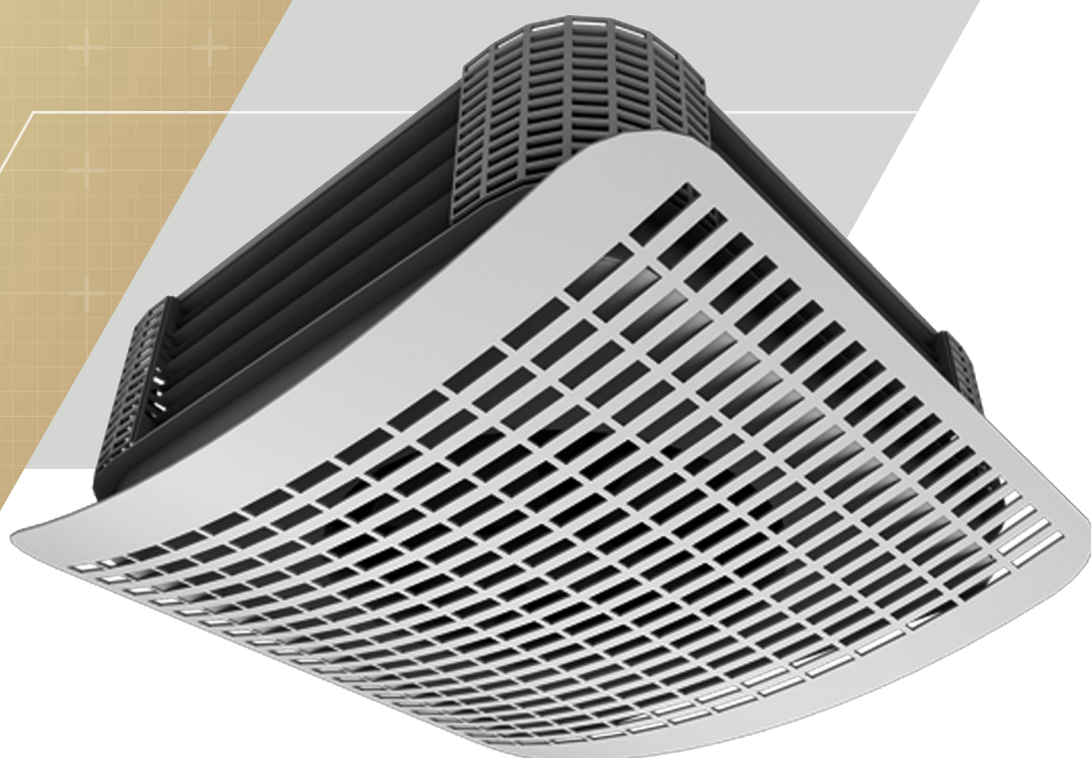


MULTI FLAIR®

OPERATION MANUAL



Product range



Type code

Multi Flair UNIT HEATER

M 1 1 1 U 0 W A G B 0 5

Unit Type	
1	= Comfort version (with designer grille)
2	= Standard (without designer grille)

Size	
1	= Size 1
2	= Size 2
3	= Size 3

Capacity stage	
1	= Capacity stage 1 - 1 row, fin spacing 3 mm
2	= Capacity stage 2 - 1 row, fin spacing 2.1 mm
3	= Capacity stage 3 - 2 rows, fin spacing 3 mm
4	= Capacity stage 4 - 2 rows, fin spacing 2.1 mm

Air-flow function	
U	= Recirculating air
P	= Primary air

Heating, cooling

Only Heating

0W = Heating water (PWW)

Cooling or Heating

WC = Cooling water (PKW)

Heating water (PWW)

only Cooling

W0 = Cooling water (PKW)

Heat exchanger type

A = Cu/Al

Coil connection, filter

Without filter

E = Connections from top

F = Connections from side

with filter (only comfort design M1)

G = Connections from top

H = Connections from side

Electric motor / Speeds

Terminal block

B = AC motor, 400 V/3~50 Hz, 2-speed

F = AC motor, 230 V/1~50 Hz, 1-speed

G = EC motor, 230 V/1~50 Hz, continuous

Control box for integrated controls

L = AC motor, 400 V/3~50 Hz, 2-speed

P = AC motor, 230 V/1~50 Hz, 3-speed

Y = EC motor, 230 V/1~50 Hz, continuous

Condensate drain / pump

0 = Without (only heating units)

A = With condensate drain (units with cooling)

P = With condensate pump (units with cooling)

Colour

4 = Galvanized steel (only for standard model M2)

5 = White RAL 9010

9 = RAL selection

Controls package

I 3 0 0 1 B A

Controller type	
2	= MATRIX 2000
3	= MATRIX 3000

Controller package No.

Controller

IP20

A = MATRIX OP21C

B = MATRIX OP30C

C = MATRIX OP31C

d = MATRIX OP44C

E = MATRIX OP50C

F = MATRIX OP51C

U = MATRIX OP20C

IP54

G = MATRIX OP21I

H = MATRIX OP30I

I = MATRIX OP31I

L = MATRIX OP50I

M = MATRIX OP51I

Z = Without controller

Controls type

Control unit, controller

A = Stand-alone controller

C = Without controller

Slave unit

d = Without controller

Unit with

Z = Terminal block

or

MC 4 U 1AC 000

Unit type

U = Recirculating

Electric motor version

AC motors

1AC = 1-speed, 230 V, 50 Hz

2AC = 2-speed, 400 V, 50 Hz

EC motors

1EC = continuous, 230 V, 50 Hz

1	Safety and user instructions	7
1.1	Operation manual scope	7
1.2	Symbols used	7
1.3	Safety instructions: warning messages and risk symbols	8
1.4	Safety at work	9
1.5	Use	9
1.6	Improper use	10
1.7	Safety regulations and standards	10
1.8	Changes and modifications	11
1.9	Spare parts	11
1.10	Staff selection and professional qualifications	11
2	Technical data	12
2.1	Unit components	12
2.2	Operational limits	14
2.2.1	Inlet medium temperature	14
2.2.2	Unit and heat exchanger	14
2.3	Dimensions	15
2.3.1	Basic unit	15
2.4	Technical data	15
2.4.1	Unit weight, water volume in the heat exchanger and protection	15
2.2.4	Electrical data	16
2.5	Condensate pump	17
2.5.1	Condensate drainage	17
2.5.2	Condensate pump	17
2.6	Ecodesign Directive requirements pursuant to Commission Regulation (EU) 2016/2281	19
3	Transportation and storage	20
3.1	Transportation safety	20
3.2	Packed content	20
3.3	Packaging	20
3.4	Transportation	20
3.5	Storage	21
3.6	Disposal	21
4	Installation	22
4.1	Installation site	22
4.2	Installation of the unit	23
4.2.2	Removing corner guards	23
4.2.2	Installation to the ceiling	23
4.2.3	Installation to the ceiling using threaded rods	25
4.2.4	Primary air connection (only for units with a primary air pipe connection fitting)	26
4.2.5	Designer cover installation (only in version M1)	27
5	Hydraulic connections	28
5.1	General information	28
5.2	Pipe connections	28
5.2.1	Installation example: Pipe connections from the top	29
5.2.2	Installation example: Pipe connections from the side	29
5.2.3	Protection class / Water volume / Weight / Sound power level	30

5.3	Condensate drainage	31
5.3.1	Condensate drain connection for units with a condensate pump	31
5.3.2	Condensate drain connection for units without a condensate pump	32
6	Electrical data	33
6.1	Wiring diagrams	33
6.2	Connections when used with controllers, MATRIX control systems or control systems provided by site contractors	34
6.3	Overview of MATRIX boards	35
6.3.1	Terminal block for units with AC-motors 230 V and 400 V	35
6.3.2	Terminal block for units with EC-motors 230 V	36
6.3.3	MATRIX 2001 and MATRIX 3001 control system	37
6.3.4	Fan with upstream resistor	38
6.4	Controller installation	39
6.5	Electrical connection of an external controller	40
6.5.1	Terminal block connection for units with AC-motors 230 V	40
6.5.2	Terminal block connection for units with AC-motors 400 V	40
6.5.3	Terminal block connection for units with EC-motors 230 V	41
6.5.4	Condensate pump connection	41
6.5.5	Connecting several heater unit with 230 V AC motors to a single controller 985.450	42
6.5.6	Connecting several heater unit with 230 V AC motors to a single controller MC4U1AC.000	43
6.5.7	Connecting several heater unit with 400 V AC motors to a single controller 985.420	44
6.5.8	Connecting several heater unit with 400 V AC motors to a single controller MC4U2AC.000	45
6.5.9	Connecting several heater unit with 230 V EC motors to a single controller MC4U1EC.000	46
6.5.10	Connecting several heater unit with 230 V EC motors to a single potentiometer 950EC1	47
6.6	Electrical connections with MATRIX	48
6.6.1	Connecting power supply in units with a controller	48
6.6.2	Connecting control cables	49
6.6.3	Connecting bus cables	52
6.6.4	Connecting an outside temperature sensor (optional)	53
6.6.5	Connecting a supply air temperature sensor (optional)	53
6.6.6	Connecting a room temperature sensor (optional)	54
6.6.7	Connecting an operational and error message system	54
6.6.8	Connecting a functional input	54
6.6.9	Connecting 230 V valves	55
6.7	MATRIX.Net network and connecting shielding	56
6.7.1	Group structure	56
6.7.2	MATRIX.Net network structure	59
6.7.3	MATRIX.Net network topology	60
6.7.4	Line structure	60
6.7.5	Line structure	61
6.7.6	Building MATRIX.Net network	62
6.7.6	Shielding / earthing	62
7	Commissioning	63
7.1	Safety test	63
7.1.1	Pre-commissioning checklist	63

7.1.2	Before commissioning the following checks must be carried out:	63
7.1.3	Setting secondary air fins	64
7.1.4	Following commissioning:	64
7.2	Bleeding the heat exchanger	64
7.3	Condensate pump check (only in cooling)	65
7.3.1	Condensate pump test run	65
7.4	Terminating resistors	66
7.5	Setting addresses	68
7.6	Starting the unit	70
7.7	Data connection check	71
7.7.1	Checking control cables	71
7.7.2	Checking data cables	71
7.8	Checking control inputs and outputs	72
7.8.1	Functional input	72
7.9	Functions when used with the MATRIX control system	73
7.9.1	Fan	73
7.9.2	Valves	73
7.9.3	Condensate pump	74
7.9.4	Standby mode	74
7.9.5	Indoor frost protection	74
7.9.6	Summer / winter compensation	74
7.9.7	Filter replacement indication	74
8	Maintenance and troubleshooting	75
8.1	Maintenance	75
8.2	Regular maintenance interval schedule	75
8.3	Quarterly maintenance	76
8.3.1	Filter cleaning / replacement	76
8.4	Annual maintenance	77
8.4.1	Heat exchanger cleaning	77
8.4.2	Checking hydraulic threaded connections	77
8.4.3	Condensate pump test run	77
8.4.4	Checking electrical cables and earthing	77
8.4.5	Heat exchanger bleed check	78
8.4.6	Condensate pan and condensate pump cover cleaning	78
8.5	Before cooling period	79
8.5.1	Condensate pump performance test	79
8.6	Filter retrofitting	79
8.7	Operational faults	80
	EC Declaration of conformity	83

Safeguard clause

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1 Safety and user instructions

This is the original operation manual verified by the manufacturer.

Multi Flair unit heaters are developed and manufactured using state-of-the-art technology in accordance with the standards and regulations of the EU and CZ.

Multi Flair unit heaters are safe and comply with high quality standards. This product range combines technical perfection with ease of use and maintenance.

Nevertheless, individual units may pose a risk to the user or third parties, may break down or cause other damage. For this reason, safety regulations must be observed at all times. Units must be operated and maintained in compliance with regulations and standards; failure to do so could lead to injury, damage or environmental impact.

Observing the safety instructions in this operation manual will help avoid these risks, and ensure economical operation of the unit and the full benefit of its use.

The safety aspects covered by this chapter apply to the entire Multi Flair unit heater operation manual.

1.1 Operation manual scope

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

- Transportation
- Fitting
- Installation
- Power supply connection
- Commissioning
- Operation
- Maintenance, cleaning and disposal

1.2 Symbols

The text of this operation manual uses the following symbols:

- Symbol for a new paragraph
- Symbol for Instructions to follow
- ✓ Symbol for the result of an action



Attention!

This symbol indicates additional information on Multi Flair unit heaters and their accessories.



Recycling!

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

1.3 Safety instructions: warning messages and risk symbols

All information in this chapter is important and relevant to your safety. Therefore, not all information included in this chapter is highlighted using special warning symbols.

Safety instructions in the following chapters of this operation manual are indicated by pictograms. General safety instructions are listed at the beginning of each chapter and special safety instructions on specific process steps are listed along with these steps.

The following warnings are used:

**Risk of electrocution!**

This symbol indicates activities with an inherent risk of electrocution.

**Risk of scalding!**

This symbol indicates warnings, commands and prohibitions which, if not observed, may lead to personal injury and damage caused by hot heating fluids.

**Risk of injury from rotating mechanical parts!**

This symbol indicates warnings, commands and prohibitions which, if not observed, may lead to personal injury and damage caused by rotating parts of the unit or its accessories.

**Risk of injury from suspended loads!**

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

**Personal injury!**

This symbol indicates warnings, commands and prohibitions which, if not observed, may lead to personal injury and damage to the unit and property.

**Damage to the unit!**

This symbol indicates warnings, commands and prohibitions which, if not observed, may lead to damage to the unit and its accessories and control system.

**Damage to the environment!**

This symbol indicates a risk of damage to the environment or provides information on environmental protection regulations.

1.4 Safety at work

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



Risk of electrocution!

Before commencing any work on the unit, disconnect the unit from the power supply and secure it against reconnection. (Check that the unit is not live, earth it and short-circuit conducting parts. Failure could lead to serious injury or death.)



Risk of scalding!

Shut off the fluid supply before commencing any work on the valves or the inlet and outlet heating / cooling pipework. To prevent injury by scalding or burning, do not start any work on the unit until the heating fluid has cooled down.



Risk of injury from rotating mechanical parts!

There is a risk of injury from rotating mechanical parts! Before commencing any work, disconnect the unit from the power supply. Ensure that the unit cannot be reconnected by securing the on-site power supply.



Risk of injury from suspended loads!

Wear protective gear, i.e. a hard hat and safety boots to prevent injury from falling components when installing the unit to the ceiling. Ceiling installation should always be performed by two persons!



Personal injury!

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

1.5 Use

Multi Flair unit heaters are installed in industrial, storage, retail and exhibition premises, i.e. in a standard environment according to CSN 33 2000-1 ed. 2 and CSN EN 60 721-3-3, and are used for air heating, cooling or filtration.

The unit must be used pursuant to Commission Regulation (EU) No. 1253/2014.

This Multi Flair operation manual must be observed in order to ensure the proper use of the units.

Water or a water/glycol solution may be used as a medium (max. solution concentration 50%).

