to the “Commissioning and Testing” section in the relevant operation manual for MATRIX control panels.
– on the printed circuit board of the MATRIX 3000 controller – refer to the unit’s operation manual.

Data assignment of MATRIX.LON module is performed via LON-side configuration. The MATRIX.V module is assigned to this group via the group address switch – refer to the “Commissioning” section in this operation manual or the corresponding manual for MATRIX Global Modules.

Any assignment and combination of units 2-16 is possible. The control panel must be connected to a MATRIX 3000 controller type

It is possible to set up a group using the MATRIX 3000 system that also incorporates components of the MATRIX 2000 system.

Besides, the control panel is not required if global modules (such as MATRIX.LON, DI, DO and AI) are available and the required operating parameters and setpoints are communicated via these group modules.

Group structure with MATRIX 3000 and/or MATRIX 4000 system

A group may be formed using the MATRIX 3000 and MATRIX 4000 systems. The fig. 6-33 shows an example of a network consisting of a control panel, MATRIX 3000 system, MATRIX 4000 system and various global modules.

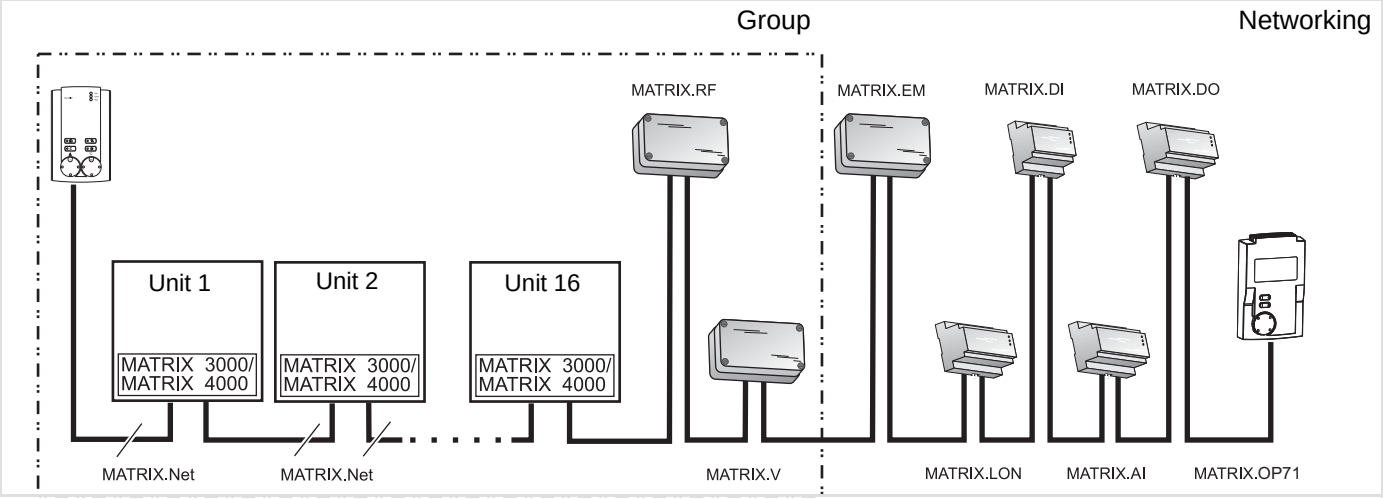


Fig. 6-33: Combined group structure of controller types MATRIX 3000 and MATRIX 4000

Any assignment and combination of the controllers/units is possible. However, only MATRIX 3000 or only MATRIX 4000 controllers may be used. We recommend the assignment of the control panel as the first component of a group.

The group address is assigned:

– via the group address switch on the control panel – refer to the “Commissioning and Testing” section in the relevant operation manual for MATRIX control panels.
– on the printed circuit board of the MATRIX 3000/4000 controller – refer to the unit’s operation manual.

Data assignment of MATRIX.LON module is performed via LON˜side configuration. The MATRIX.V, MATRIX.RF and MATRIX.EM modules are assigned to this group via the group address switch – refer to the “Commissioning” section in this operation manual or the corresponding manual for MATRIX Global Modules.

NOTE!

The combination of units with MATRIX 3000 and units with MATRIX 2000 systems is permitted in this group set-up – see “Group structure of the MATRIX 3000 system in combination with the MATRIX 2000 system” on page 46. The combination of units with MATRIX 4000 and units with MATRIX 2000 systems is not possible

6.9.2 Network structure MATRIX.Net

A network can consist of one or several groups (up to 16). Global modules can also be integrated into the network. The network structure/network topology of MATRIX.Net must be performed in a linear manner - see “Topologies of network MATRIX.Net” on page 49. The maximum extent of the MATRIX.Net network is shown in fig. 6-34.

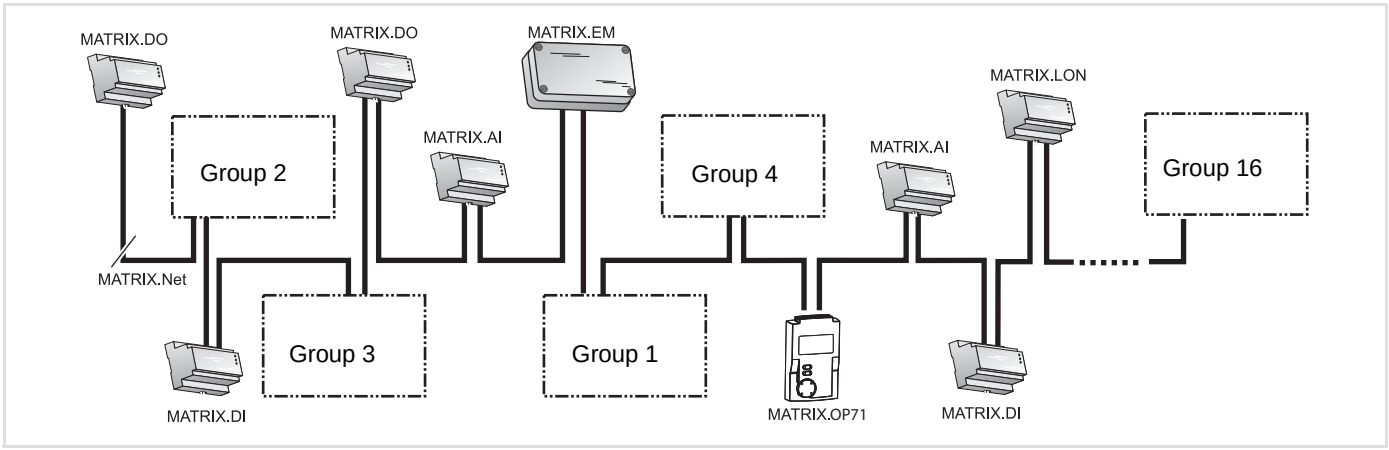


Fig. 6-34: Example of maximum extent of the network

At its maximum extent, the network can consist of:

– a maximum of 16 unit groups – see “Topologies of network MATRIX.Net” on page 49
– two digital input modules (MATRIX.DI)
– two analogue input modules (MATRIX.AI)
– two digital output modules (MATRIX.DO)
– control with display (MATRIX.OP71)
– a return air management (MATRIX.EM)
– up to 16 LON modules (MATRIX.LON).

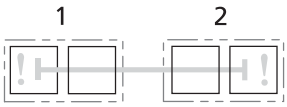
Any assignment of the unit groups and the global modules in the network is possible. The following points are decisive for the assignment of the units, control panels and global modules to a group. Physical assignment is not considered:

– the setting of the group address switch (refer to the Chapter “Commissioning and Testing” in the relevant operation manual)
– or the assignment of a module input and output to a unit group via the MATRIX.PC service tool (refer to the online help for the service software).

6.9.3 Topologies of network MATRIX.Net

The MATRIX.Net can be set **in a line structure and a line structure with a stub line.** All units fitted with MATRIX system can access this data bus. The data bus must be terminated at both physical ends to avoid reflections which can interfere with data transfer. Configurable bus end resistors are integrated on the respective boards enabling safe termination – refer to Chapter „Connecting MATRIX.Net“.

6.9.4 Line structure



The illustration shows the setup of the MATRIX.Net with line structure. As an example two groups, each consisting of a control panel and a Global Module, are networked. In addition, power supply of the control panel via the controller (terminals 95/99) is shown.

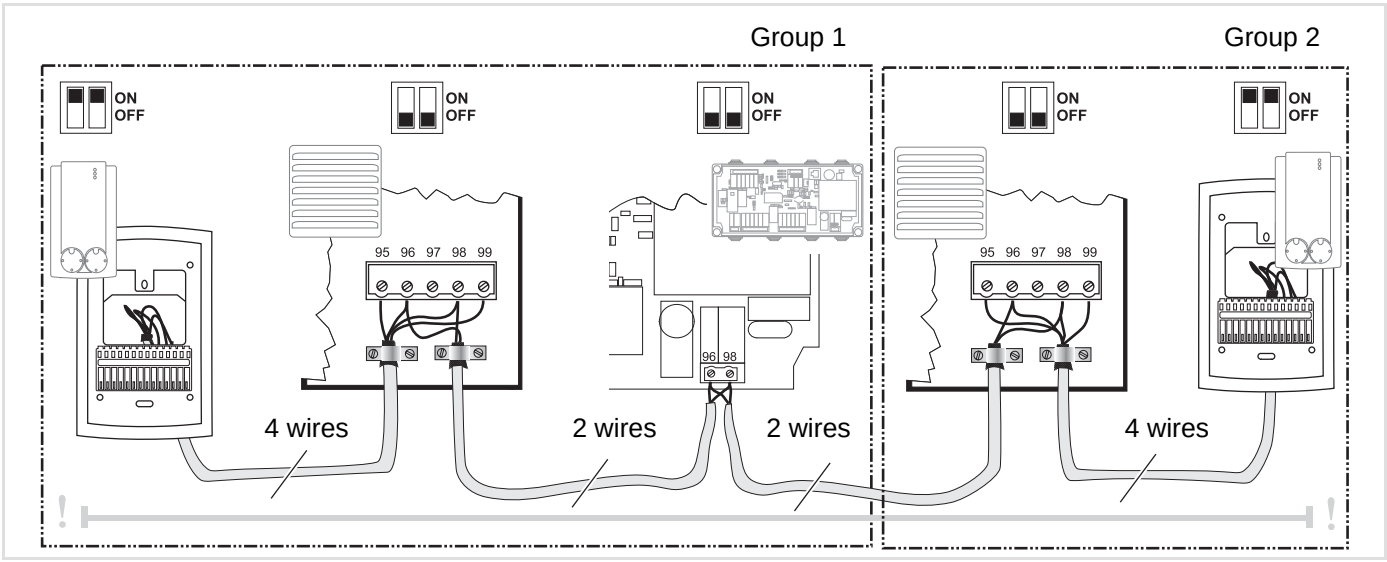
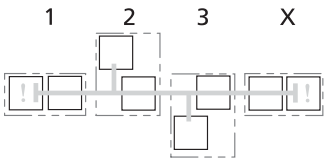


Fig. 6-35: Set up of MATRIX.Net in line structure

NOTE!