The following limit values apply for use with Cu/Al heat exchangers:

Parameter		Unit with	Value
pH value (at 20°C)			7.5 - 9
Conductivity (at 20°C)		mS/cm	< 700
Oxygen content	O ₂	mg/l	< 0.1
Total hardness		°dH	1 - 15
Dissolved sulphur	S		Not detectable
Sodium	Na ⁺	mg/l	< 100
Iron	Fe ²⁺ , Fe ³⁺	mg/l	< 0.1
Manganese	Mn ²⁺	mg/l	< 0.05
Ammonium	NH ₄ ⁺	mg/l	< 0.1
Chloride	Cl ⁻	mg/l	< 100
Sulphate	SO ₄ ²⁻	mg/l	< 50
Nitrite	NO ₂ ⁻	mg/l	< 50
Nitrate	NO ₃ ⁻	mg/l	< 50

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

The following limit values apply for Cu/Al heat exchangers:

Parameter	Unit with	Value
Max. operating temperature	°C	90
Min. cooling temperature (when used with a MA-TRIX control system and valves)	°C	6
Max. operating pressure	MPa (bar)	1.6 (16)
Max. intake air temperature	°C	40

Tab. 1-2: Limit values for Cu/Al heat exchangers



Damage to the unit!

In open systems (e.g. when using water from a well, observe the limit values from tab. 1-1) it is necessary to remove contaminants from the water using an inlet filter. Otherwise, there is a risk of corrosion due to deposits.
In addition, ensure that the unit is protected from dust and other substances which, in conjunction with water, result in an acidic or alkaline reaction (aluminium corrosion).

Multi Flair unit heaters may only be used indoors.

Multi Flair unit heaters are designed for ceiling installation.



Attention!

Any use other than or beyond the above is considered improper use.
The manufacturer / supplier is not liable for any resulting damage as this risk is borne solely by the user.
Proper use is the responsibility of the user.
Proper use also includes compliance with the operation manual and the inspection and maintenance conditions stipulated by FläktGroup.

1.6 Improper use

The unit heaters Multi Flair **must not be operated**:

- in areas with a risk of explosion,
- in humid areas,
- in excessively dusty areas or areas with corrosive air.



Personal injury!

Improper use of the unit may lead to personal injury and damage to property.

1.7 Safety regulations and standards

When carrying out the installation, commissioning, maintenance and servicing of Multi Flair unit heaters, all local safety regulations and codes, as well as generally established technical practices, must be followed.

- CSN 33 1310 ed. 2 Electric regulations. Safety regulations for electrical equipment destined for use by persons with no electrotechnical qualifications.
- CSN 33 2000-1 ed. 2 Low-voltage electrical installations – Part 1: Fundamental principles, assessment of general characteristics, definitions
- CSN 06 1008 Fire protection of heating appliances.
- CSN EN 13501-1+A1 Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests.

1.8 Changes and modifications

No changes or modifications may be made to Multi Flair unit heaters or their components.

Changes or modifications to Multi Flair units will invalidate the declaration of conformity and render all warranty claims null and void.

1.9 Spare parts

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

1.10 Staff selection and professional qualifications



Attention!

Each person assigned to work on Multi Flair unit heaters must read and fully understand this operation manual.

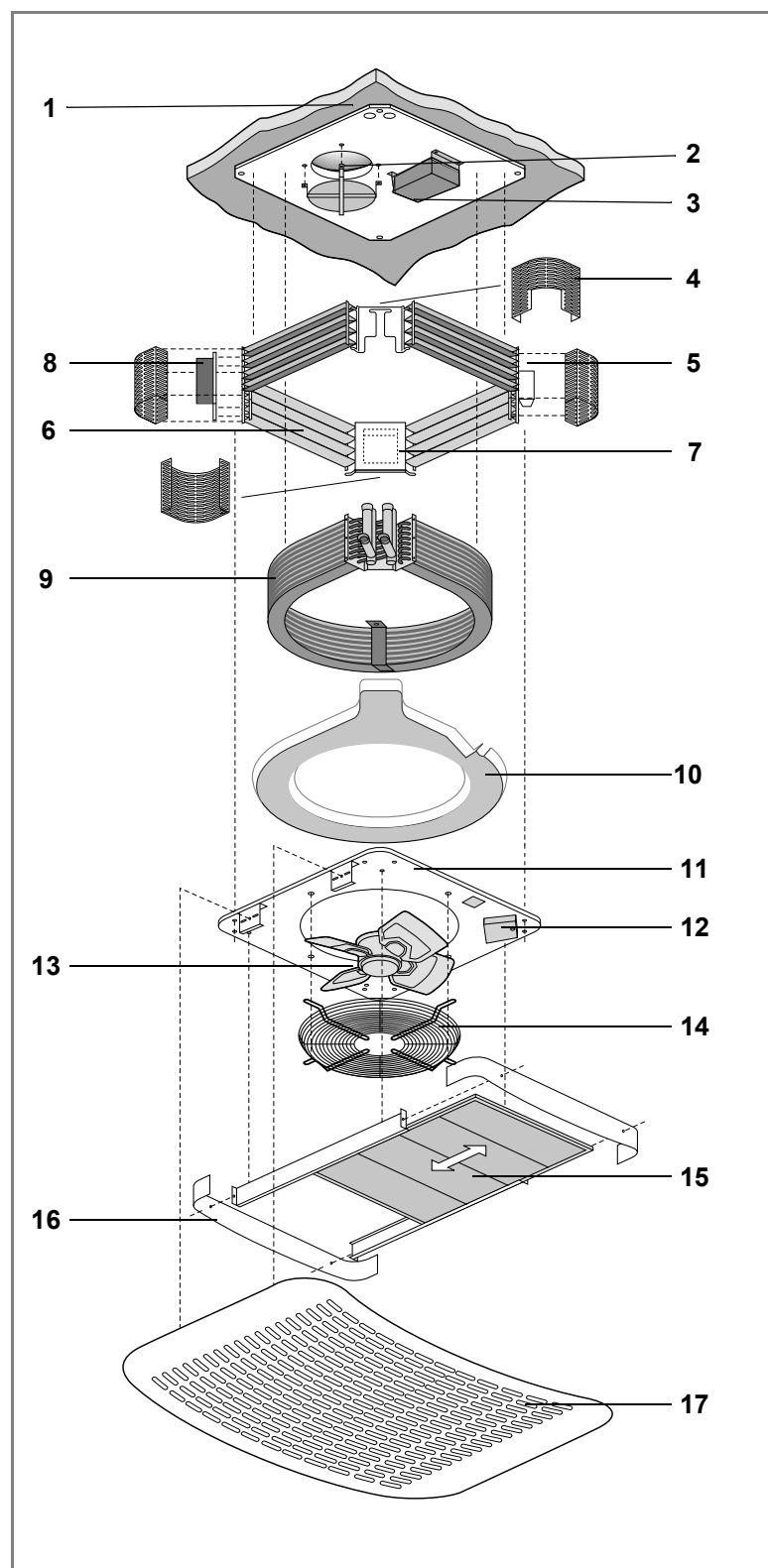
Installation / commissioning / maintenance / repairs: Only by trained and competent HVAC personnel.

Electrical installation: Only by trained electrical engineering personnel with competent pursuant to Section 6 of Regulations CUBP and CBU No.50/78 Coll.

All professionals must be able to evaluate the work they have been assigned and recognize and prevent any risks.

2 Technical data

2.1 Unit components



- Pos. 1: Ceiling plate
- Pos. 2: Control electronics
- Pos. 3: Primary air supply connection
- Pos. 4: Corner guards (4 pieces)
- Pos. 5: Condensate pump – cooling (accessories)
- Pos. 6: 4-sided secondary air fin
- Pos. 7: MATRIX control board
- Pos. 8: Terminal block
- Pos. 9: Circular heat exchanger
- Pos. 10: Condensate pan with drainage
- Pos. 11: Base plate
- Pos. 12: Condensate pump cover
- Pos. 13: Axial fan with AC or EC-motor with external rotor
- Pos. 14: Fan protection grille
- Pos. 15: Filter cassette with 2 guide rails (only with M1 unit models)
- Pos. 16: Filter covers (only with M1 unit models)
- Pos. 17: Designer cover (only with M1 unit models)

Fig. 2-1: Components of Multi Flair unit heaters

Some of the unit components from fig. 2-1 are described in detail below:

Ceiling plate (pos. 1)

Ceiling plate with primary air connection and air impact deflector

Control electronics (pos. 2)

- at 230 V with upstream resistor
- at 400 V with MATRIX control board

Corner guards (4 pieces) (pos. 4)

Corner guards are fitted on the unit.

Condensate pump – cooling (accessories) (pos. 5)

The condensate pump drains condensate from the condensate pan into upstream collection or sewer systems.

MATRIX control board (pos. 7)

On 230 V unit models, the controller PCB is fitted here.

Terminal block (pos. 8)

Connection of the unit's power supply 230 V / 400 V.

Circular heat exchanger (pos. 9)

The chilled and warm water heat exchanger is equipped with R 3/4" female connection fittings and a bleed valve.

Condensate pan with drainage (pos. 10)

The condensate pan is designed for the collection and drainage of condensate.

Base plate (pos. 11)

A base plate with a type identification label.

Condensate pump cover (pos. 12)

Condensate captured in the condensate pan is collected in the pump cover (only with cooling units).

Axial fan with AC or EC-motor with external rotor (pos. 13)

The axial fan consists of an AC or EC motor with an external rotor and flat blade impeller. The electric motor is protected using integrated thermal contacts.

Filter cassette with 2 guide rails (only with M1 unit models) (pos. 15)

The guide rail is separated in the condensate pan space.

2.2 Operational limits

2.2.1 Inlet medium temperature

To prevent the temperature from falling below the dew point and the formation of condensate on non-insulated parts of the unit in cooling mode, the specific minimum inlet temperature or evaporating temperature limits must not be exceeded. These depend on room temperature and relative humidity and are specified in the following diagram.

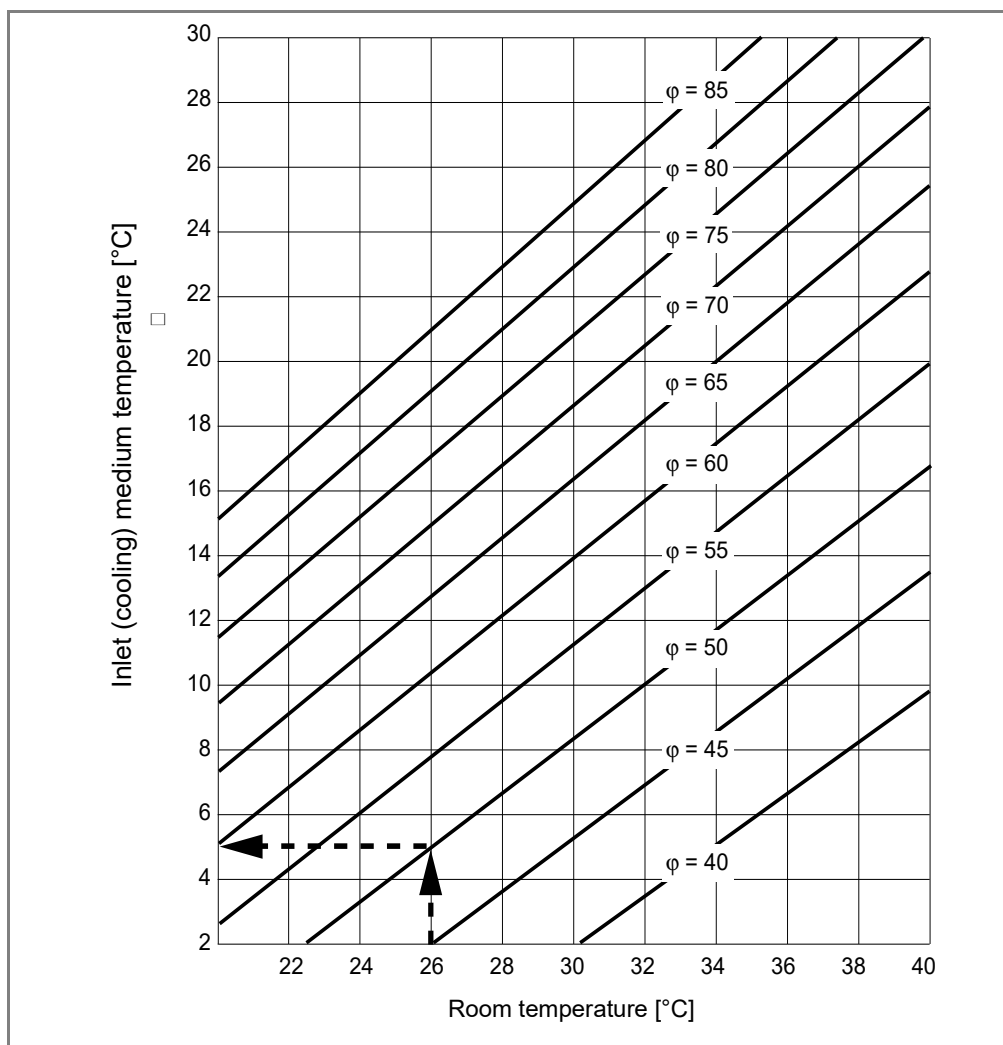


Fig. 2-2: Minimum permitted inlet medium temperature Air pressure = 1,013 hPa; φ = relative humidity

2.2.2 Unit and heat exchanger

Unit and heat exchanger	Value
Max. operating pressure / temperature	1.6 MPa (16 bar) / 90°C
Max. permitted ambient temperature	40°C
Min. permitted ambient temperature	2°C
Operating voltage	230 V AC, 50 Hz or 400 V AC
Power input / current	See the type label
Max. discharge air temperature	75°C (risk of scalding)
Min. primary air temperature	7°C

Tab. 2-1: Operational limits for the unit and heat exchanger

2.3 Dimensions

2.3.1 Basic unit

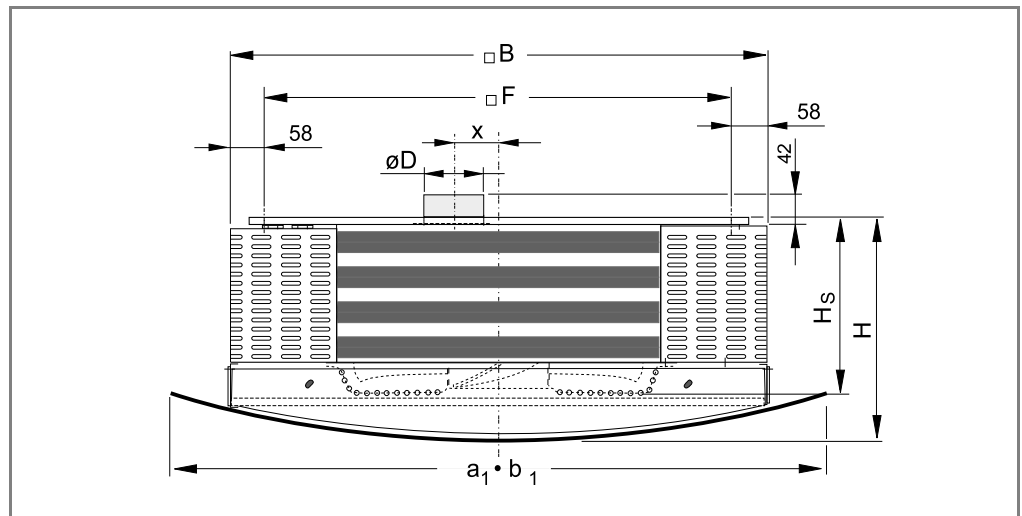


Fig. 2-3: Basic unit dimensions

Size	Dimensions (mm)						
	B	H	H _S	a ₁ • b ₁	x	Ø D	F
1	729	328	296	900 • 800	120	150	613
2	830	395	301/355*	1000 • 900	120	180	713
3	930	415	310/360*	1100 • 985	120	200	813

Tab. 2-2: Basic unit dimensions; depending on structural dimensions H_S unit in "Standard" F configuration fixing point spacing

* applies to EC-motor

2.4 Technical data

2.4.1 Unit weight, water volume in the heat exchanger and protection

Size	1	2	3
Protection	IP20	IP20	IP20
Protection class	I	I	I
Water volume in the heat exchanger CR1,2 / CR3/4 [l]	1.2 / 2.2	1.5 / 2.6	1.7 / 3.2
Weight: Unit / designer cover [kg]	39.5 / 3.5	47.5 / 4.2	58.5 / 5.2

Tab. 2-3: Unit weight, water volume in the heat exchanger and protection (CR... capacity range)

2.4.2 Electrical data

Size	Speed levels	Speed [rpm]	Sound power level [dB(A)]	Sound pressure level* [dB(A)]	Max. power input [kW]	Max. current [A]
AC-motor, 1 ~ 230 V, 1-speed						
1	1	920	66	52	0.09	0.48
2	1	865	68	54	0.14	0.68
3	1	910	75	61	0.29	1.25
EC-motor, 1~230 V, continuous**						
1	min.	468	40	36	0.01	0.10
	max.	1056	65	61	0.06	0.51
2	min.	276	34	30	0.01	0.04
	max.	862	68	64	0.11	0.53
3	min.	290	47	32	0.02	0.29
	max.	680	65	51	0.15	0.72
AC-motor, 1 ~ 230 V, 3-speed						
1	1	480	50	36	0.09	0.48
	2	680	59	45		
	3	850	64	50		
2	1	325	45	31	0.14	0.68
	2	415	50	36		
	3	610	59	45		
3	1	410	57	43	0.29	1.25
	2	490	62	47		
	3	620	65	51		
AC-motor, 3 ~ 400 V, 2-speed						
1	1	770	61	47	0.08	0.19
	2	920	66	53		
2	1	600	63	49	0.12	0.28
	2	830	69	55		
3	1	500	60	46	0.13	0.29
	2	660	67	53		

Tab. 2-4: Electrical values of AC and EC-motor fans

* Sound pressure level: The value in the table is the sound pressure level in dB(A) of an unloaded unit in a room with average reference characteristics, at a distance of 3 metres from the unit. Absorption surface 200 m² Sabin, heat radiation hemisphere = directional factor 2.

** Values apply for the minimum and maximum permissible control voltage of the EC-motor

2.5 Condensate pump

In cooling units, condensate may form which is collected in the condensate pan. The condensate pump drains condensate into drainage and sewage pipework located upstream.

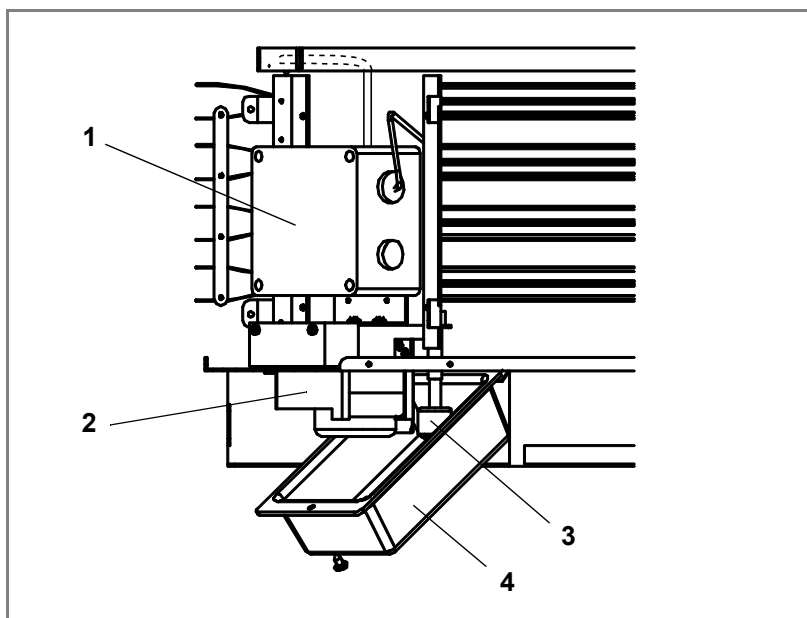
2.5.1 Condensate drainage

The condensate pump has a float switch with the following functions:

- It activates the pump when the pre-set water level in the condensate pan has been exceeded.
- It switches the pump off if the condensate level falls below the minimum water level.
- It activates an alarm if the maximum permitted water level has been exceeded.

2.5.2 Condensate pump

- The maximum operating pressure of the pump is 0.1 MPa (1 bar); the maximum water flow rate is 10 l/h. fig. 2-5 shows the pump's capacity in l/h in relation to the delivery head.



Pos. 1: Pump control (SKP)
Pos. 2: Condensate pump
Pos. 3: Float switch
Pos. 4: Condensate pump cover

Fig. 2-4: Condensate pump (accessories)

Condensate pump technical data

Product data	Value
Operating voltage	230 V AC / 50 Hz
Current	max. 0.2 A
Power input	55 W
Max. pump head	1.3 m
Max. water flow rate	60 l/h
Sound power level	at H = 0 m 45 dB(A) at H = 4 m 46 dB(A)

Tab. 2-5: Condensate pump technical data

Condensate pump capacity

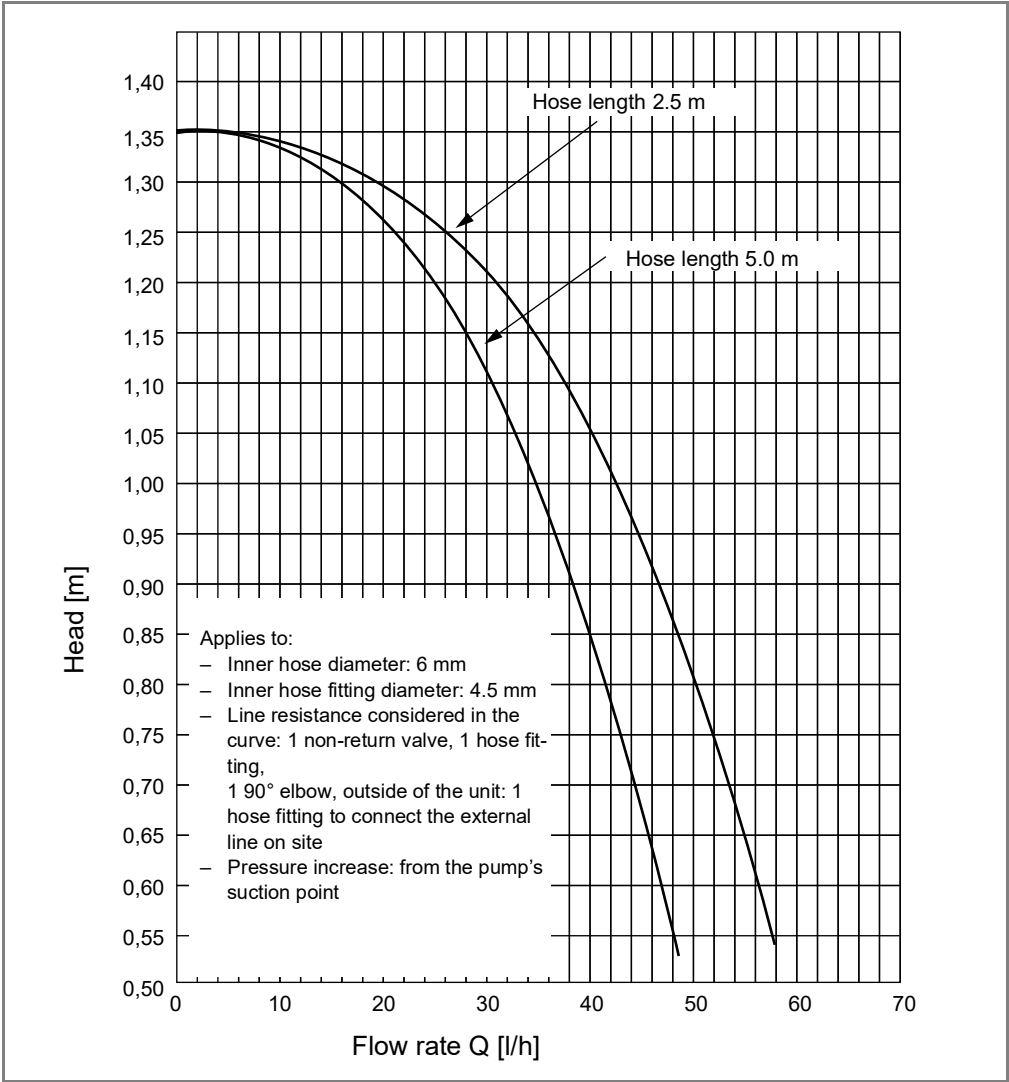


Fig. 2-5: Condensate pump cover

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

The values specified in tab. 2-6 are in accordance with the requirements of Commission Regulation (EU) 2016/2281, implementing Directive 2009/125/EC of the European Parliament and of the Council establishing a framework for the setting of ecodesign requirements for energy-related products, with regard to ecodesign requirements for air heating products, cooling products, high temperature process chillers and fan coil units.

Size	Unit code	Electric motor version	Fan speed levels	Total cooling capacity	Cooling capacity (sensible)	Cooling capacity (latent)	Heat energy consumption	Total electrical power consumption	Volume flow rate	Sound power level
				P _{rated,c} [kW]	P _{rated,c} [kW]	P _{rated,c} [kW]	P _{rated,h} [kW]	P _{elec} [kW]	V [m ³ /h]	L _{WA} [dB(A)]
1	M#14.#W0(0W)#	AC	1	3.1	2.9	0.2	4.5	0.009	820	50
			2	4.1	3.7	0.4	5.7	0.009	1,160	59
			3	4.7	4.3	0.4	6.6	0.009	1,450	64
	M#14.#W0(0W)#.	EC	min.	3.1	2.9	0.2	4.6	0.01	825	41
			max.	5.4	5.0	0.4	7.6	0.057	1,840	66
2	M#24.#W0(0W)#	AC	1	4.6	3.7	0.9	5.4	0.14	890	46
			2	5.4	4.5	0.9	6.4	0.14	1,160	50
			3	6.8	5.8	1.0	8.4	0.14	1,740	60
	M#24.#W0(0W)#	EC	min.	4.7	3.9	0.8	5.6	0.01	940	36
			max.	9.0	8.0	1.0	11.5	0.11	3,010	70
3	M#34.#W0(0W)#.	AC	1	7.9	6.4	1.5	9.0	0.29	1,700	56
			2	8.9	7.4	1.5	10.4	0.29	2,130	61
			3	10.5	8.9	1.6	12.6	0.29	2,920	66
	M#34.#W0(0W)#.	EC	min.	5.6	4.4	1.2	6.2	0.021	970	43
			max.	11.5	10.0	1.5	14.3	0.151	3,590	66

Tab. 2-6: Values in accordance with Commission Regulation (EU) 2016/2281 (the values apply to: 2-pipe system – thermal output at PWW 45/40°C, air intake +20°C/50% r.h., cooling capacity at PWW 7/12°C, air intake 27°C/50% r.h.)
The values apply to units without filter.

3 Transportation and storage

3.1 Transportation safety

**Risk of injury from suspended loads!**

Standing underneath suspended loads may pose a risk to life.

- Make sure that there are no people standing underneath suspended loads.

**Damage to the unit!**

Improper use may lead to damage to the Multi Flair unit heater.

- If damage has been caused due to impact or the unit falling, carefully check it for proper function and power input.
- Transport Multi Flair unit heaters with care!

3.2 Scope of delivery

Immediately upon receipt, remove the packaging and inspect the unit to determine if any damage has occurred during shipment (if any damage is found, immediately report a complaint to the shipping company) and check that the scope of delivery is complete and correct. To do that, compare data on the type label with the delivery note.

This also applies to all accessories. Missing parts (quantities) or damage caused during transportation can only be dealt with through shipping insurance if the damage has been confirmed by the shipping company.

3.3 Packaging

Multi Flair unit heaters are delivered in firm shipping cardboard.

3.4 Transportation

**Personal injury!**

- Wear safety gloves to prevent injury caused by sharp edges.
- Multi Flair units should be handled by at least two people to prevent any injury.
- When delivering on pallets, they can be handled only by forklift trucks and transport vehicles with sufficient load-bearing capacity.
- Secure the load during transit to prevent it from falling / tipping over.

3.5 Storage

The following must be observed during storage:

- Multi Flair unit heaters may only be stored in their original packaging.
- The storage site must conform to IE12 according to CSN EN 60721-3-1, must be protected from the elements, must be dry and dust-free and air humidity must be between 50 and 85% r.h.
- Storage temperature must be between -10 and 50°C.

**Damage to the unit!**

Any residual water in the heat exchanger must be removed.
Risk of freezing!

- Multi Flair unit heaters must be protected against impact and vibration etc.

3.6 Disposal

**Recycling!**

Ensure that operating supplies, packaging and replacement parts are disposed of in a safe and environmentally friendly manner. Use local recycling facilities and comply with all applicable recycling regulations.

During disposal, components are, as far as possible, to be separated and sorted by material type.

4 Installation



Risk of electrocution!

Before you start drilling, check that there are no electric or other lines at the drilling site.



Personal injury!

A risk of injury due to falling parts or sharp edges! During installation wear a hard hat, safety boots and gloves. Ceiling installation is to be carried out by a pair of workers.



Attention!

The unit must be secured in all installation positions and in all configurations in such a way so as to eliminate any mechanical twisting or stress.
Make sure that the unit heaters are installed horizontally.
All attachment points must be used.

4.1 Installation site

The site of installation must in its nature, properties and ambient temperature meet the requirements of the individual unit heaters (see Chapter 1.5 and Chapter 1.6). The following points must be observed:

- The ceiling or other load-bearing systems must be able to carry the weight of the unit filled with media including accessories.
- Only indoor mounting of the unit is allowed.
- To secure the unit in place, especially when installing it on a suspended ceiling, only use the mounting kit (accessories).
- The minimum mounting height must be 2.5 metres.
- The following maximum suspension heights must be observed:

Size	1	2	3
Suspension height (m)	3.0	3.5	4.0

Tab. 4-1: Maximum suspension height of unit heaters

4.2 Installation of the unit

Before installing the unit, remove or uninstall the corner guards.

4.2.1 Removing corner guards

Before installing the unit, remove or uninstall the corner guards.

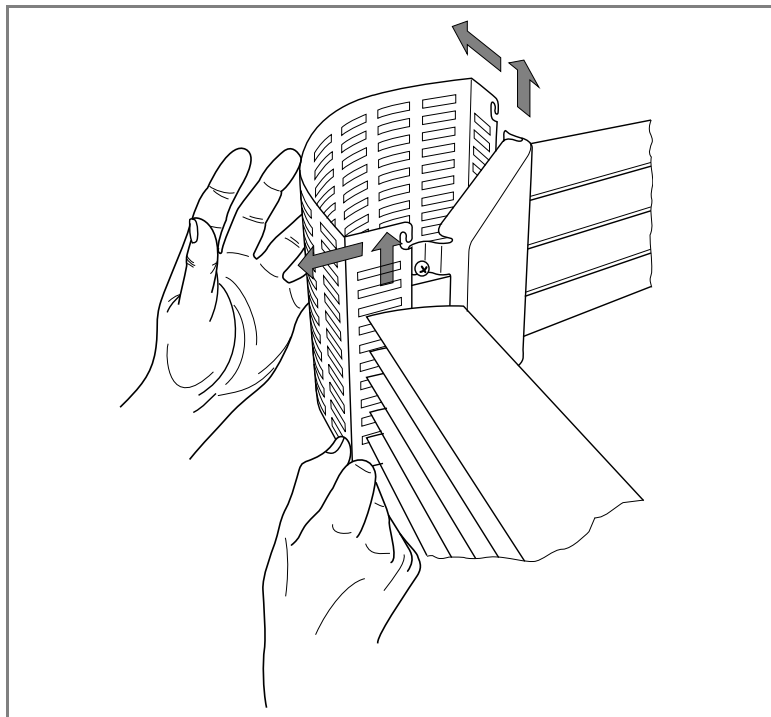


Fig. 4-1: Removing corner guards

Removing corner guards:

- Slide the corner guard upwards.
- Pull it outwards.