The data transfer cable must be run as demonstrated in fig. 6-35 in such a way that only one side of the respective shielding is applied – see “Shielding / Earthing” on page 52.

6.9.5 Line structure with stub line



The illustration shows the setup of the MATRIX.Net with line and stub line structure. A sample connection of a control panel via a stub line in multiple groups is illustrated. The maximum allowed stub line length amounts to 25 m.

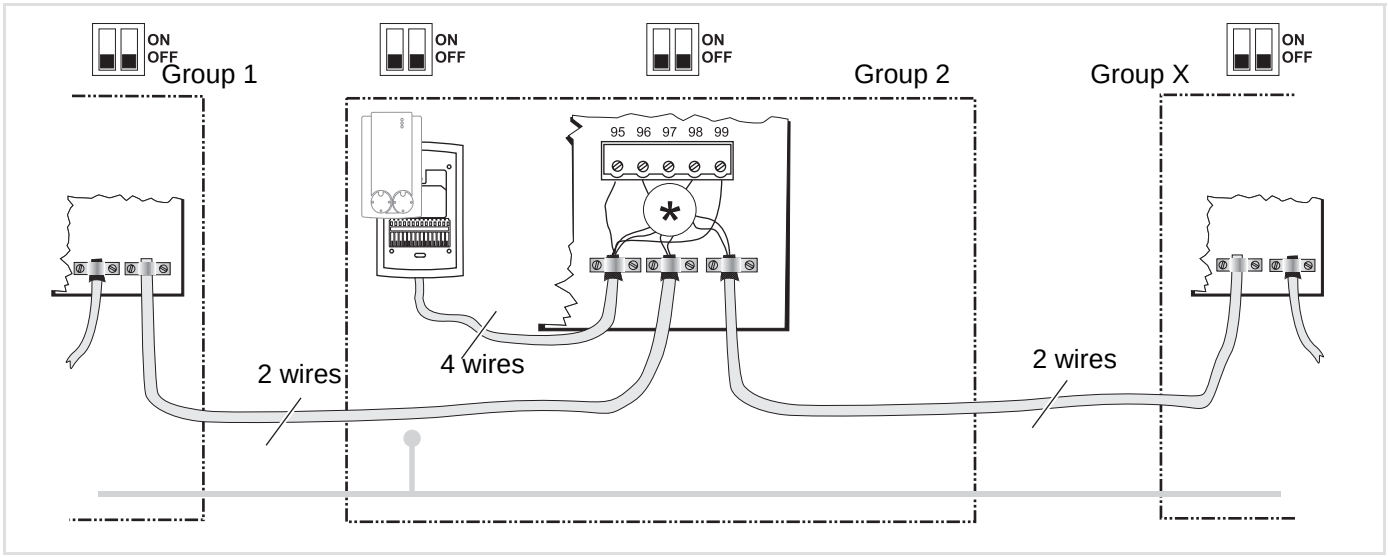


Fig. 6-36: Set up of MATRIX.Net in a line structure with a stub line

** As it is not allowed to connect three wires together, a joining terminal must be provided. To do so, the intermediate terminals (STV) mounted on the board (if not already occupied) or terminals fitted on-site by others can be used.*

NOTE!

The data transfer cable must be run as demonstrated in fig. 6-36 in such a way that only one side of the respective shielding is applied – see “Shielding / Earthing” on page 52.

6.9.6 Network setup MATRIX.Net

Data transfer cable

For setting up the MATRIX.Net use only data transfer cable certified according to DIN 19245 T3 and EN 50170 as twisted-pair wire with braided shield.

We recommend the following data transfer cable:

Total max. line length [m]	Max. line length with stub lines [m]	Producer	Cable type	only MATRIX.Net	MATRIX.Net + supply voltage
50	50	LAPP cable	UNITRONIC® BUS CAN	1x2x0.22	2x2x0.22
300	150	LAPP cable	UNITRONIC® BUS CAN	1x2x0.34	2x2x0.34
600	150	LAPP cable	UNITRONIC® BUS CAN	1x2x0.5	2x2x0.5
30	30	LAPP cable	UNITRONIC® BUS LD	1x2x0.22	2x2x0.22
30	30	LAPP cable	UNITRONIC® Li2YCY (TP)		2x2x0.22
150	60	LAPP cable	UNITRONIC® Li2YCY (TP)	1x2x0.34	2x2x0.34
150	60	LAPP cable	UNITRONIC® Li2YCY (TP)	1x2x0.5	2x2x0.5
30	30	LAPP cable	UNITRONIC® Li2YCY PiMF		2x2x0.22
300	150	LAPP cable	UNITRONIC® Li2YCY PiMF		2x2x0.34
600	150	LAPP cable	UNITRONIC® Li2YCY PiMF		2x2x0.5
50	50	HELUKABEL	CAN BUS	1x2x0.22	4x1x0.22
300	150	HELUKABEL	CAN BUS	1x2x0.34	4x1x0.34
600	150	HELUKABEL	CAN BUS	1x2x0.5	4x1x0.5
30	30	HELUKABEL	PAAR-TRONIC-Li-2YCYV 2X2X		2x2x0.22
30	30	BELDEN	9841	1x2xAWG24	
30	30	BELDEN	9842		2x2xAWG24
150	60	BELDEN	3105A	1x2xAWG22	
150	60	BELDEN	3107A		2x2xAWG22

Tab. 6-2: Data transfer cable

Line lengths

Regardless of the cross section and the number of participants the maximum line length including stub lines must not exceed 600 m. The stub line must not exceed 25 m. The total length of all stub lines may not exceed a maximum 150 m.

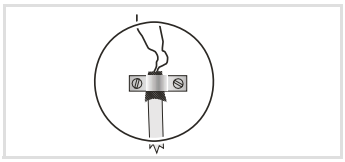
RECOMMENDATION

Bridges must be used in the network if there are more than 110 users. To increase the line length, special jumpers are necessary to decouple running times of telegrams between the network participants.

The cross-section of the bus cable must be changed depending on the MATRIX.net cable 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
*Contains 2 wires for power supply to control panels or modules	

Shielding / Earthing



- Install the data transfer cable (MATRIX.Net) **on one side** in the Multi*MAXX* HS unit using shielding clips to ensure the best possible electrical contact.
- Connect the shielding with the shielding clip to a large earth surface area!
- In systems with a large network extent, or if large scale EMC impairment is likely, the shielding should be applied on both sides. Before this operation make sure that no potential differentials occur.

6.10 Connecting control unit MC 4 or controls by others

The components are connected via a terminal strip. Depending on the particular model and coil connections. the terminal strip is placed in a plastic terminal box and mounted on the right or left side of the fan casing.

ATTENTION! CONTROL UNITS!
Wiring diagrams are enclosed with the corresponding MC 3xx control units.

Control and supply cables depend on the unit configuration and local electrical codes. refer to fig. 6-37 and fig. 6-38.

NOTICE ON CONTROLS BY OTHERS!!
For details on connecting individual assemblies (e.g. fan. anti-freeze facility. etc.) refer to the unit-specific wiring diagram enclosed with the main unit. Before commencing electrical connection. check that the order code of the unit electrical equipment matches the wiring diagram.

HAZARDOUS VOLTAGE!
Before opening the connection box. the unit heater must be de-energised and isolated at all poles.

- Connections must only be performed in accordance with the unit-specific wiring diagram.

NOTE!
The installation site of the room temperature sensor/room thermostat is crucial for the precise control of indoor temperature. Therefore do not install an indoor temperature sensor/thermostat in the following locations:

- next to doors. windows or openings etc. as intense air movement can cause incorrect measurements.
- hot or cold walls (e.g. chimney. outside wall). as wall temperature can cause incorrect measurements.
- behind curtains and net curtains as insulating layers of air can cause incorrect measurements.
- adjacent to unit discharge grilles as discharge temperature can cause incorrect measurements.

6.10.1 Specification of MC 4 control unit

Function ”K” - control switch 230 V „open – close“ for regulation of secondary air louver

Function ”F” - Filter change signaling

Input for remote control fan speed.

Unit group comprising Multi*MAXX* HS mixed air unit with MC 4 control unit.