Attention!

When removing the corner guards, observe the direction of the arrows.

4.2.2 Installation to the ceiling



Attention!

Multi Flair units can be mounted directly to the ceiling or suspended ceiling using the appropriate fixtures.

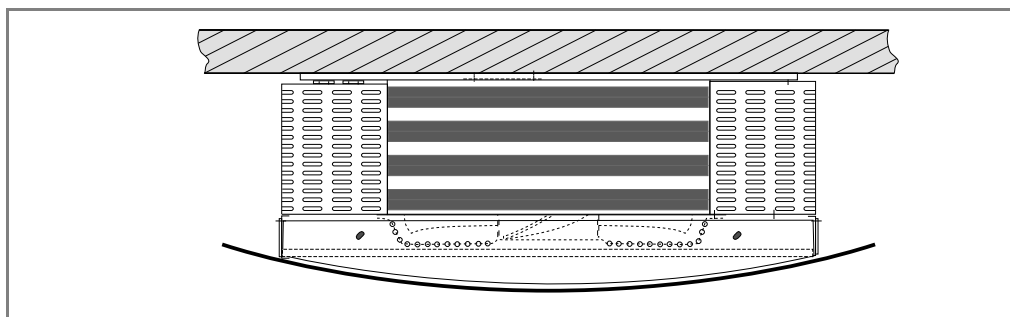


Fig. 4-2: Ceiling mounting of Multi Flair unit heaters

To mount the unit to the ceiling it is necessary to drill at least 4 holes (2 on each side).

- Plot the drilling dimensions according to fig. 4-3 and tab. 4-2 onto the ceiling.
- Install the Multi Flair unit in the position indicated.

Attachment points

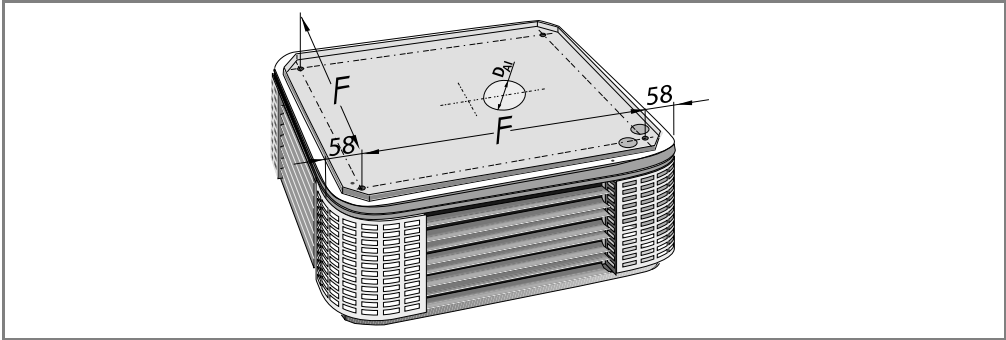


Fig. 4-3: Drilling dimensions for ceiling-mounted Multi Flair unit heaters

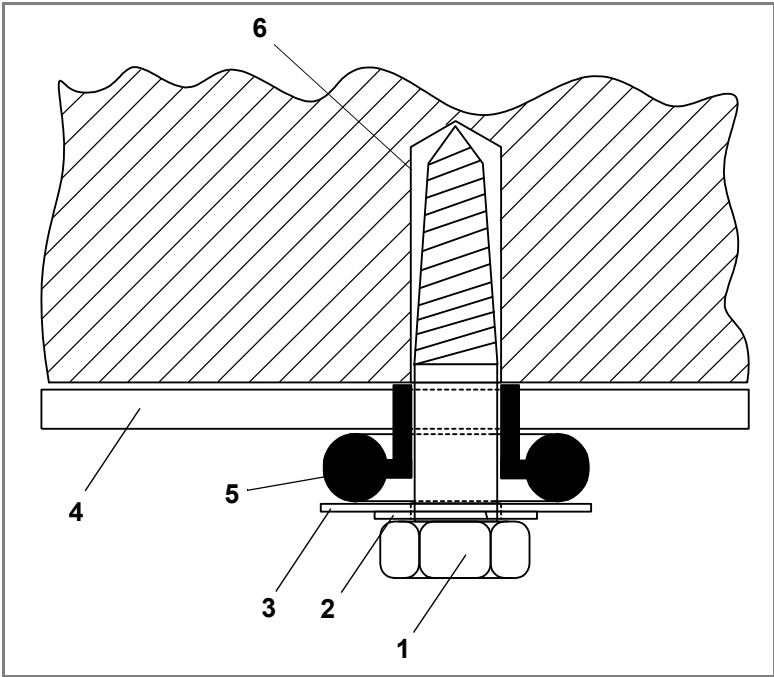
Size	1	2	3
F (mm)	613	713	813

Tab. 4-2: Attachment point dimensions

Mounting kit 46D

Mounting kit 46D (see fig. 4-4) consists of:

- 4 hexagonal M8 bolts
 - 4 8 mm spring washers
 - 4 8 mm washers
 - 4 elastomer-insulated washers
 - 4 10 mm wall plugs
- Place the elastomer-insulated washers into the attachment holes on the unit's base plate.
 - Secure the unit in place using washers, spring washers and bolts.



- Pos. 1: M8 x 60 mm bolt
- Pos. 2: 8 mm spring washer
- Pos. 3: 8 mm washer
- Pos. 4: Unit base plate
- Pos. 5: Elastomer-insulated washer
- Pos. 6: 10 mm wall plug

Fig. 4-4: Mounting kit 46D



Attention!

After the unit has been mounted and connections installed, the corner guards are to be fitted again. To do that carry out all of the above steps in reverse order.

4.2.3 Installation to the ceiling using threaded rods

For the dimensions of the ceiling plate and pipe connections see fig. 4-5.

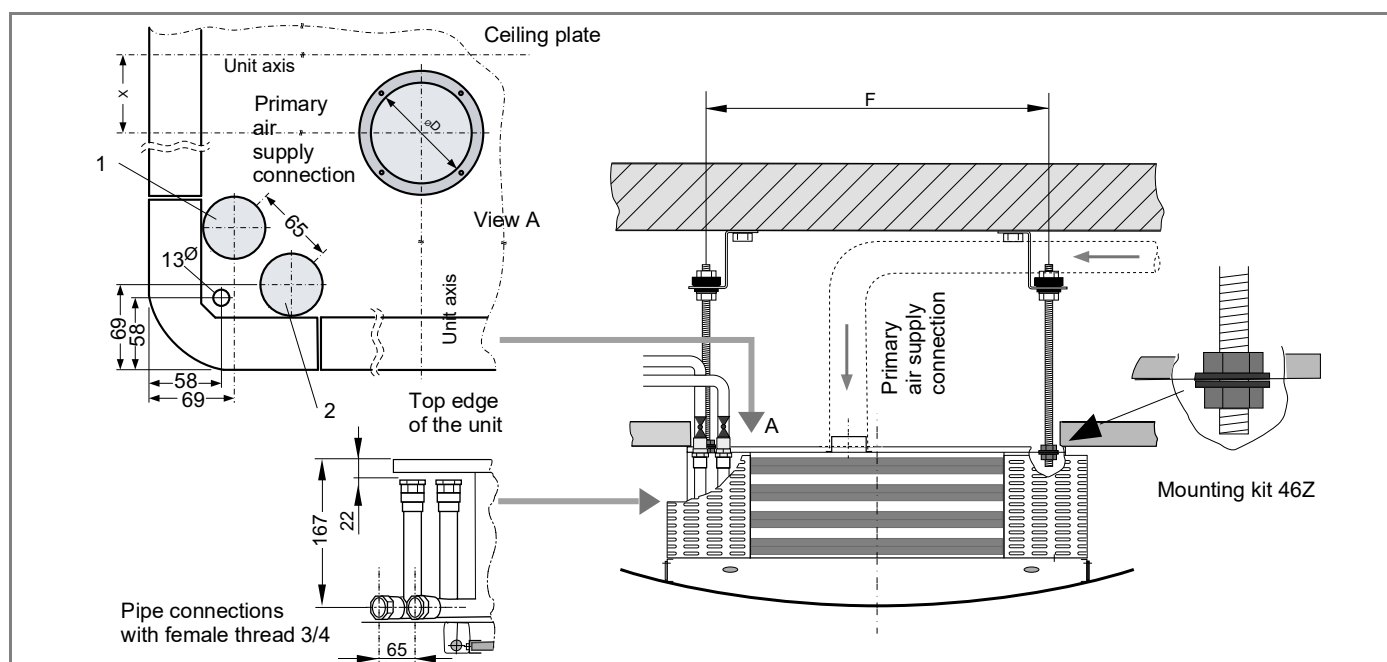


Fig. 4-5: Installation to the ceiling using threaded rods

Size	1	2	3
F (mm)	613	713	813

Tab. 4-3: Attachment point dimensions

Mounting kit 46Z

Mounting kit 46Z (see fig. 4-5) consists of:

- 4 angle brackets (see fig. 4-6)
- 4 M8 x 500 mm threaded rods
- 8 M8 nuts
- 8 M8 hexagonal nuts
- 4 10 mm wall plugs
- 4 hexagonal M8 bolts

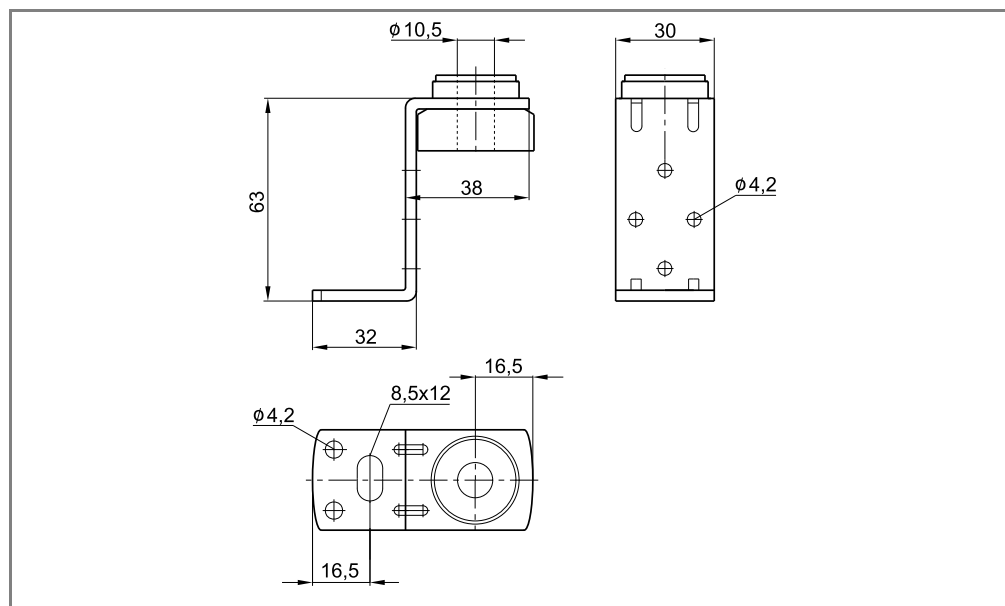


Fig. 4-6: Dimensions of angle brackets in mounting kit 46Z

**Attention!**

After the unit has been mounted and connections installed, the corner guards are to be fitted again. To do that carry out all of the above steps in reverse order.

4.2.4 Primary air connection (only for units with a primary air pipe connection fitting)

Before mounting the unit to the ceiling or below a suspended ceiling the primary air connection fitting must be installed:

- Release the primary air connection fitting from the ceiling plate (4 screws).
- Remove the primary air connection fitting.
- Rotate the primary air connection fitting by 180°.
- Screw the primary air connection fitting onto the ceiling plate from the top.

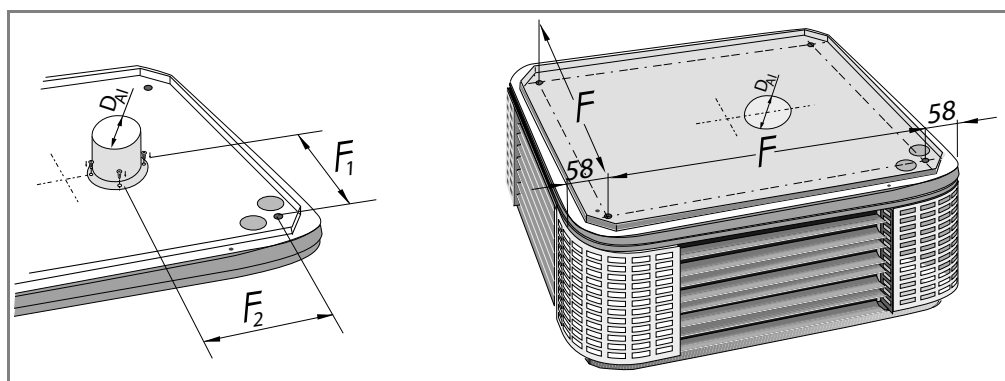


Fig. 4-7: Primary air connection dimensions

Mounting dimensions, primary air connection fitting diameter and primary air volume

Size	F (mm)	F ₁ (mm)	F ₂ (mm)	D _{AI} (mm)	Primary air volume V _{max} (m ³ /h)
1	613	307	186	150	610
2	713	357	237	180	900
3	813	407	287	200	1165

Tab. 4-4: Mounting dimensions, primary air connection fitting diameter and primary air volume

**Attention!**

Primary air must be clean air – i.e. filtered and conditioned (10 - 40°C, with max. absolute air humidity being 13.5 g/m³ for units with cooling function) to cover the air change requirement.

The maximum primary air volume must not exceed the values of V_{max} shown in table 4-4.

4.2.5 Designer cover installation (only in version M1)



Damage to the unit!

In units with pipe connections from the side the designer cover must be installed on this side!

- The angle bracket lugs and angle bracket should be screwed onto the bottom of the unit (holes are provided).
- Hook the designer cover into the angle bracket lugs on the suspension side (see pos. 1).
- Fold the designer cover upwards (see pos. 2).
- Screw the cover onto both angle brackets on the mounting side (see pos. 3).
- Screw the fixing screws into the angle bracket lugs (insertion side) (see pos. 1).