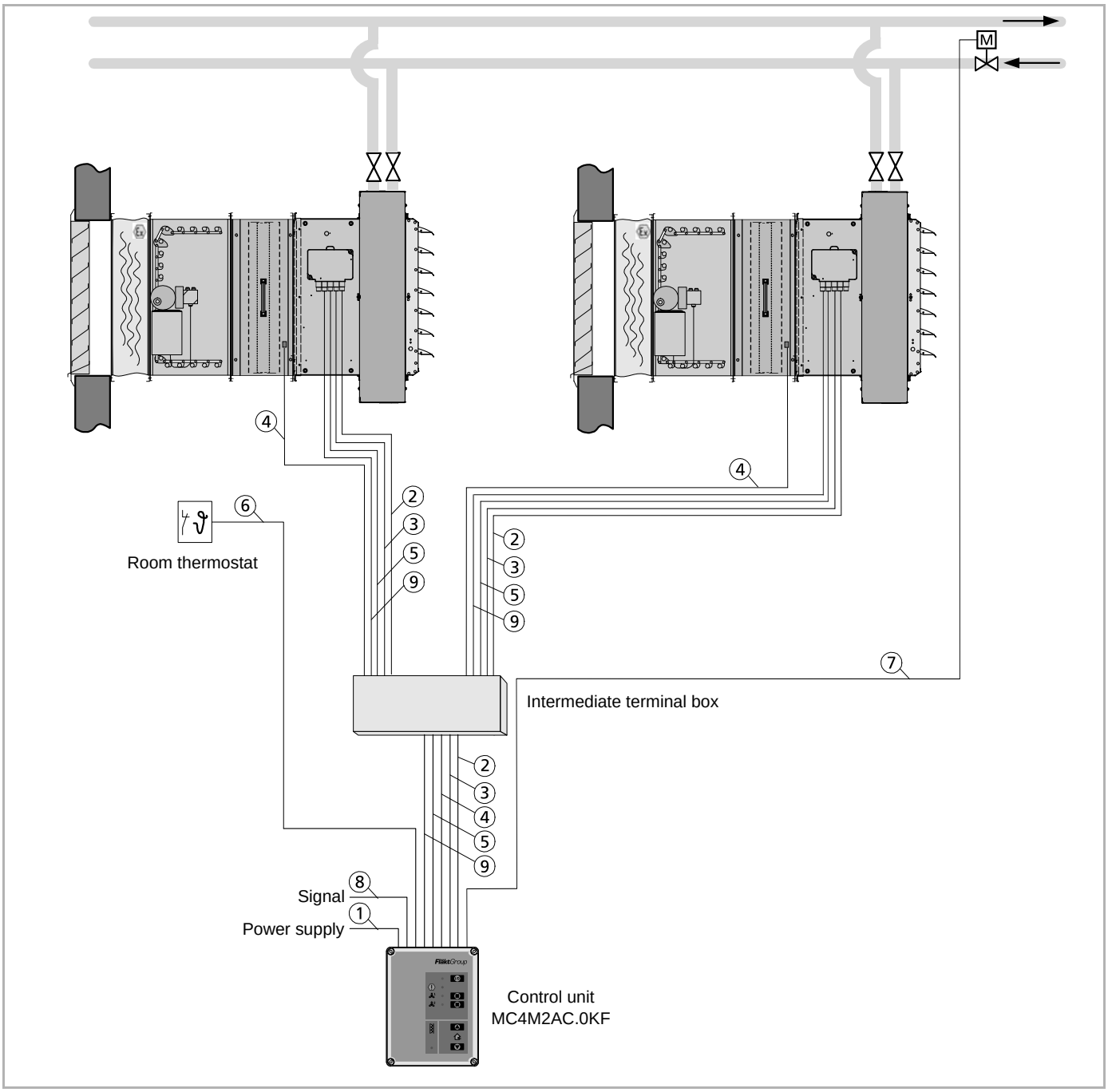


Fig. 6-37: Unit group comprising MultiMAXX HS mixed air units with MC 4 control unit

Required number of wires

Schaltgerät	**MC4M2AC.0KF** 3x400V
Cable 1 (Power supply)	5
Cable 2 (Frost protection)	5
Cable 3 (Fan motor)	7
Cable 4 (Filter)	2
Cable 5 (Mixed air module)	3
Cable 6 (Room thermostat)	3
Cable 7 (Ventil)	2
Cable 8 (Signal)	6
Cable 9* (Thermal contact)	2

** Shielded cable*

Unit group comprising Multi*MAXX* HS mixed air units with MC 4 control unit.

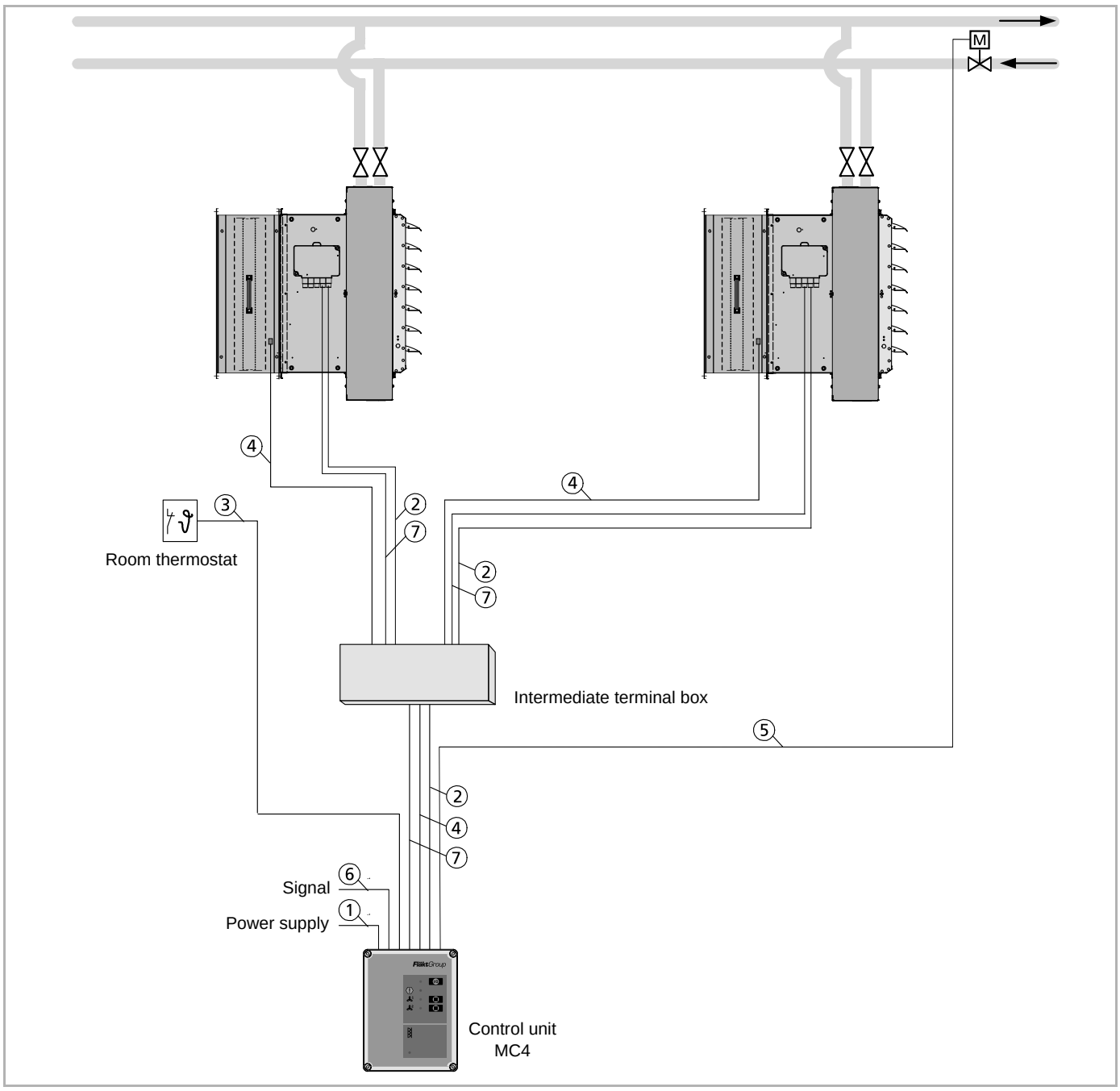


Abb. 6-38: Unit group comprising MultiMAXX HS recirculating air units with MC 4 control unit.

Required number of wires

Control unit	**MC4U2AC.000** 3x400V	**MC4U2AC.00F** 3x400V
Cable 1 (Power supply)	5	5
Cable 2 (Fan motor)	7	7
Cable 3 (Room thermostat)	3	3
Cable 4 (Filter)	-	2
Cable 5 (Ventil)	2	2
Cable 6 (Signal)	3	6
Cable 7* (Thermal contact)	2	2

** Shielded cable*

6.11 Recommended connection for frost protection

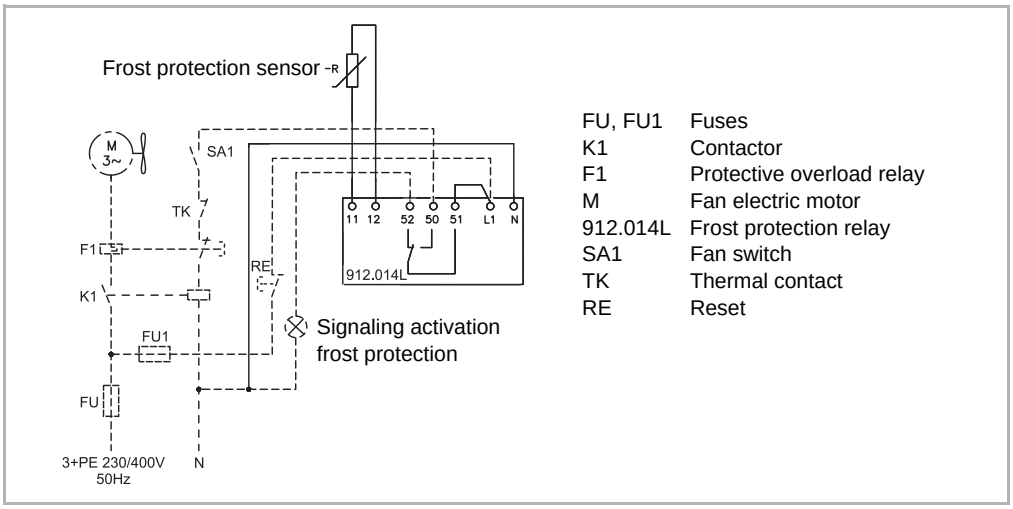


Abb. 6-39: Recommended connection for frost protection

6.12 Connecting actuators for mixed air module and blocking damper

The relevant connection diagram is printed on identification plates of actuators.

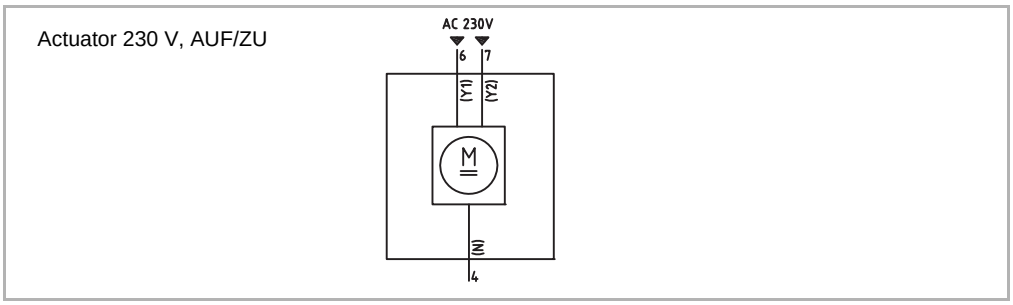


Abb. 6-40: Connection for actuator

6.13 Connection for differential pressure switch

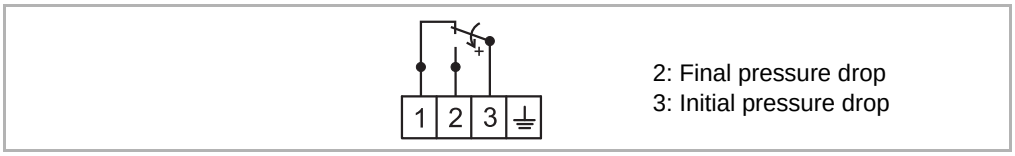


Abb. 6-41: Connection for differential pressure switch

7 Commissioning

DANGER OF ELECTRICAL CURRENT!

Before performing any work on the unit, ensure that it is isolated.
Ensure that the unit is secured against being switched back on at an appropriate point of the on-site power supply.

DANGER OF SCALDING!

Before completing any kind of job on fan coil units:
Seal off the supply of heating medium before performing work on the valves or the inlet or outlet pipework. Ensure that the shut off pipework can not be opened inadevertently.
Do not commence work before the heating medium has cooled down.

DANGER OF ROTATING UNIT PARTS

Rotating fan impellers pose a risk and may cause injuries. Before performing any work on the unit, ensure that it is isolated. Ensure that the unit is secured against being switched back on at an appropriate point of the on-site power supply.

NOTE!

Before commissioning make sure that unit discharge. heat exchanger. coil drip tray and filters are clean.

If necessary. these components should be cleaned or filter medium replaced.

7.1 Pre-commissioning checklist

- Mechanically and electrical installation of the entire system comprising Multi*MAXX* HS units is complete.
- The Multi*MAXX* HS unit is de-energised and isolated.
- All medium pipes were flushed and are free from residues and foreign matter.
- The unit is properly charged with medium (refer to "Proper use" on page 29).

7.1.1 Prior to commissioning the following checks must be carried out:

- Check all screwed pipe connections and fixing points. Check the unit heater for possible damage. (ensure that the unit heater is error-free).
- Checking plug fan: minimum clearance between impeller and air suction nozzle must correspond to a minimum 1% of impeller cross section.
- Open the valves in the pipework.
- If the pipework / heat exchanger were drained following the assembly, charge the system properly and perform its air venting (see kap. 7.2).
- Give special attention to complete air venting of the unit in order to prevent formation of air bubbles in the heat exchanger.
- Check that the pipework and connections and tight and leak-free.
- Check electric connections. as specified in the wiring diagrams in the current operation manual or/and enclosed in the control box of the unit. MC 4 or MATRIX control box.
- Check correct air flow direction: fan rotating direction is correct. if air is discharged from the discharge louvres into the room.
- Perform adjustment of secondary air louvre depending on desired air flow direction. Ensure that air draughts in the occupied zone are eliminated.
- Check proper function of protective equipment (anti-freeze facility. thermal contact)
- After checks are carried out. close the plastic electrical control box.
- Prior to commissioning of the unit fitted with a fan isolator. switch the latter into „ON“ position.

7.2 Unit air venting

- Open all shut off and control valves.
- Use an air venting key to open an air vent screw by others.
- Close the air vent screw again, only if heating/cooling medium is still pouring out.

7.3 Funktionskontrolle der Frostschutzeinrichtung (nur bei Mischluftgeräten)

Die Geräte mit Frischluftansaug (Mischluftgeräte) sind mit einer Frostschutzeinrichtung ausgerüstet. Bei Unterschreitung einer Zulufttemperatur von 5°C wird die Frostschutzeinrichtung aktiviert. Der Ventilatormotor schaltet aus und das Mischluftmodul fährt in Umluftstellung.

- Schalten Sie, wenn noch nicht eingeschaltet, die elektrische Versorgung ein.
- Überprüfen Sie das Zufahren des Stellantriebes und Schließen der Aussenluftklappe bei Temperatur unter 5°C. Um die Abschalttemperatur zu erreichen vereisen Sie den Frostschutzfühler mit Kältespray.
- Überprüfen Sie das Schließen des Regelventiles.
- Überprüfen Sie, ob der Ventilator ausschaltet.
- Nach der Überprüfung schalten Sie das Gerät wieder aus.

7.4 Operation with MC 4 control units

7.4.1 Fan

Activation and deactivation is performed via a speed selection switch (mounted on MC 4 control box) or via room thermostat or field-provided control contact.

7.4.2 Regulated mixing air section/damper

Regulation of mixing air section/damper is performed via a switch "heating-ventilation" mounted on the MC 4 control unit.

For heating - outside air damper is closed. fan is regulated using a room thermostat. if fitted.

Ventilating - outside air damper is open. fan is operating continuously.

7.4.3 Anti-freeze facility

This function prevents frost-related damage to heat exchanger of mixed air units. The frost alarm is detected by an anti-freeze sensor / anti-freeze controller fitted in the unit heater. If supply air temperature falls below 5°C. anti-freeze device is activated. The fan motor is switched off and mixed air module changes into recirculating air mode.

7.4.4 Differential pressure switch

Differential pressure switch is activated if set limits for pressure drop of the filter insert are exceeded.

7.5 Operating instructions

NOTE!
Ensure free cross section and unobstructed air discharge at the outlet.
The discharge direction shall be set in such way as to prevent air draughts in the occupied zone.
The fan isolator fitted on the unit is used for deactivation of the fan only.
This switch is not used as the main isolator or emergency switch.

7.6 Deactivating unit

Press the I / O button on the MC4 control box (diode goes off).

7.7 Operation with MATRIX control system

7.7.1 Terminating resistors

MATRIX			
200#	300#	400#	400#+IO
✓			

There are no terminating resistors on the unit printed circuit boards of the MATRIX 200# control system. The terminating resistors have to be switched on or off in the control panel only if a network is established through the MATRIX.Net to other unit groups or additional modules, such as a clock module, or to input and output modules.

Switching on terminating resistors at the beginning and end of the line (see Fig. 7-1):

• Activate the DIP switch of both users (e.g. control panels, unit circuit boards or modules) by setting position to “ON”.

The line beginning and line end correspond to the start and end of the bus cable. The terminating resistors should also be switched on for stand-alone units.

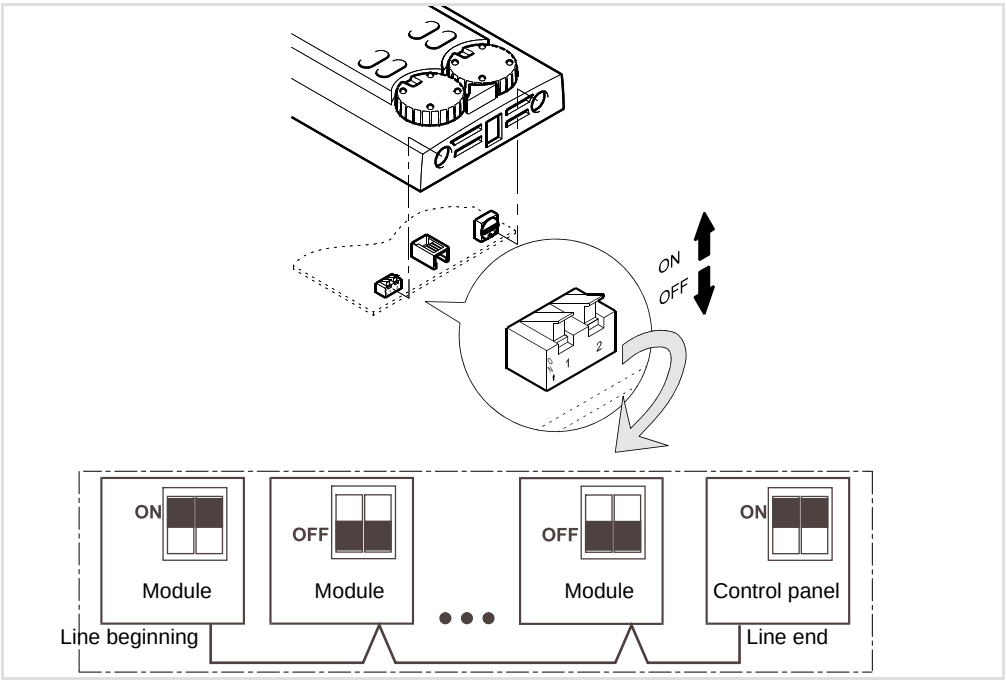


Fig. 7-1: Adjusting terminating resistors

DIP switch		Function
1	2	
OFF	OFF	Terminating resistor switched off
ON	ON	Terminating resistor switched on (default setting)

NOTE!
With default settings the DIP switches are set to “ON/ON” and must be switched off if used as an intermediate unit.

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

There are terminating resistors on the unit printed circuit boards of the MATRIX 300#/ 400# control system.

Switching on terminating resistors at the beginning and end of the line (see Fig. 7-2):

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

The line beginning and line end correspond to the start and end of the bus cable. The terminating resistors should also be switched on for stand-alone units.