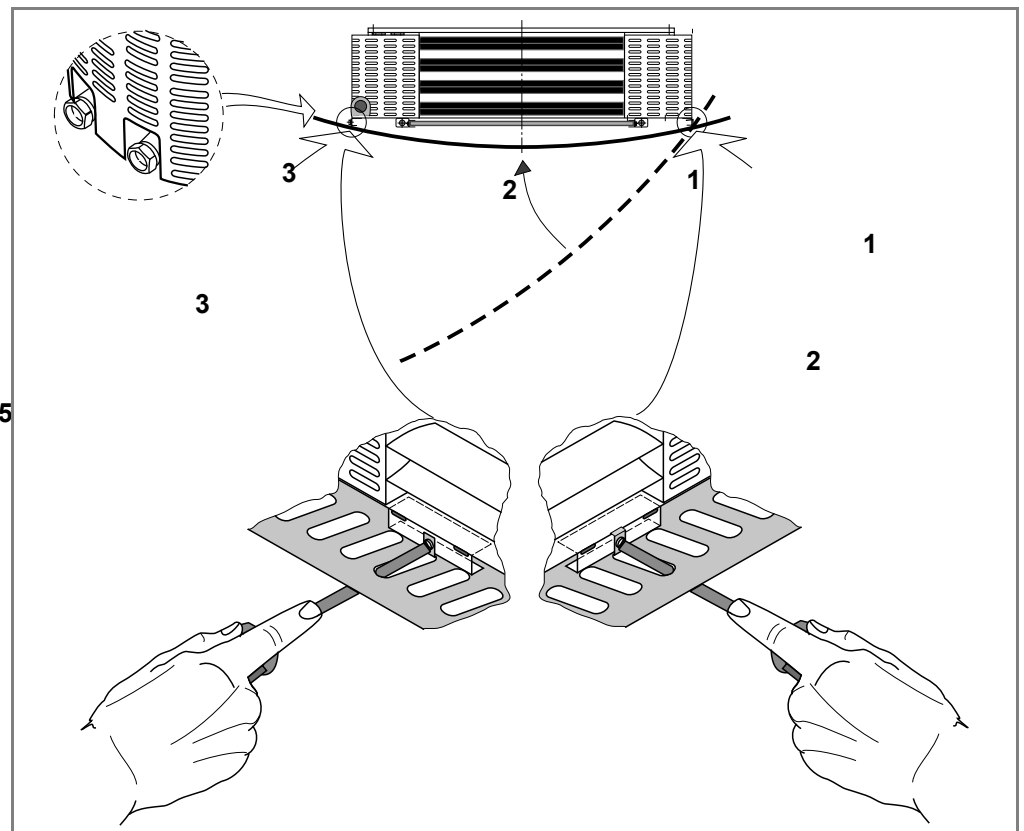


Fig. 4-8: Designer cover installation

Pos. 1: Insertion side

Pos. 2: Fold the designer cover upwards

Pos. 3: Screwing side

5 Hydraulic connections

5.1 General Information

In Multi Flair units without valves, or with valves fitted on site at a later date, the position of supply and return lines depends on coil connections performed by others and/or the valve used.

**Risk of scalding!**

Before installing the pipework on site and setting up the hydraulic connections of the Multi Flair unit heater, the heating/cooling medium supply must be shut off and secured against inadvertent opening.

Unit heaters with a cooling function are fitted with a side-mounted condensate pan. The pan is used to collect condensate that forms in the unit (valves, screw connections and piping).

**Attention!**

All cooling medium pipework on site must be insulated to prevent the formation of condensate.

**Attention!**

Once all connections have been made, all threaded connections should be tightened again and checked to make sure they are free of mechanical stress.

5.2 Pipe connections

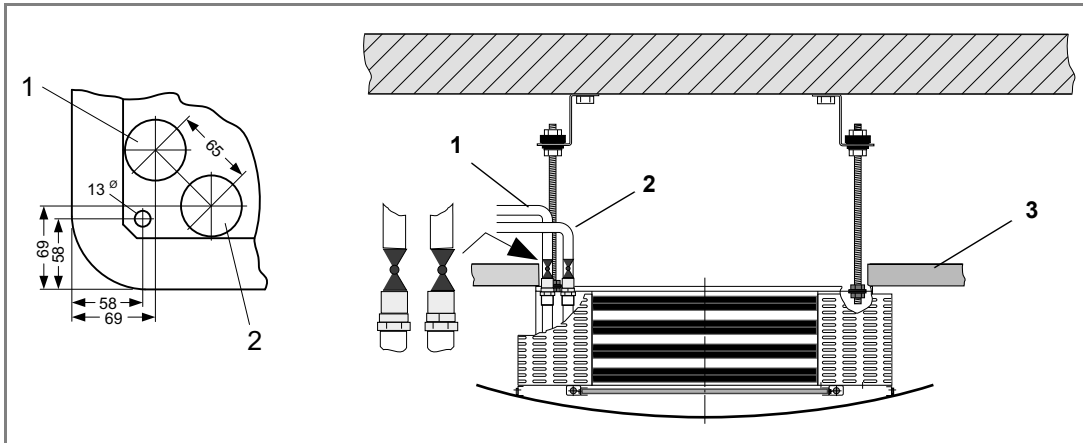
The pipework must be laid in such a way as to avoid mechanical stress on the heat exchanger and to ensure accessibility for maintenance and servicing.

**Damage to the unit!**

During installation, the connecting nut on the heat exchanger must be secured using a suitable tool.

- Supply / return line:
 - 1 row: closable depending on the direction
 - 2 rows: observe the labelling!
- Exchanger pipe connections: Female thread 3/4"
- Air venting of pipework must be provided on site.
- Unused pipe connections must be properly sealed with enclosed plugs.
- Pipe connections in cooling units must be insulated.

5.2.1 Installation example: Pipe connections from the top

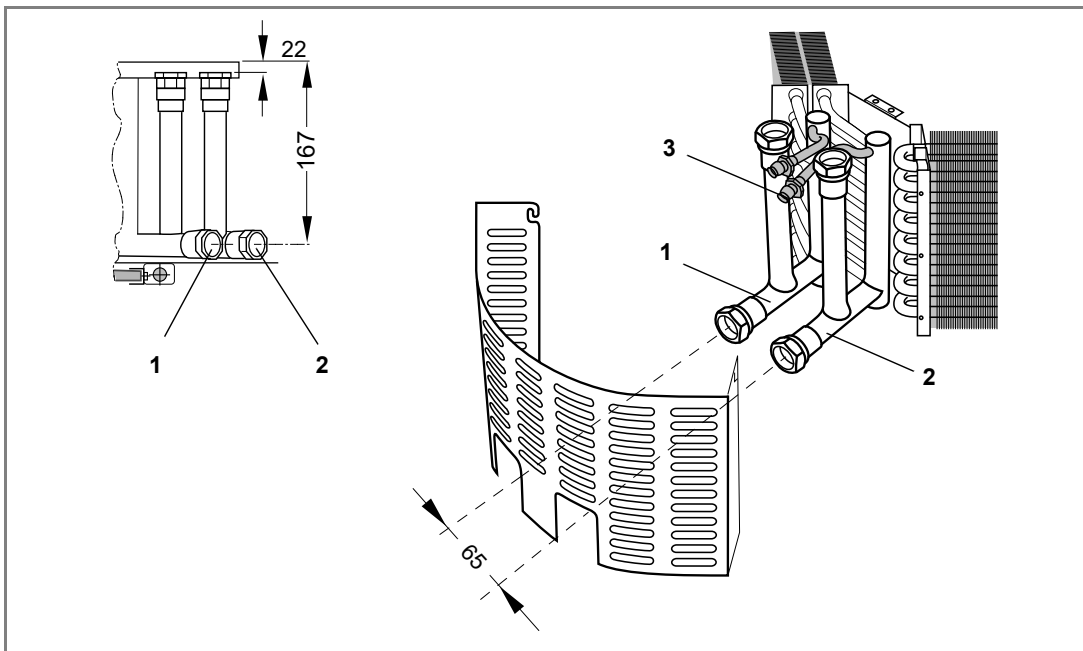


Pos. 1: Supply line
Pos. 2: Return line
Pos. 3: Suspended ceiling

Fig. 5-1: Pipe connections from the top

- Before the installation of the unit, lateral pipe connections must be properly sealed with the threaded plugs provided.
- Mount the unit horizontally, so as to eliminate vibration, below the suspended ceiling using the mounting kit and threaded rods provided.
- Air venting of pipework must be provided on site.
- In cooling units unused pipe connections must also be insulated.

5.2.2 Installation example: Pipe connections from the side



Pos. 1: Supply line
Pos. 2: Return line
Pos. 3: Air venting

Fig. 5-2: Pipe connections from the side

- Before the installation of the unit, top pipe connections must be properly sealed with the threaded plugs provided.
- Mount the unit horizontally, so as to eliminate vibration, below the suspended ceiling using the mounting kit and threaded rods provided.
- Air venting of pipework must be provided on site.
- In cooling units unused pipe connections must also be insulated.

5.2.3 Protection class / water volume / weight

Size		1	2	3
Protection		IP20	IP20	IP20
Protection class		I	I	I
Water volume: 1 row / 2 rows	l	1.2 / 2.2	1.5 / 2.6	1.7 / 3.2
Weight: Unit / enclosure	kg	39.5 / 3.5	47.5 / 4.2	58.5 / 5.2

Tab. 5-1: Protection class / water volume / weight

Condensate pump

Integrated condensate pump sound power level:

- Not assessed: 54 dB
- A rated: 52 dB(A)

Sound pressure level amounts to 37 dB(A).

The condensate pump during its start-up phase.

The condensate pump can cause short-term amplified operating noise during start-up phase as a result of air locks in the air intake ductwork and deviation from normal operating temperature.

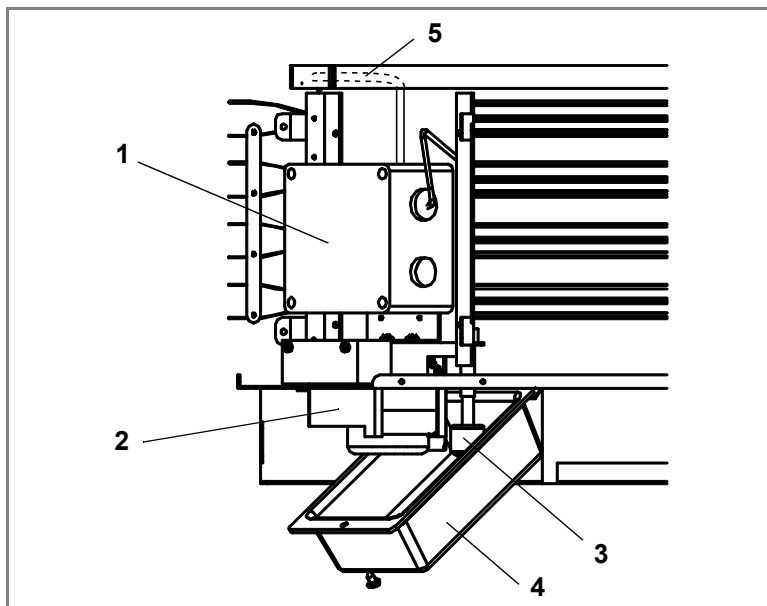
5.3 Condensate drain

5.3.1 Condensate drain connection for units with a condensate pump

Condensate pump capacity is shown in the diagram (Fig. 2-5 on page 18). A short period of dry running (less than 5 minutes) will not impact the service life of the condensate pump.

When routing the condensate drain line outside the unit consider the following:

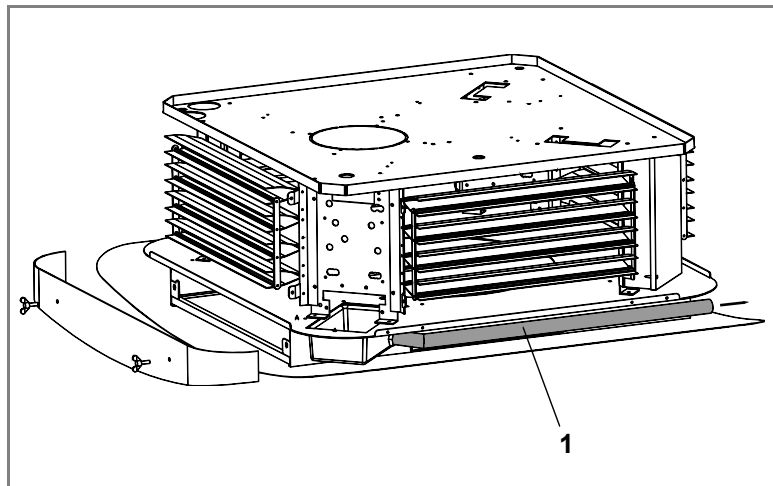
- The condensate drain line must have a sufficient diameter and must be inclined as necessary along its entire length.
- If there are no reductions in cross-section following the condensate pump, except for a non-return valve and 2 hose nozzles, the delivery head amounts to 1.35 m. (condensate hose internal diameter: 6 mm, with max. hose length being 5 m)



- Pos. 1: Pump control (SKP)
Pos. 2: Condensate pump
Pos. 3: Float switch
Pos. 4: Condensate pump cover
Pos. 5: Pump pressure hose, length: 1.5 m; internal diameter: 6 mm

Fig. 5-3: Condensate pump (accessories)

5.3.2 Condensate drain connection for units without a condensate pump



Pos. 1: Condensate drain hose, length: 1 m, internal diameter: 16 mm

Fig. 5-4: Condensate drain connection provided by site contractors

**Attention!**

The connecting hose must be appropriately inclined.

6 Electrical connections



Risk of electrocution!

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



Attention!

When connecting the unit observe operational safety regulations and generally recognized rules of engineering practice.

- CSN 331310 ed. 2 Electrical engineering regulations. Safety regulations for electrical equipment intended to be used by persons without any electrical engineering qualifications.
- CSN 332000-1 ed. 2 Electrical engineering regulations. Fundamental provisions for electrical appliances

6.1 Wiring diagrams

The electrical connection of the unit heaters must be carried out in accordance with the applicable wiring diagrams. The wiring diagram is located on the inside cover of the unit terminal box or is enclosed as a separate document.



Risk of electrocution!

The wiring diagrams do not specify any protective measures.

Applicable standards and regulations must always be observed when carrying out electrical connection.

Control electronics	Fuse
MATRIX 2001	B 10 A
MATRIX 2002	B 10 A
MATRIX 3001	B 10 A
Controller	B 10 A

Tab. 6-1: Fuse

6.2 Connections when using controllers, the MATRIX control system or control systems provided by site contractors

The electrical connections of the unit are through the terminal block. This is located in the steel terminal box located in the corner of the unit (see Fig. 2-1).

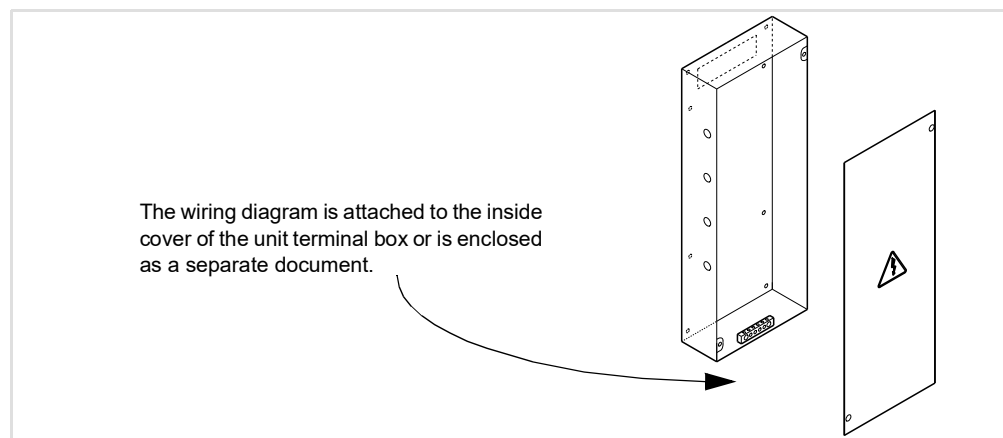


Fig. 6-1: Steel terminal box - 230V / 400V

Multi Flair unit heaters with a fan with EC motor and a control system provided by site contractors (type code ###.#####.G##) can be operated with a maximum control voltage as calculated using DesignA!R software.

Maximum fan control voltage			
Size	Filter	Capacity stage	Maximum fan control voltage [V]
1	Without filter	1 & 2	7.3
		3 & 4	7.5
	With filter	1 & 2	9.4
		3 & 4	9.6
2	Without filter	1 & 2	7.8
		3 & 4	8,0
	With filter	1 & 2	9.1
		3 & 4	9.3
3	-	-	6.2

Tab. 6-2: EC motor fan control voltage



Attention!

The exact manner of connecting each of the components (the fan, valves etc.) is indicated in the following electrical connection descriptions of this operation manual. Before making connections, check that the order code of the unit's electrical equipment matches the wiring diagram.

Only one fan speed level may be activated at any one time!

- Connections must be made according to the unit's wiring diagram.

6.3 Overview of MATRIX PCBs and control panels

The unit's terminal blocks, MATRIX PCBs and control panels are incorporated in the terminal box. The following overview shows the various connecting terminals and control PCBs of the unit. To be able to make the necessary connections the PCB type always indicates the controller type it incorporates. You can also find out the controller type (e.g. MATRIX 3001) from the wiring diagram attached to the inside of the control box cover or as a PCB sticker.

Each component to be connected comes with a table which indicates whether it is compatible with the control system.

6.3.1 Terminal block for 230 V and 400 V AC motors

The unit's terminal block for 230 V and 400 V AC motors is used for connecting to 230 V or 400 V mains power and the unit's control system.

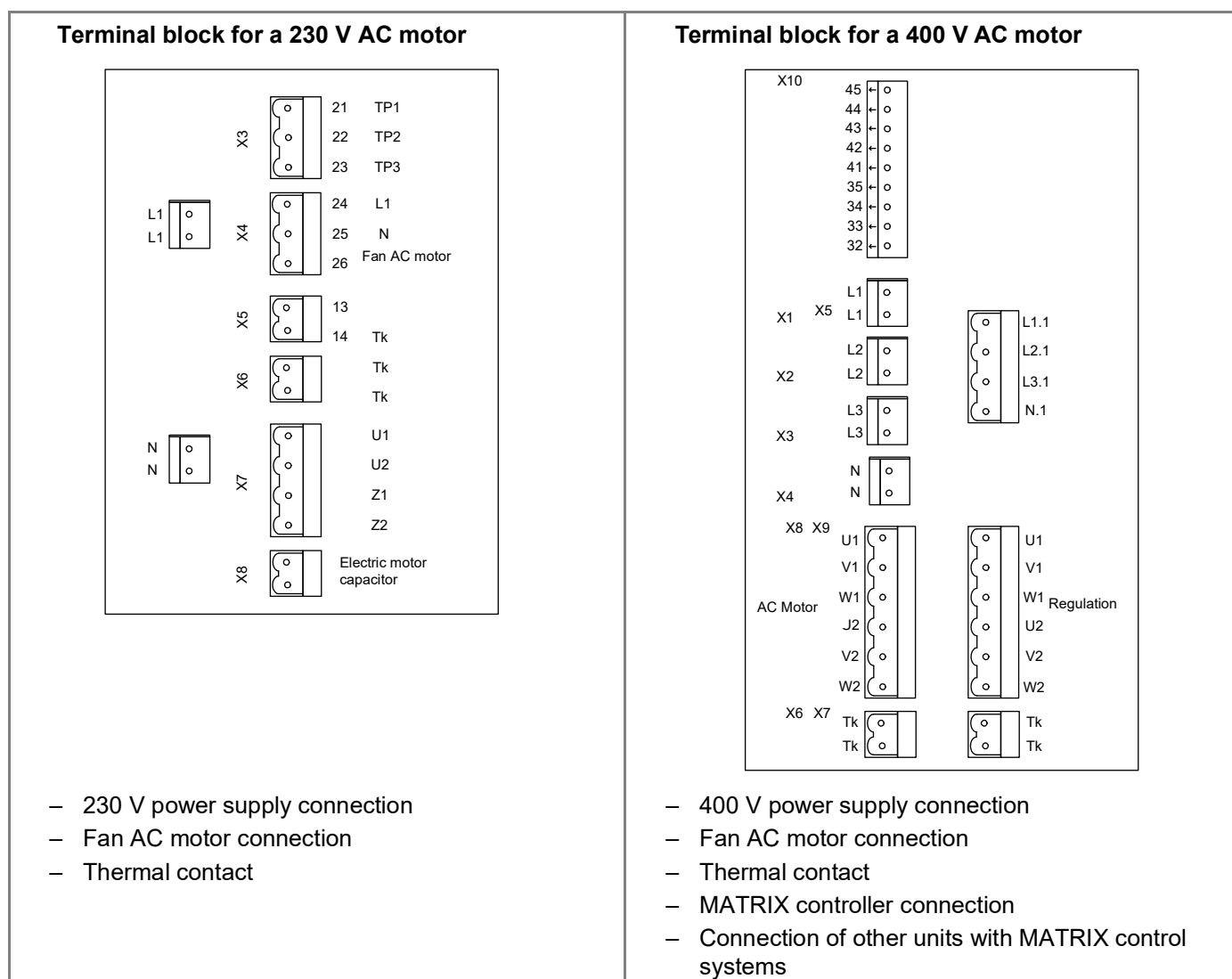


Fig. 6-2: Terminal block for 230 V and 400 V AC motors

6.3.2 Terminal block for a 230 V EC motor

The unit's terminal block for a 230 V EC motor is used for connecting to the 230 V mains power and the unit's control system.

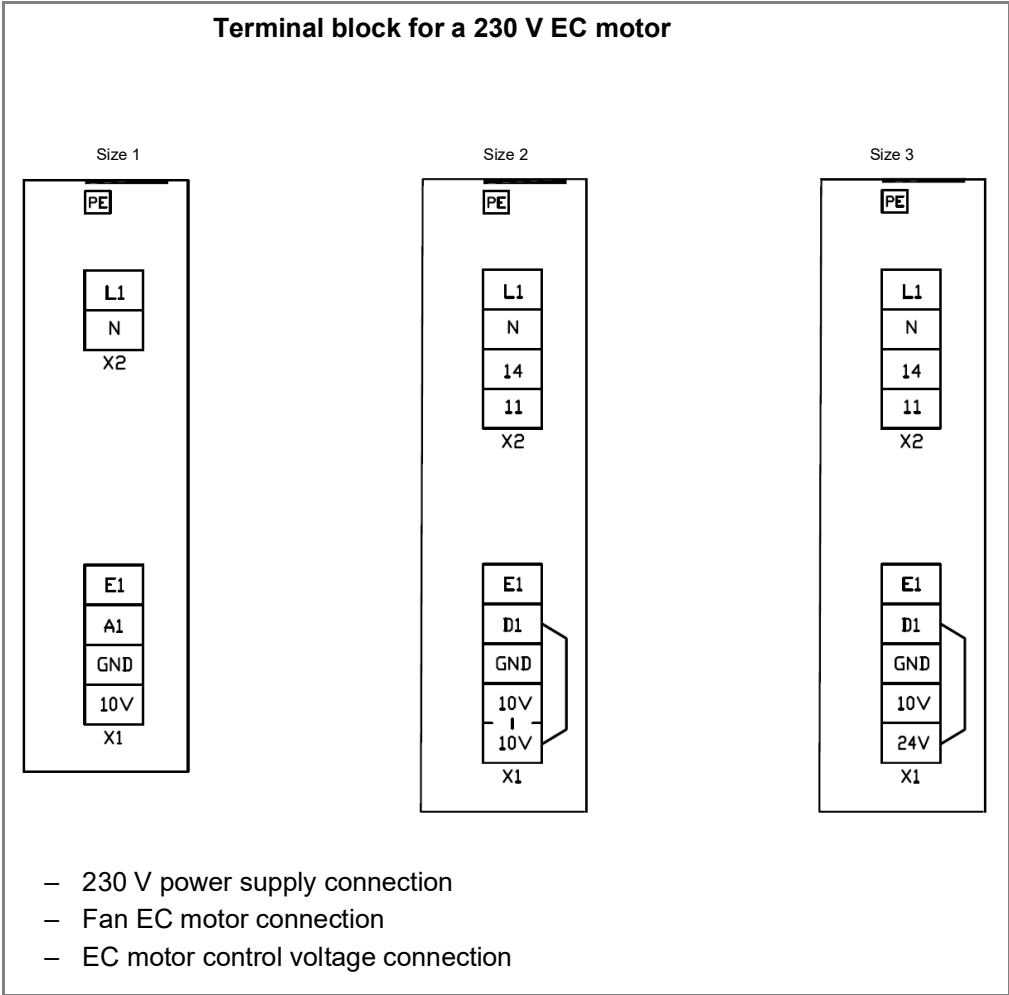


Fig. 6-3: Terminal block for a 230 V EC motor

6.3.3 MATRIX 2001 and MATRIX 3001 control system

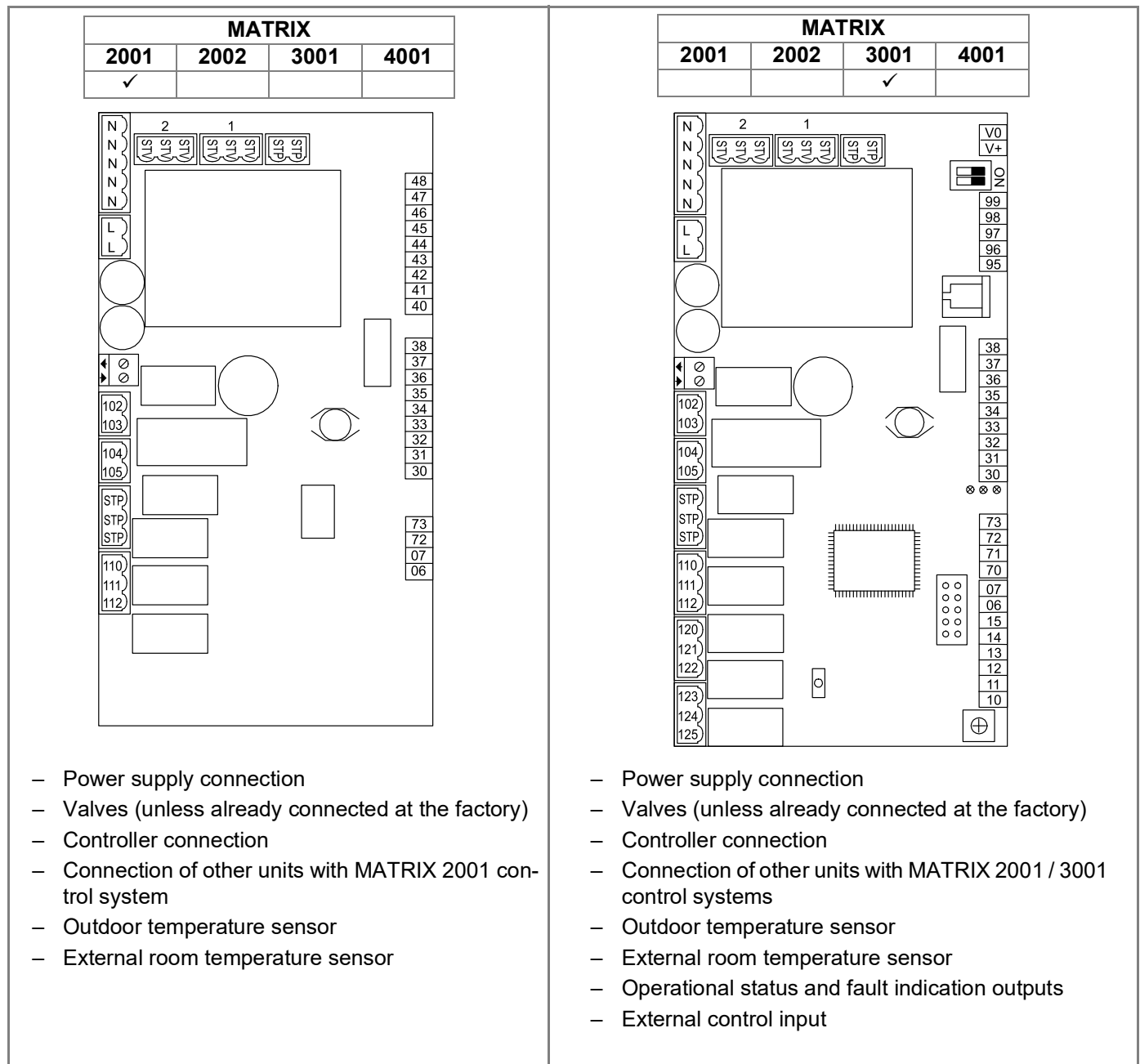
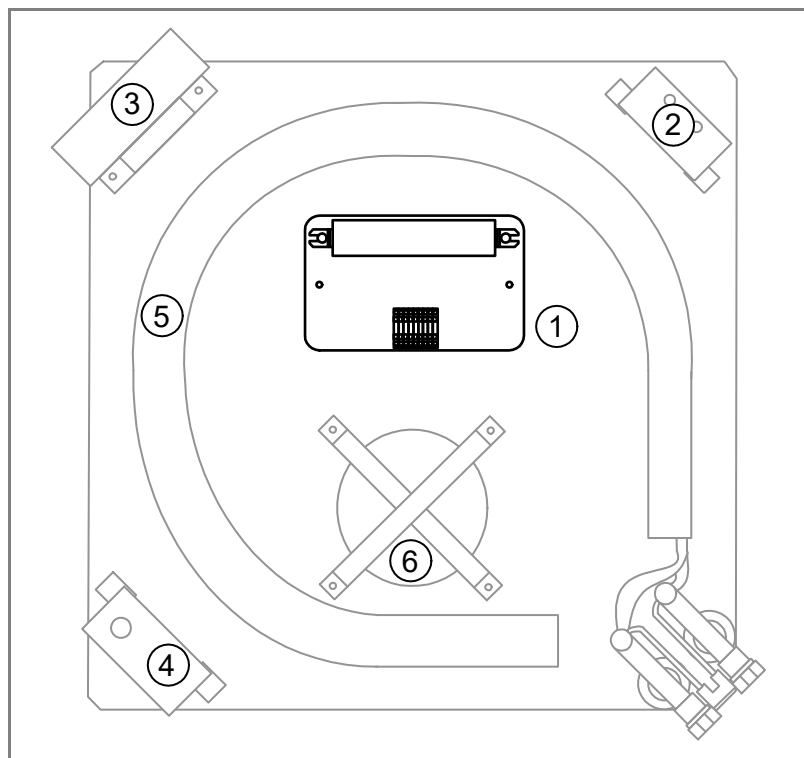


Fig. 6-4: MATRIX 2001 and MATRIX 3001 control system

6.3.4 Fan with upstream resistor

In 3-speed 1 x 230 V AC motors speed is controlled using upstream resistors. This upstream resistor is used to set three default speed levels.