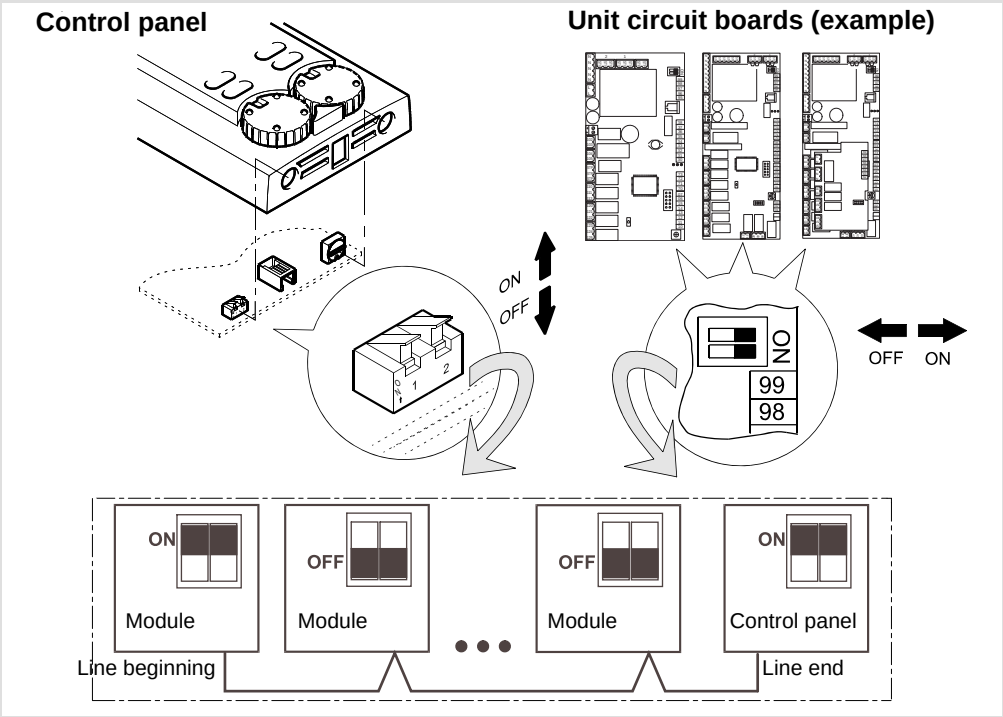


Fig. 7-2: Adjusting terminating resistors

DIP switch		Function
1	**2**	
OFF	OFF	No terminating resistor
ON	ON	Terminating resistor switched on (default setting)

NOTE!
With default settings the DIP switches are set to “ON/ON” and must be switched off if used as an intermediate unit.

7.7.2 Setting address

MATRIX			
200#	300#	400#	400#+IO
✓			

The unit PCBs of the MATRIX 2000 control system are not fitted with address selection switches.

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

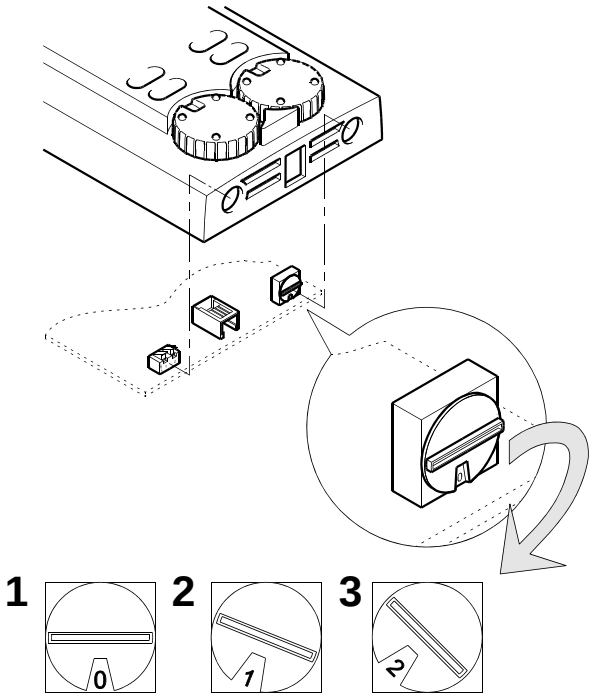
Single group (without networking multiple unit groups)

- Set the "0" address (manufacturer's default setting) on the control panel. Connected MATRIX.V module must also be set to "0" address.

Networking multiple groups

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

NOTE!
Assigning duplicate addresses on the control panels can cause malfunctions. 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. 7-3: Setting the address on the control panel

Pos. 1: Control panel group 0 (address 0)
Pos. 2: Control panel group 1 (address 1)
Poz. 3: Control panel group 2 (address 2) and so on...

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

The corresponding group address must be assigned to the control panels and units in a group.

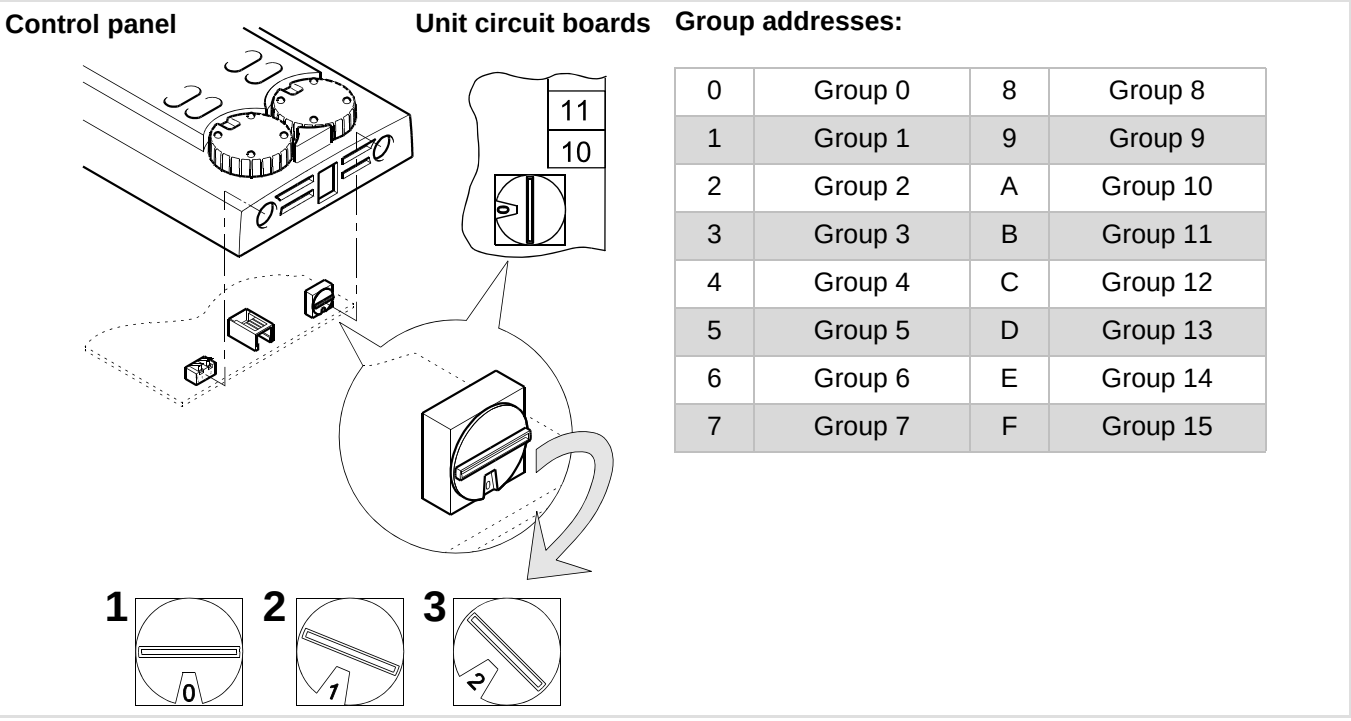
Single group (without networking multiple unit groups)

- On the control panel, set the address “0” (manufacturer's default setting).
- On the unit PCB(s), set the “0” address (manufacturer's default setting).

Networking multiple groups

- On the control panels and all unit PCBs assigned to the individual groups - set the addresses to 0 -15. Each group is assigned its own address. The labels A to F correspond to the addresses 10 to 15.

NOTE!
Assigning duplicate addresses on the control panels can cause malfunctions. The default setting for the group address switch is “0” and it may need to be changed, if necessary.



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. 7-4: Setting the address on the control panel

Pos. 1: Control panel, Multi*MAXX unit(s) Group 0 (address 0)*
Pos. 2: Control panel, Multi*MAXX unit(s) Group 1 (address 1)*
Poz. 3: Control panel, Multi*MAXX unit(s) Group 2 (address 2), etc*

7.7.3 Switch on the unit

HAZARDOUS VOLTAGE!
The electrical control box is open.
Direct interventions in the electrical control box are not permitted!
Before completing work on the air treatment unit, ensure that the electrical control box is properly closed.

- Apply supply voltage.
  The unit is activated using a MATRIX control panel.
  For further instructions, refer to the operation manual of the corresponding control panel.
- Switch the unit on using the control panel.
- Test the fan speeds.

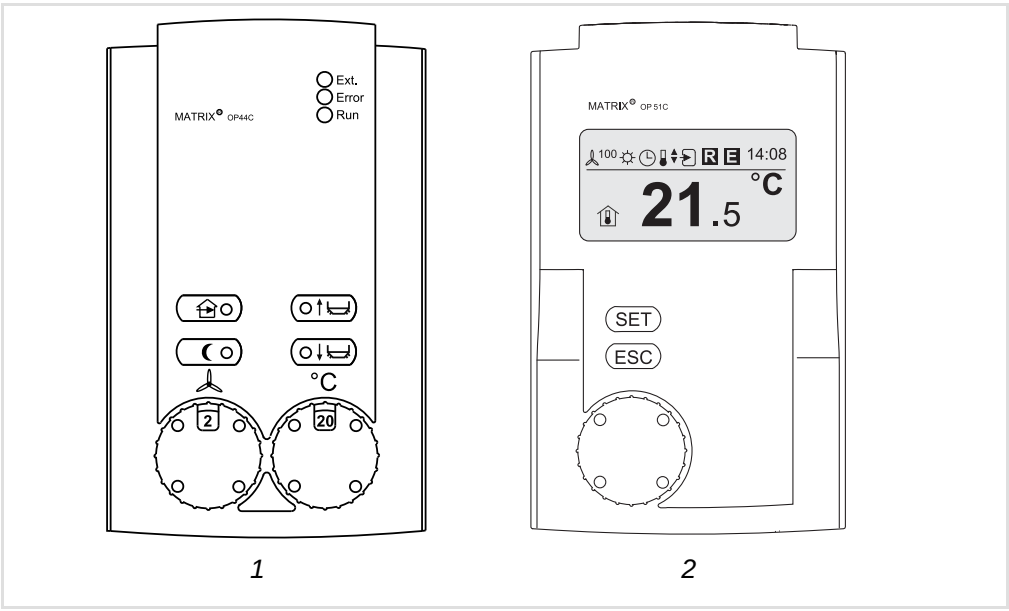


Fig. 7-5: Switching the unit on using the control panel

Pos. 1: Control panel MATRIX OP44I
Poz. 2: Control panel MATRIX OP51I

NOTE!
The position of the speed selection switch (only OP5#/OP21I/OP31I/OP44I) can be mechanically limited.
The limitation should be set in such a way that the maximum adjustable fan speed corresponds to that of the unit.
For details on the limitation, refer to the operation manual for the control panel.