- Pos. 1: Upstream resistor on control panel
- Pos. 2: Mains power supply electrical box
- Pos. 3: Low voltage electrical box (sensors, remote control)
- Pos. 4: Condensate pump
- Pos. 5: Circular heat exchanger
- Pos. 6: Primary air connection

Note: Fan side view.

Fig. 6-5: Fan with upstream resistor

6.4 Controller installation

All IP20 controllers include an integrated room temperature sensor. The sensor can be used when the controller is located at an ideal place for temperature control in the room. All IP54 controllers are supplied with an external room temperature sensor.



Attention!

The installation site of the room temperature sensor is crucial for the precise control of room temperature. For this reason, do not install the sensor (see Fig. 6-6):

- next to doors, windows and pass-through windows etc. as the movement of air distorts the measured values.
- on hot or cold walls (e.g. outside walls, chimney) as wall temperature can cause incorrect measurements.
- behind blinds and curtains as insulating air layers distort the measured values.
- in the immediate vicinity of the discharge grille of the unit as the temperature of exhaust air distorts the measured values.

If there is no good installation site for the IP20 controller, or if the IP54 controller is being used, a separate room or circulation air temperature sensor must be installed. This automatically disables the integrated room temperature sensor.

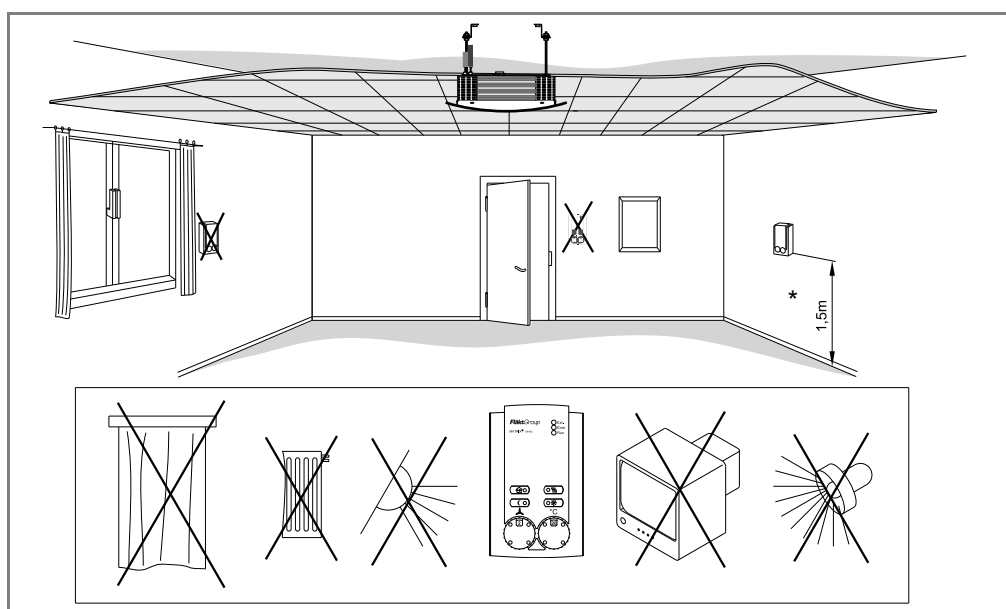


Fig. 6-6: Room temperature / controller sensor * recommended installation height

If the controller is to be installed on the wall or in a flush-mount box, please follow the controller operation manual. It also includes a drilling template.

6.5 Electrical connection of controllers not included in the unit

6.5.1 Connection of terminal block for a 230 V AC motor

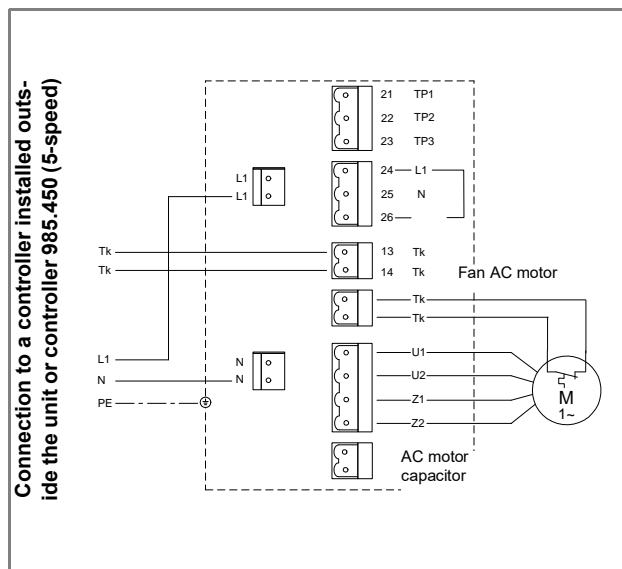


Fig. 6-7: Connection of terminal block for a 230 V AC motor

- Connection can be made with a 1 to 5-speed controller installed outside the unit or controller 985.450.
- AC motor control is achieved via thermal contacts built into the motor winding (rated for 230 V AC, 0.5 A).
- The unit's overcurrent protection on site must not exceed 10 A (in 985.450 controllers max. 8 A).
- Connect the unit heater in accordance with the wiring diagram.

6.5.2 Connection of terminal block for a 400 V AC motor

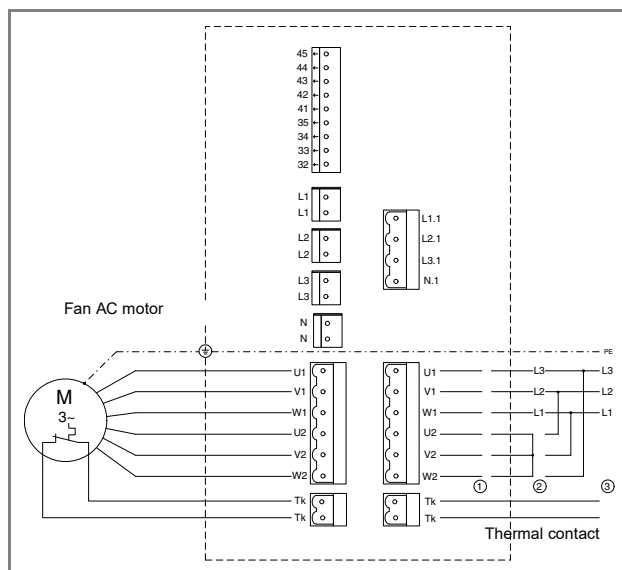


Fig. 6-8: Connection of terminal block for a 400 V AC motor

- The electrical connection of a controller which is not part of the unit can be made as 1-speed.
 - Low speed (star connection, pos. 2)
 - High speed (triangle connection, pos. 3)
- 2-speed connection can be made using controller 985.420 (see pos. 1).
- AC motor protection is achieved via thermal contacts built into the motor winding (rated for 230 V AC, 0.5 A).
- The unit's overcurrent protection on site must not exceed 10 A).
- Connect the unit heater in accordance with the wiring diagram.

6.5.3 Connection of terminal block for a 230 V EC motor

The electrical connection of a controller which is not part of the unit can be made for the various sizes of the unit with maximum control voltage rates as specified in the table below.

Maximum permitted EC motor fan control voltage in cooling mode (W0) according to Table 6-2.

3-speed control of EC motor fans can be achieved using a MC4U1EC.000 controller. The controller can be set to three levels between 1.25 and 10 V.

Variable speed control of EC motor fans can be achieved using a 950EC1 potentiometer.

EC motor fan status indication is connected to the electrical box terminals.

The unit's overcurrent protection on site must not exceed 10 A.



Attention!

Connect the units in accordance with the wiring diagram provided.
Connection with resistors applies to cooling units.

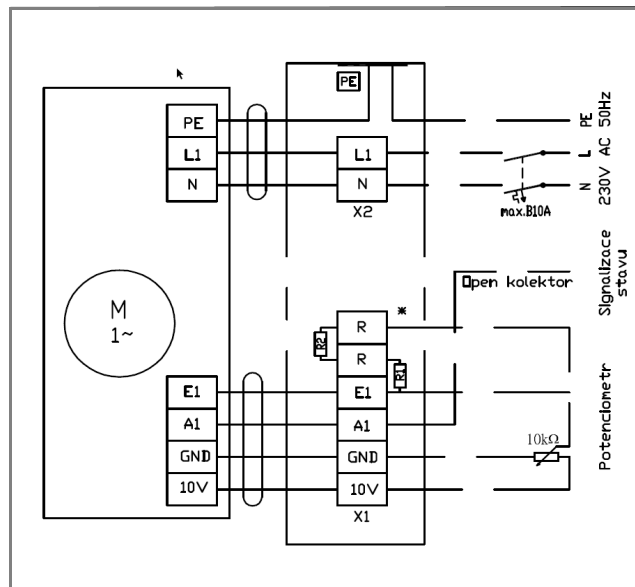


Fig. 6-9: Unit size 1, EC motor

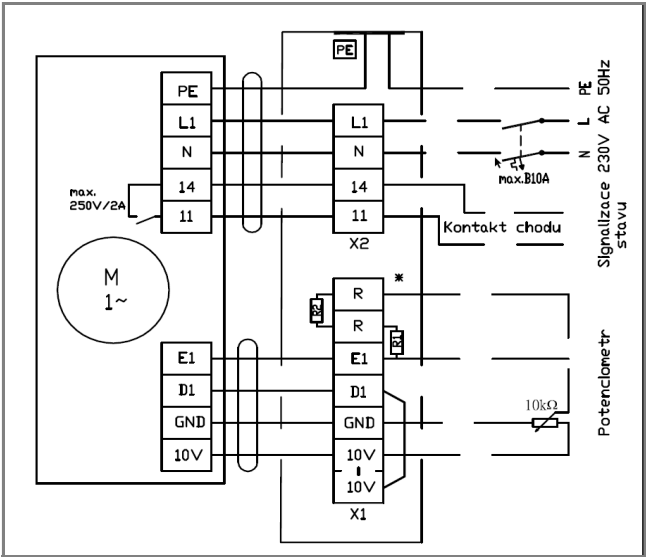


Fig. 6-10: Unit size 2, EC motor

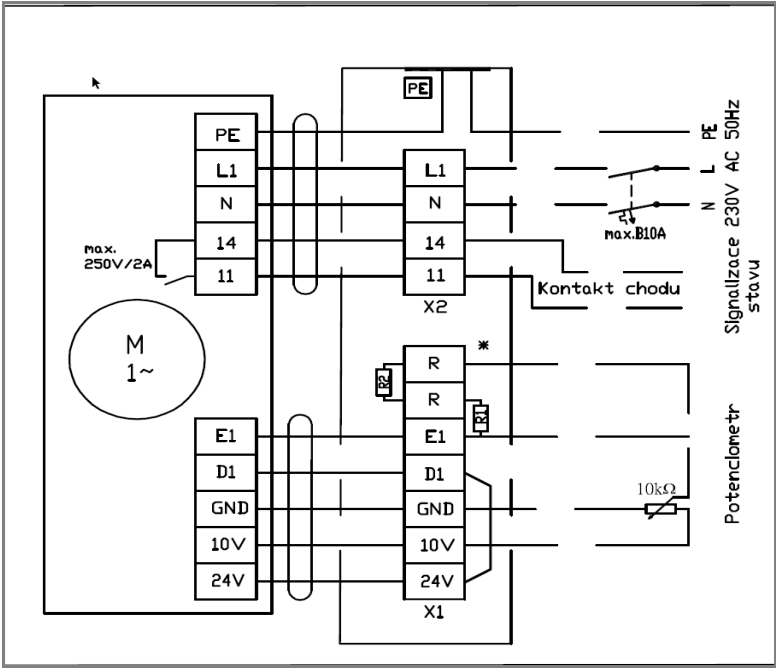
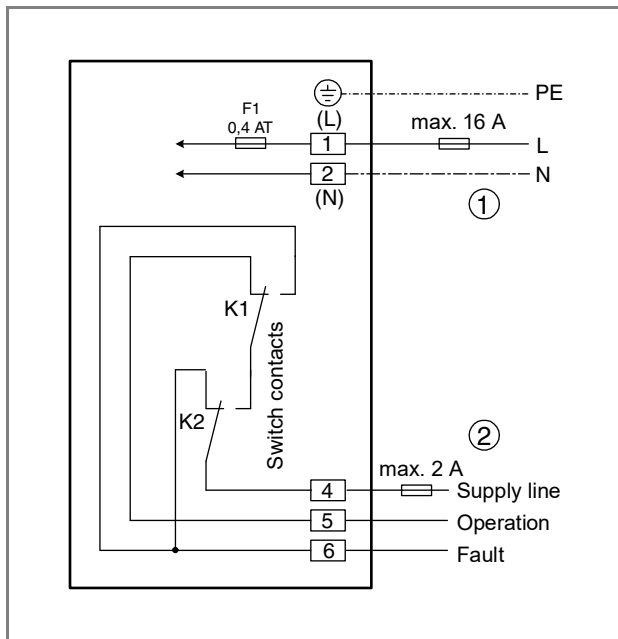


Fig. 6-11: Unit size 3, EC motor

6.5.4 Condensate pump connection



Pos. 1: Power supply 230 V / 50 Hz / N / PE max. 16 A

Pos. 2: Indication output (max. 230 V/2 A)

- K1 closes when the condensate level is too high.
- K2 closes when voltage is supplied to terminals 1 and 2 (L, N).