7.8 Checking data connection

HAZARDOUS VOLTAGE!

Before correcting an error in the data connection, de-energise and isolate the entire system down. Ensure that the unit is isolated and secured against being energised at an appropriate point of the on-site power supply.

7.8.1 Checking control cables

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

The data/commands are communicated via control cables. Depending on the fitted equipment, these should be connected and/or checked in accordance with the wiring diagram attached to the unit connection box (see Fig. 6-13 and Fig. 6-14).

The yellow LED on the unit PCB signals an active supply voltage to the electronics.

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

7.8.2 Checking data connection

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

Data are communicated via a 2/4-wire data cable. This cable must be connected and/or checked in accordance with the wiring diagram attached to the unit connection box (see Completing bus connection on page 38).

3 LEDs on the unit printed circuit board signal the operating status of the unit.

LED	LED status	Operating status	ACTION
Yellow	On	Power supply to electronics OK	–
	Off	Power supply to electronics not OK	Check 230 V power supply on unit
Green	On	Operating system and control software have been started and are working properly	–
	Off	Software or processor defective	Replace PCB
Red	Permanent on	Error in electronics	Power PCB down and wait for a short time. Power the PCB on. If the error message is still present, replace the PCB.
	Flashes	Data bus interruption	Check the connection of the data cables and the setting of the terminating resistors on all units.

Fig. 7-6: Operation status and remedy for faults in the data connection (MATRIX 3000/4000)

7.9 Checking control inputs and outputs

The MATRIX 3000/4000 control system are fitted with inputs and/or outputs.
When checking control inputs and outputs, consider that the configuration is set by the manufacturer.
Refer to the unit connection diagram (attached to the connection box) for the relevant controller function.

Field-performed changes to the configuration (via MATRIX.PC service software) have to be considered separately.

7.9.1 Functional input

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

Depending on control system, the input can be assigned with the following functions as required:

Unit OFF

- Set the jumper on the input terminals.
- Turn the unit on and adjust the setpoint as required until the fan is running.
- Open the jumper.
- ✓ The fan must switch off, the valves close
  (unit remains in frost protection monitoring mode).

Gate contact

- Set the jumper on the input terminals.
- ✓ The unit switches in the configured fan speed
- Open the jumper.
- ✓ The unit switches into previous operating mode after configured idle time has elapsed.

Economy operation

- Turn the unit on and adjust the setpoint as required until the fan is running.
- Set the jumper on the input terminals.
- ✓ The fan must switch off and valves close
  Requirement: economy mode setpoint set accordingly (unit remains in frost protection monitoring mode).

NOTE!
If multiple inputs of different configuration are used within one group, then „economy mode“ input has priority over „window contact“ input.

7.9.2 Enabling external extract air control

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

Procedure

- Turn the unit on and adjust the setpoint as required until the fan is running.
- Confirm the mixed air damper control. The outside air damper opens and the possibly connected extract air fan switches on.

7.9.3 Operating modes

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

Using 4 additional inputs and 2 outputs the following operating modes can be activated:

Procedure for activating „normal mode“:

- Switch the unit on.
- Switch the unit into economy mode (see operation manual for control panel).
- Set the jumper on the input terminals.

✓ The unit switches into normal mode.

Procedure for activating „autonomous operating mode“ or „economy mode“:

- Switch the unit on.
- Set the jumper on the input terminals.

✓ The unit switches into „free operation mode“ or „economy mode“.

Procedure for activating „unit off“:

- Switch the unit on.
- Set the jumper on the input terminals.

✓ The unit switches off (attention: no frost protection function).

Procedure for activating „heat request“:

- Switch the unit on and increase the setpoint, until the unit starts heating.

✓ Contact "heat request" closes.

Procedure for activating „cool request“:

- Switch the unit on and decrease the setpoint, until the unit starts cooling.

✓ Contact "cooling request" closes.

7.10 MATRIX functions

7.10.1 Fans with MATRIX 200# to 400#

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

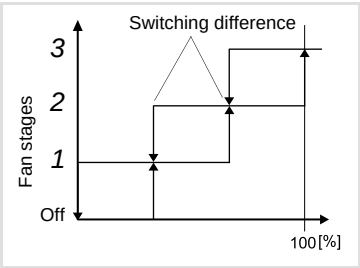
Fan control depends on the configured control type and selected operating mode on the control panel. The following fan modes can be set:

– Manual fan control
– Automatic fan control
– Automatic fan control in “mute” mode

Irrespective of the selected mode, the fan is deactivated, if one of the following errors has occurred:

– Motor thermal monitoring tripped
– Insufficient operating data due to sensor error
– Defective hardware

Automatic



The fan is regulated depending on the difference from the setpoint (temperature).

In „mute“ mode the highest fan speed is blocked.

The fan speeds are controlled according to the difference between actual and setpoint readings. Both size and time of the current difference have an effect on the control performance.

The number of available fan speeds depends on the unit type.

Parameter:

– Speed number: 0 ... 3 - speed stage fan
– EC motor (only MATRIX 4004)

Manual

The fan is operated at the pre-set fan speed. The fan speed can be pre-set via control panel, the building management system or external modules (e.g. MATRIX.DI digital input module).

Fast ventilation (only with mixed air units)

This function enables to ventilate the room with fresh air for a limited period of time. This function is available only in connection with control panel MATRIX OP50 or MATRIX OP51.

Air change function

This function enables the fan to operate irrespective of the selected control system and even, if the setpoint temperature is reached. In this case the fan stage must be selected manually. This should provide an optimal air change in the room. This function can only be selected using the MATRIX OP50 and MATRIX OP51 control panel or the MATRIX.PC service software.

Enabling

In case of malfunctions, e.g. frost risk, the unit is blocked. To enable the speed selection switch after troubleshooting set the latter in "0" of "Off" position, wait a few seconds and switch on again.

Start up function

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

With mixed air units the fan is activated with delay, and the valve is opened immediately, if ambient temperatures fall below a preset value (default 10 °C). (external sensor is required for this function).

7.10.2 Valves

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

Depending on the selected controller, the integrated valve controller supports open/close and modulating valves.

The valves can be controlled in mode heating.

In order to reach a common starting position, the factory set synchronisation mechanism moves all connected valves (only modulating valves) to OPEN or CLOSE position every 12 hours.

7.10.3 Mixed air damper control

Open/close manual control

The mixing air damper control is performed using a button on the MATRIX OP44 control panel or is assigned as a setpoint between 0% and 100% on the MATRIX OP50 or MATRIX OP51 control panels.

Modulating point fresh air volume control

The damper position is calculated on the basis of the required fresh air flow and current fan speed.

Temperature control

The damper's position is regulated on the basis of the currently required heating in the room or supply air operation mode and the outside temperature (external potential). In favourable temperature conditions the regulation is achieved only by controlling the mixed air damper (passive mode).

Energy saving control

This function is the same as temperature regulation; but with certain temperature conditions and open damper, the fan speed is increased in make use of energy contained in outside air.

7.10.4 EC motor (only MATRIX 4004)

An EC motor is an electrically commutated motor. Motor speed can be regulated continuously. By selecting setpoint between 0 and 100% using controller mounted on the motor, the required speed can be set.

7.10.5 Anti-freeze facility (only MATRIX 400# and 400#+IO)

This function prevents frost-related damage to heat exchanger of mixed air units. The frost alarm is detected by a sensor fitted in the unit heater. In case of malfunction, the fan is switched off and the mixed air damper closes, i.e. it switches into recirculating air mode.

7.10.6 Setting limitation functions

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

Limitation values of the supply air temperature can be set for heating and cooling operation.

– Heating operation:
  Minimum and maximum limitation (limitation type rigid or variable)

These limitation values and limitation type can be set using “MATRIX.PC” service software. (See online help of the service software for further procedures).

When using a control panel with display (MATRIX OP50 or OP51), the limitation values can also be set here (See MATRIX OP50/OP51 operation manual).

When using control panels MATRIX OP30 to OP44 the service software for making settings is generally necessary.

General functions of supply air temperature limitation

If a supply air temperature limit is either not reached or exceeded, the controller is running automatically in supply air mode. Supply air temperature with relevant control settings is regulated to reach this limit value.

With the room temperature and cascade control types, this temporary supply air regulation remains active until the main control setpoint, i.e. particular room temperature, is reached. The unit then switches back to the main control mode.

Minimum heating temperature

If this function is activated and a temperature sensor is present in supply air duct, a temperature value must be entered here. Supply air must not fall below (rigid limitation), or be only slightly below the limit (variable limitation).

Factory setting and enter values:

– Default value: 18.0 °C
– Minimum enter value: 10.0 °C
– Maximum enter value: 35.0 °C

With room temperature control, you can also select whether the minimum limitation should be rigid or sliding.

Minimum heating limitation (rigid):

The set minimum temperature value is maintained (value does not fall below limit).

– Advantage: This largely prevents draughts.
– Disadvantage: The room can become slightly overheated, particularly if the set values are too high, as the controller is not able to prevent overheating using cooler air.

Minimum heating limitation (variable):

Value can fall below the set minimum temperature value, if the current indoor temperature value exceeds the setpoint by a value, that is calculated as room temperature difference multiplied by effective factor.

– Advantage: Overheating of the room can be prevented or minimized by means of the minimum limitation.
– Disadvantage: The supply air temperature can fall below the minimum limitation temperature value.

Factory setting and enter limits for effect factor:

– Default value 1.0
– Minimum enter value 0.4
– Maximum enter value 4.0

Maximum heating temperature

If this function is activated and a temperature sensor is present in supply air, a temperature value can be entered here. This value should not exceed supply air temperature.

Factory setting and enter values:

– Default value 60.0 °C
– Minimum enter value 25.0 °C
– Maximum enter value 60.0 °C

7.10.7 Stand by mode

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

Standby temperatures mode is only available with room temperature control option. This does not regulate the temperature to a fixed setpoint, but instead to a pre-set setpoint range. The MATRIX.PC service software enables to change this setpoint.

The standby mode is activated if a room temperature sensor is connected but no room temperature setpoint, i.e. no control panel, is available (e.g. during construction phase and drying of building).

The “standby mode” function is terminated as soon as the fixed room temperature setpoint is set.

7.10.8 Indoor anti-freeze protection

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

NOTE!

This note is only valid for units with a heating function.

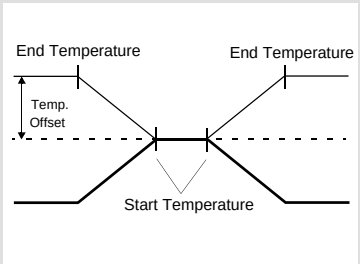
This function ensures a frost-free condition when the unit is switched off.

At room temperatures < 4 °C, the valve is fully opened or electric heater on. The fan is activated at the lowest speed, regardless of the inlet temperature.

At room temperatures > 6 °C the valve is closed and fan deactivated.
Normal regulation mode is activated.

7.10.9 Summer / winter compensation

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



For this function a connected external sensor is required. This function enables a shift in the room temperature setpoint depending on the ambient temperature.

Application example:

Starting from outside temperature of 26 °C this setting dictates to increase the room temperature setpoint by 0.5 °C per 1 °C increase of outside temperature. The setpoint should not be increased any further if outside air temperature reaches 32 °C. Thus 26 °C as the start temperature and 32 °C as the end temperature should be entered.

The setpoint offset is calculated as follows:

(End temperature - start temperature) * 0.5 °C (the increase per °C external temperature increase)

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

The factory set parameters can only be changed via the MATRIX.PC service software.

7.10.10Filter replacement indication

This function calculates the filter contamination level using the operation times of the respective fan speeds. The required filter replacement warning is displayed and confirmed only on the MATRIX OP50 or MATRIX OP51 control panels.

The „filter change“ message is indicated after "service period" or "minimum service interval" is exceeded or generated by a connected differential pressure switch. Confirmation of the warning is followed by the new calculation of the remaining service period.

Upon successful filter replacement the internal run timer counter is reset using the menu selection at the control panel.

7.10.11 Air quality regulation (only MATRIX 400# and 400#+IO)

With active air quality regulation mode volume flow rate is automatically adjusted depending on indoor air quality. MATRIX.PC service software is used to select between increasing motor speed and/or regulating air damper.

The following settings are possible:

– Deactivated: air quality regulation is disabled
– Fan only: only motor RPM regulates air quality
– Air damper only: only air damper regulates air quality
– Fan ->Damper: air quality regulation uses motor speed up to 100% and subsequently damper position up to 100% (factory setting)
– Damper -> Fan: air quality regulation uses damper position up to 100% and subsequently motor speed up to 100%

The input for air quality sensor is factory pre-configured with 0-10 V output signal and a sensor range of 0-2000 ppm. In case of a short circuit or sensor break in a connected sensor - air quality regulation is disabled.

8 Maintenance and Troubleshooting

8.1 Maintenance

NOTE!
We recommend to conclude a maintenance contract with a service company. The service firm staff should be trained by the unit manufacturer.

HAZARDOUS VOLTAGE!
Isolate all power supply connections to the unit heater and ensure the power cannot be inadvertently energised.

DANGER OF ROTATING UNIT PARTS
Wait to allow the fan rotational momentum to cease!

RISK OF ACCIDENT DUE TO HOT MEDIUM!
Wait until the heat exchanger of the unit heater has cooled down!

NOTE!
For unit (unit heater) maintenance - inspections at regular intervals must be observed and possible malfunctions repaired (see Tab. 8-1). Maintenance shall only be performed if the unit is fully isolated by authorized and qualified staff.

Function test of the unit fan and heat exchanger must be included in the inspection. If necessary, possible dirt and solid deposits must be removed from the heat exchanger. Ensure that the impeller is not obstructed and rotate the fan impeller to ensure free movement. The impeller surface must maintain the same distance to the inlet nozzle.

List of regular maintenance procedures

The following maintenance tasks shall be performed at the indicated time intervals.

	Maintenance interval			
Components	**Quarterly**	**Half-yearly**	**Annually**	**Before the winter season**
Checking filter	x			
Checking air intake grille*		x		
Checking air discharge grille *		x		
Checking fan and fan section*		x		
Checking screw connections of medium lines **			x	
Checking electrical connections			x	
Checking earthing			x	
Air venting heat exchanger **			x	
Checking heat exchanger and drip tray for dirt/mould. cleaning and disinfecting. if required.			x	
Checking settings and functions of all valves **			x	
Checking antifreeze agent (if present) in medium **				x
* *Clean and remove objects. if required*				
** *Depends on the model*				

Tab. 8-1: Regular maintenance

8.2 Quarterly maintenance

8.2.1 Replacing filter

If a unit heater is fitted with a filter module, the filter insert must be checked for clean condition. If maximum pressure drop. as defined by design and layout data, is reached, the filter insert must be replaced.

If the unit heater is fitted with a filter module and differential pressure switch the project-defined value must be set.

Use the unit type code for ordering the ZH#.38## spare filter (page 3).

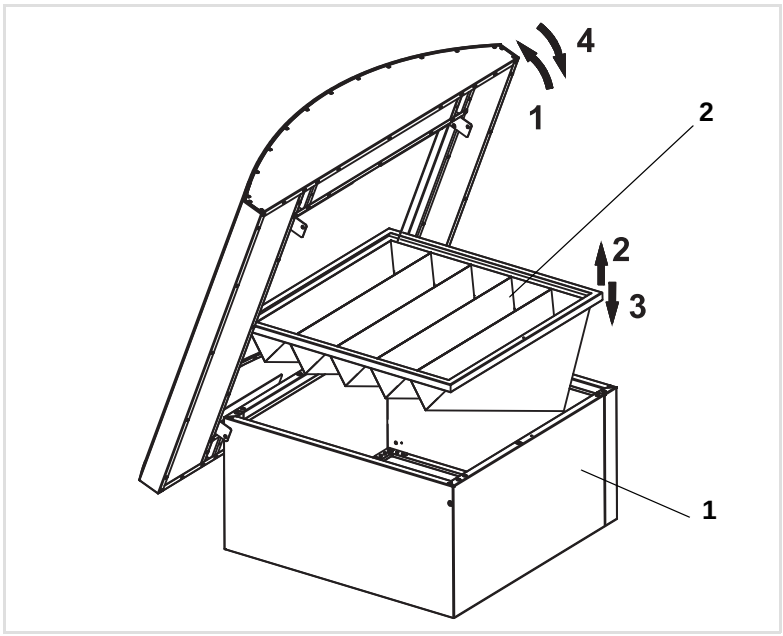


Fig. 8-1: Filter replacement in the roof hood ZH#.350#

Pos. 1: Roof hood intake side
Pos. 2: G2 or G4 bag filter

Remove the side screws (screws with plastic caps) and open the upper section of the roof hood. Remove and replace the filter. Close the roof hood and tighten the screws.

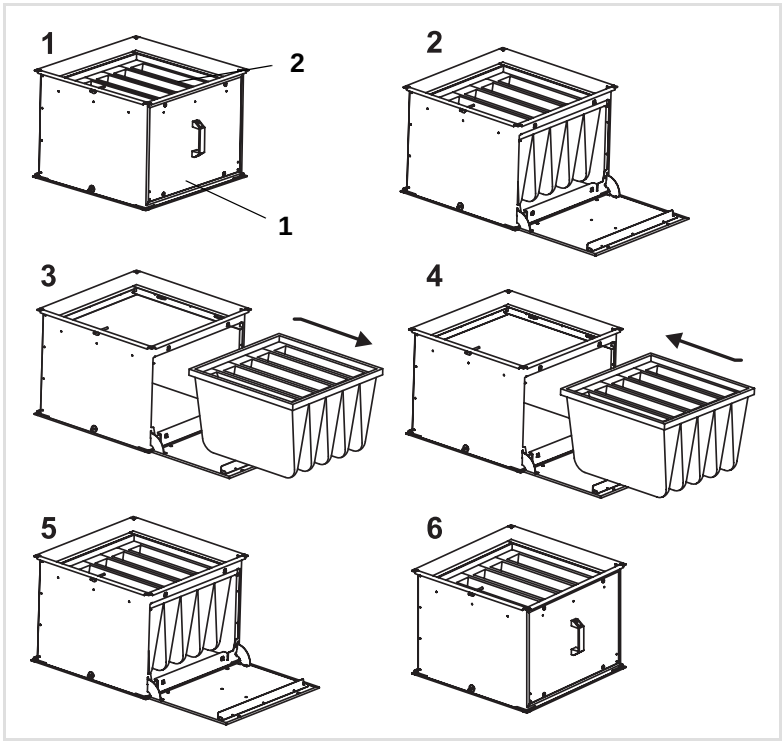


Fig. 8-2: Replacing bag filter insert ZH#.361#

Pos. 1: Filter section
Pos. 2: G2 or G4 bag filter

Unlock the side panel of the filter section (1) by slightly turning quick-action clamps 90°. open the panel and remove and replace the filter insert (2).

After inserting the bag filter. close the side panel of the filter section and secure the latter by turning the quick-action clamps 90°.

Use the unit type code for ordering the ZH#.39## spare filter (page 3).

8.3 Half-yearly maintenance

8.3.1 Checking fan

Check:

- fan impeller to confirm it turns freely in the proper direction
- power supply cable of fan motor for damage
- power supply cable of the fan motor on the terminal strip mounted on the fan module

8.4 Annual maintenance

8.4.1 Cleaning heat exchanger

Compressed air or detergents and water shall be used to clean a dirty heat exchanger. Remove the heat exchanger before cleaning it. For the removal procedure the specified sequence (1-3) must be adhered to (see fig. 8-3). Use a warm water jet (4) to clean heat exchanger fins. Replace and assemble all parts of the unit. Consider the sequence of installation steps (5-7) as specified in fig. 8-3. For unit commissioning follow the relevant instructions specified in chapter 7 „Commissioning“.

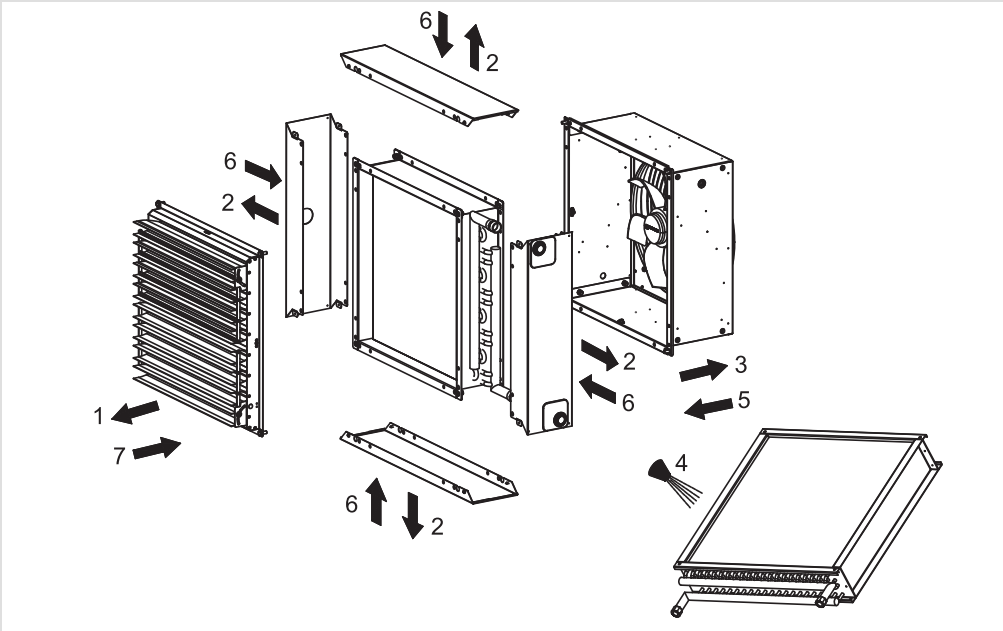


Fig. 8-3: Cleaning heat exchanger

EQUIPMENT DAMAGE!
Beware not to damage fins or louvres during cleaning of heat exchanger. Non compliance will result in the reduction of heating output. Drain water from the heat exchanger. if the unit heater is deactivated for the winter period. Otherwise this may cause water in the heat exchanger to freeze.
When cleaning with a water jet. do not direct water on the fan motor or electrical components. if necessary remove the fan motor.

8.5 Operating faults

Symptom	Possible cause	Remedy
Fan fails to start **Fan isolator (optional) is activated** **The diodes in the switching speed of the fan (1-2-3) and a switch in the I / 0 on the control box MC4 are off.**	Unit not switched on	Switch on unit
	Missing supply voltage	Check fuse/circuit breaker/power supply (technical personnel only)
	Electric lines not connected	Connect electrical cables (technical personnel only)
	Failure in unit fusing	Replace fuses (technical personnel only)
	Room thermostat switched off fan on reaching room temperature	Refer to the operation manual for control panels, use room thermostat to increase the setpoint.
Fan fails to start **Fan isolator (optional) is activated** **The Error (!) LED on the MC4 control box lights up.**	Motor protection was activated	Check temperature of the fan motor, allow time to cool down, if required, and activate again (in case of a repeated fault always make sure that the cause of the fault is identified).
Unit too noisy	Unit running at too high RPM	Set a lower RPM
	Air intake or discharge areas blocked	Clear discharge/air intake of obstructions or bends
	Noisy fan bearings	Replace faulty fan (**technical personnel only**)
	Filter is dirty	Clean/replace filter
Unit fails to heat/heats insufficiently (pumped warm water)	Fan not switched on	Switch on fan
	Air flow rate of unit too low	Select higher speed
	Air intake or discharge areas blocked	Clear or clean ducts
	Fan blocked/faulty	Check fan, replace if necessary (**technical personnel only**); also refer to „Fan fails to start“
	Filter is dirty	Clean/replace filter
	Heating medium is not hot	Switch on the heating system (boiler)
		Switch on the circulating pump
		Air vent unit
	Water flow rate too low	Check pump performance (**technical personnel only**)
		Check pipe run balance and adjust using calculated pressure drop (**technical personnel only**)
	Low temperature setpoint selected on control panel	Increase setpoint temperature on control panel
	Control panel or sensor is located above a heat source or exposed to direct sunshine	Place control panel or sensor in proper position (**technical personnel only**)
	Control valve fails to open	Replace faulty control valve (**technical personnel only**)
Water leakage around unit	Leaking heat exchanger or hydraulic connections	Check heat exchanger, vent and valve connections for leak-free state
		If necessary, re-tighten connections, clean screw insert or reseal connections
		On valves, check screw connections for ease of movement, clean sealing surfaces and replace seal if necessary (**technical personnel only**)
		Check soldered joints between collector and heat exchanger tubes and on heat exchanger deflection bends for leaks; if this case, replace heat exchanger (**technical personnel only**)

Symptom	Possible cause	Remedy
Controller switches on continuously	Control panel or sensor fitted in the wrong location (e.g. adjacent to open door or window or close to Multi*MAXX* outlet)	Fit control panel or sensor in proper location where room temperature can be measured representatively (**technical personnel only**)
	Heating medium temperature too high/low	Correct the external temperature curve on the controller of the boiler system. Check the control mode and adjust accordingly (**technical personnel only**)
	Other heating elements with individual control are on the same pipe run (e.g. radiators with thermostat valves)	Separate medium supply if necessary. Check the control mode and adjust accordingly (**technical personnel only**)
Fan fails to run Controller red LED is flashing **Flash code:**  = Electric motor faulty (thermal contact)  = Frost protection is active	Thermal contact (TC) of fan motor and/or alarm contact of humidity sensor of condensate pump activated Fan was switched off Power electronics/controller and/or fan faulty	Check thermal contact of fan motor (through connection). Replace power electronics/controller and/or fan motor (**technical personnel only**) Set the speed switch in "0" position. Wait for 3 seconds and activate again.
	Faulty T630A fuse	Replace fuses **(technical personnel only)**
	Supply air temperature dropped to 4°C or lower	Ensure that sufficient heating medium is available

** Reactivation after cause is eliminated (troubleshooting):*
Use control panel to set speed selection switch to „0“, switch to the required speed again

Tab. 8-2: Causes of malfunctions and remedies

If the malfunction cannot be eliminated by the maintenance personnel, please consult our authorized service department.

9 Disassembly and Disposal

ENVIRONMENTAL DAMAGE!
Only qualified licensed staff shall dismantle and dispose of the Multi*MAXX* HS unit!

9.1 Disassembly

To dismantle the Multi*MAXX* HS unit proceed as follows:

HAZARDOUS VOLTAGE!
When carrying out decommissioning and dismantling work on the unit heater, disconnect all power supply connections, ensure the power cannot be inadvertently energized and verify that electrical lines have been disconnected. When carrying out decommissioning and dismantling jobs on the unit, isolate all power supply connections and ensure that power cannot be inadvertently energised. Earth and isolate all adjacent live parts. Non-compliance can lead to death or serious injury.

HIGH PRESSURE HAZARD!
When carrying out decommissioning and dismantling jobs on the unit heater, shut off and evacuate/empty all connected piping until system pressure has equalized with ambient air pressure.
Failure to follow safety precautions can result in serious injury.

- Isolate all connections and ensure there are no leaking materials such as oil, refrigerant and water-glycol mix.
- Release the fixing to the floor.

PERSONAL INJURY
Secure the unit heater against slipping. Relevant shipping instructions for Multi*MAXX* HS units must be followed.

9.2 Recycling

RECYCLING!
Ensure safe and environmentally friendly disposal of operating, auxiliary and packing materials as well as spare parts. Consider and follow local regulations and codes of practice regarding recycling procedures.
For disposal - unit components must be separated and grouped according to their features and material type in the best possible manner.

ENVIRONMENTAL DAMAGE!
Dispose of all operating materials (e.g. oil, refrigerant and water-glycol mix) and components in an environmentally-friendly manner and in compliance with local laws and regulations.

FläktGroup

EC DECLARATION OF CONFORMITY

pursuant to Directive 2006/42/EC of the European Parliament and of the Council
(original EC Declaration of Conformity) 2020/044/5AB15602

Manufacturer:
FläktGroup Czech Republic a.s., Slovanská 781, 463 12 Liberec XXV – Vesec, Czech Republic; ID No.: 46708375

Entity authorized to compile technical documentation:
FläktGroup Czech Republic a.s., Slovanská 781, 463 12 Liberec XXV – Vesec, Czech Republic; ID No.: 46708375

Description and identification of machinery:

Air conditioning units

SAHARA® *MAXX* / Multi*MAXX*®

type **HN##.######.###; HS##.######.###; HD##.######.###; HB##.######.###**

incl. accessories

The ventilating units

SAHARA® *Vent / MAXX*® Vent

type **VN##.######.###; VS##.######.###**

incl. accessories

Air conditioning units SAHARA® *MAXX* / Multi*MAXX*® serve for the heating, ventilation, cooling or filtering of indoor or outdoor air. The ventilating units SAHARA® *Vent / MAXX*® Vent serve for the ventilation or filtering of indoor or outdoor air. They are installed in industrial, warehouse, retail and exhibition premises. The air-conditioning units SAHARA® *MAXX* / Multi*MAXX*® and ventilating units SAHARA® *Vent / MAXX*® Vent are suitable for mounting on walls or below ceilings. The structure of the air conditioning and ventilating units consists of a load-bearing skeleton with casing, heat exchanger (air conditioning units only), louvers on the AC unit output, ZIEHL-ABEGG ventilator with a protective grid and electrical wiring.

Declaration:
The machinery complies with all relevant provisions of Directives 2006/42/EC, 2014/30/EU and 2014/35/EU.

List of harmonized standards applied in the conformity assessment:
EN ISO 12100:2010, EN ISO 14120:2015, EN ISO 13857:2019, EN ISO 11202:2010, EN ISO 3746:2010, EN 60335-1:2012, EN 60335-2-40:2003, EN 61000-6-2:2005, EN 62233:2008, EN 55014-2:2015

This declaration relates exclusively to the machinery in the state in which it was placed on the market and excludes components which are added and/or operations carried out subsequently by the final user.

Issued at Liberec: 19. 05. 2020

Name, title: Ing. Eduard Horbal', chairman of the board

Signed

Year of manufacture

FläktGroup

EXCELLENCE IN SOLUTIONS

FläktGroup is the European market leader for smart and energy efficient Indoor Air and Critical Air solutions to support every application area. We offer our customers innovative technologies, high quality and outstanding performance supported by more than a century of accumulated industry experience. The widest product range in the market, and strong market presence in 65 countries worldwide, guarantee that we are always by your side, ready to deliver Excellence in Solutions.

PRODUCT FUNCTIONS BY FLÄKTGROUP

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

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