Fig. 6-12: Condensate pump connection

6.5.5 Connection of multiple unit heaters with a 230 V AC motor to a single 985.450 controller

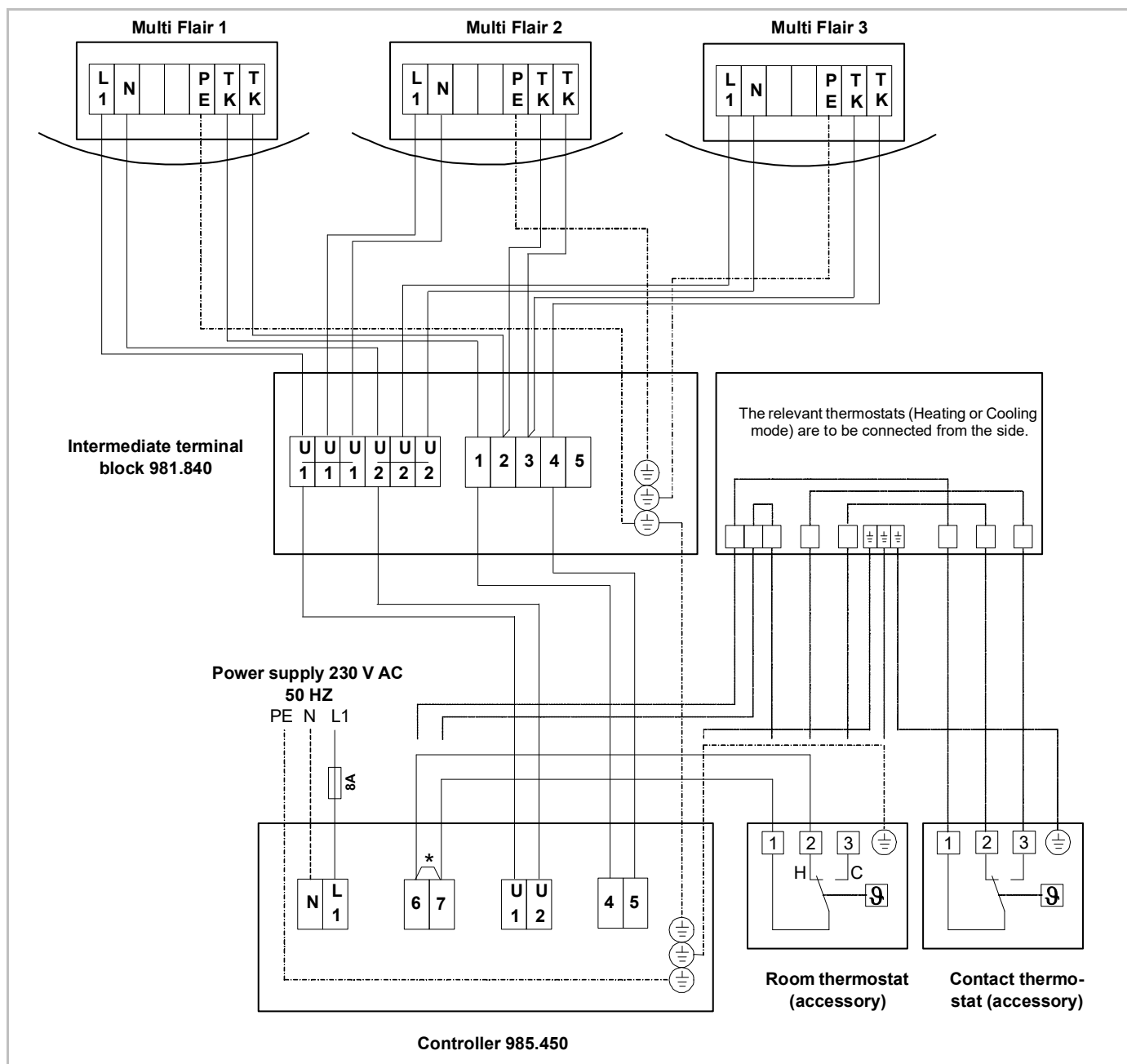


Fig. 6-13: Connection of multiple unit heaters with a 230 V AC motor to a single 985.450 controller

- Up to 4 unit heaters can be connected via intermediate terminal block 981.840 to a single 985.450 controller. (In size 3 up to 3 units can be connected).
- The thermal contacts must be connected in series.
- Terminals 6-7 of the 985.450 controller must be interconnected using a jumper wire if a room thermostat is not used.
- Max. overcurrent protection is 8 A

6.5.6 Connection of multiple unit heaters with a 230 V AC motor to a single 985.450 controller

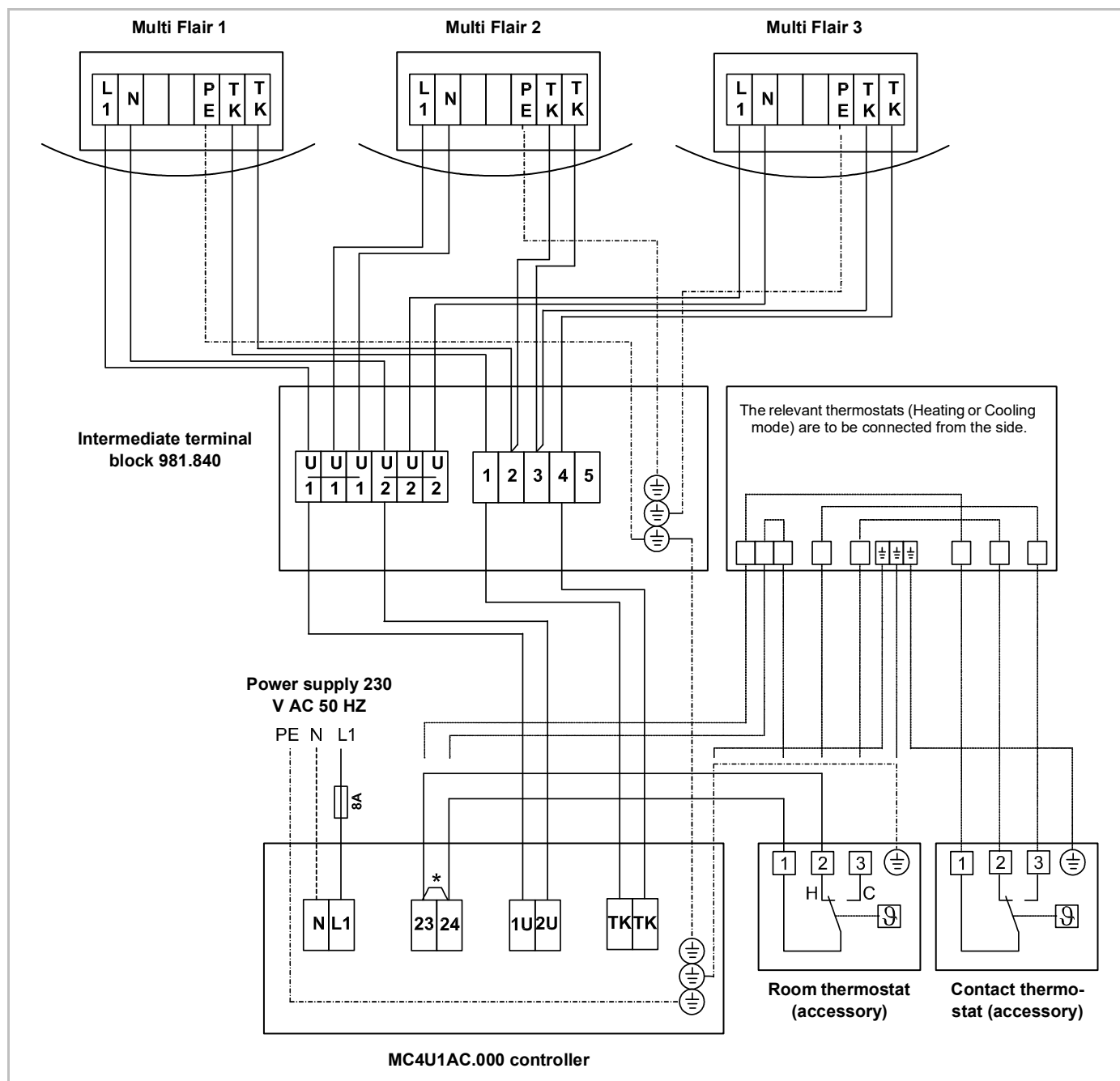


Fig. 6-14: Connection of multiple unit heaters with a 230 V AC motor to a single MC4U1AC.000 controller

- Up to 4 unit heaters can be connected via intermediate terminal block 981.840 to a single MC4U1AC.000 controller. (In size 3 up to 3 units can be connected).
- The thermal contacts must be connected in series.
- Terminals 23-24 of the MC4U1AC.000 controller must be interconnected using a jumper cable if a room thermostat is not used.
- Max. overcurrent protection is 9 A.

6.5.7 Connection of multiple unit heaters with a 230 V AC motor to a single 985.420 controller

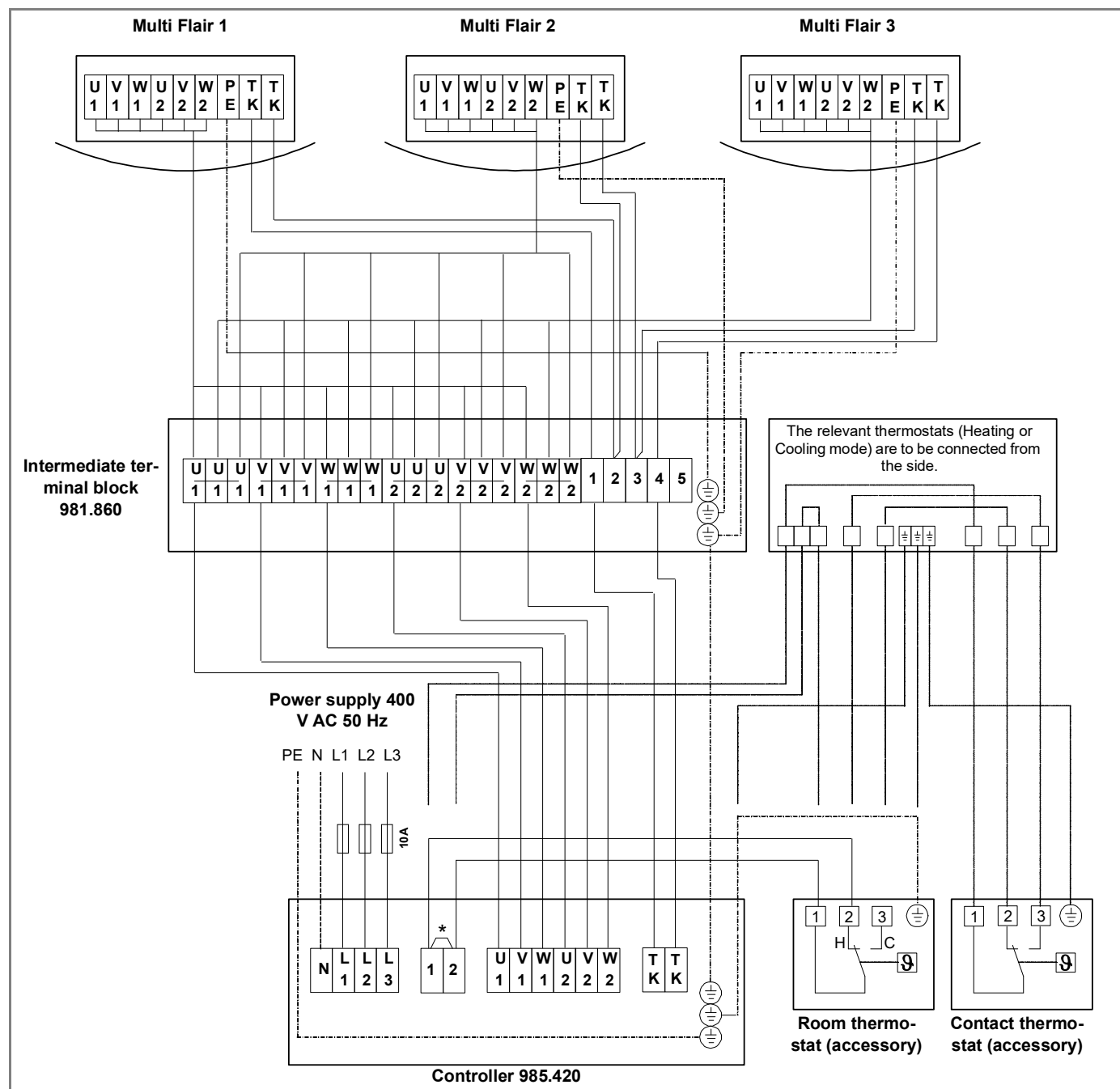


Fig. 6-15: Connection of multiple unit heaters with a 400 V AC motor to a single 985.420 controller

- Up to 4 unit heaters can be connected via intermediate terminal block 981.860 to a single 985.420 controller.
- The thermal contacts must be connected in series.
- Terminals 1-2 of the 985.420 controller must be interconnected using a jumper cable if a room thermostat is not used.
- Max. overcurrent protection is 10 A.

6.5.8 Connection of multiple unit heaters with a 400 V AC motor to a single MC4U2AC.000 controller

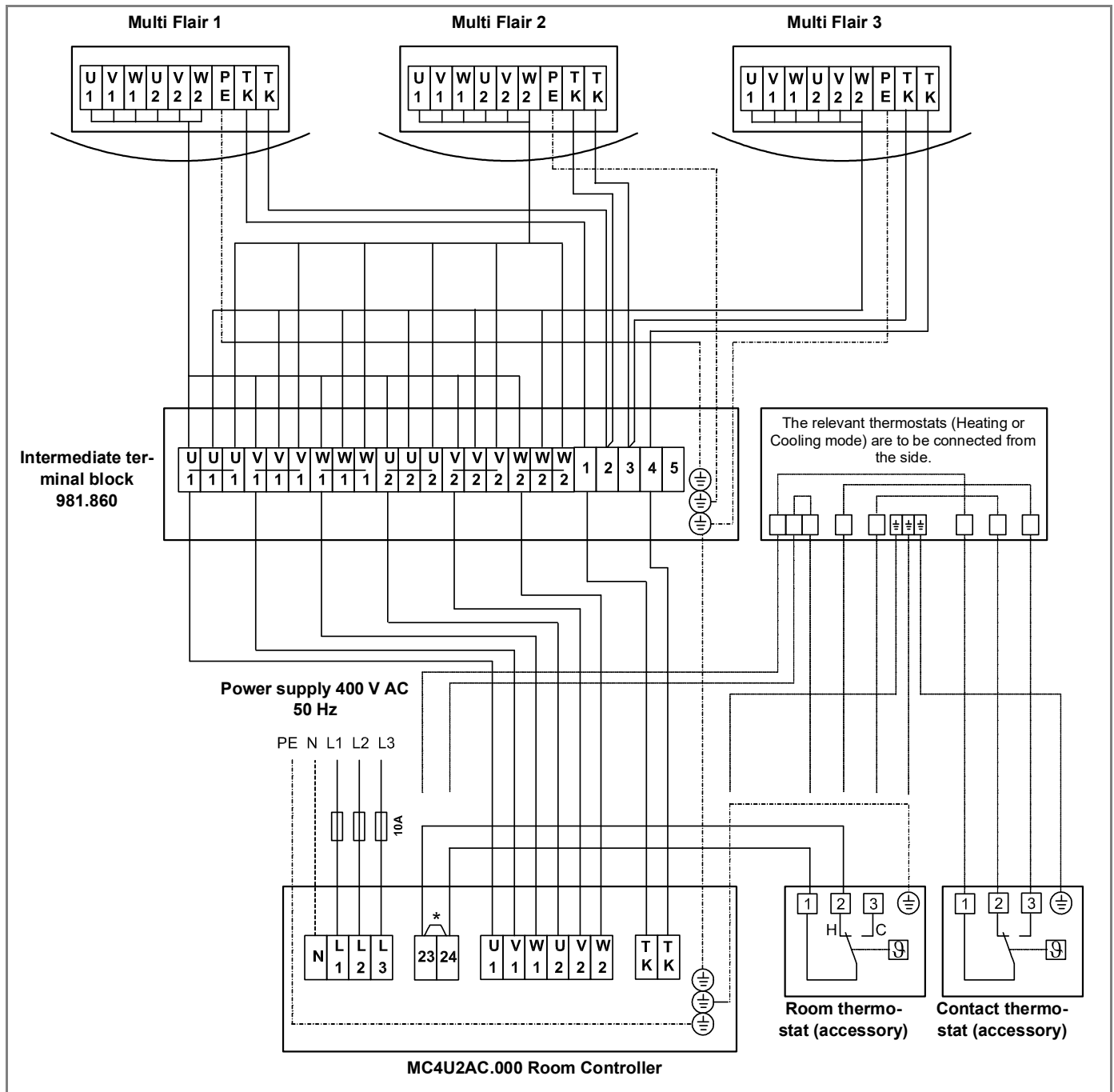


Fig. 6-16: Connection of multiple unit heaters with a 400 V AC motor to a single MC4U2AC.000 controller

- Up to 4 unit heaters can be connected via intermediate terminal block 981.860 to a single MC4U2AC.000 controller.
- The thermal contacts must be connected in series.
- Terminals 23-24 of the MC4U2AC.000 controller must be interconnected using a jumper cable if a room thermostat is not used.
- Max. overcurrent protection is 9 A.

6.5.9 Connection of multiple unit heaters with a 230 V EC motor to a single MC4U1EC.000 controller

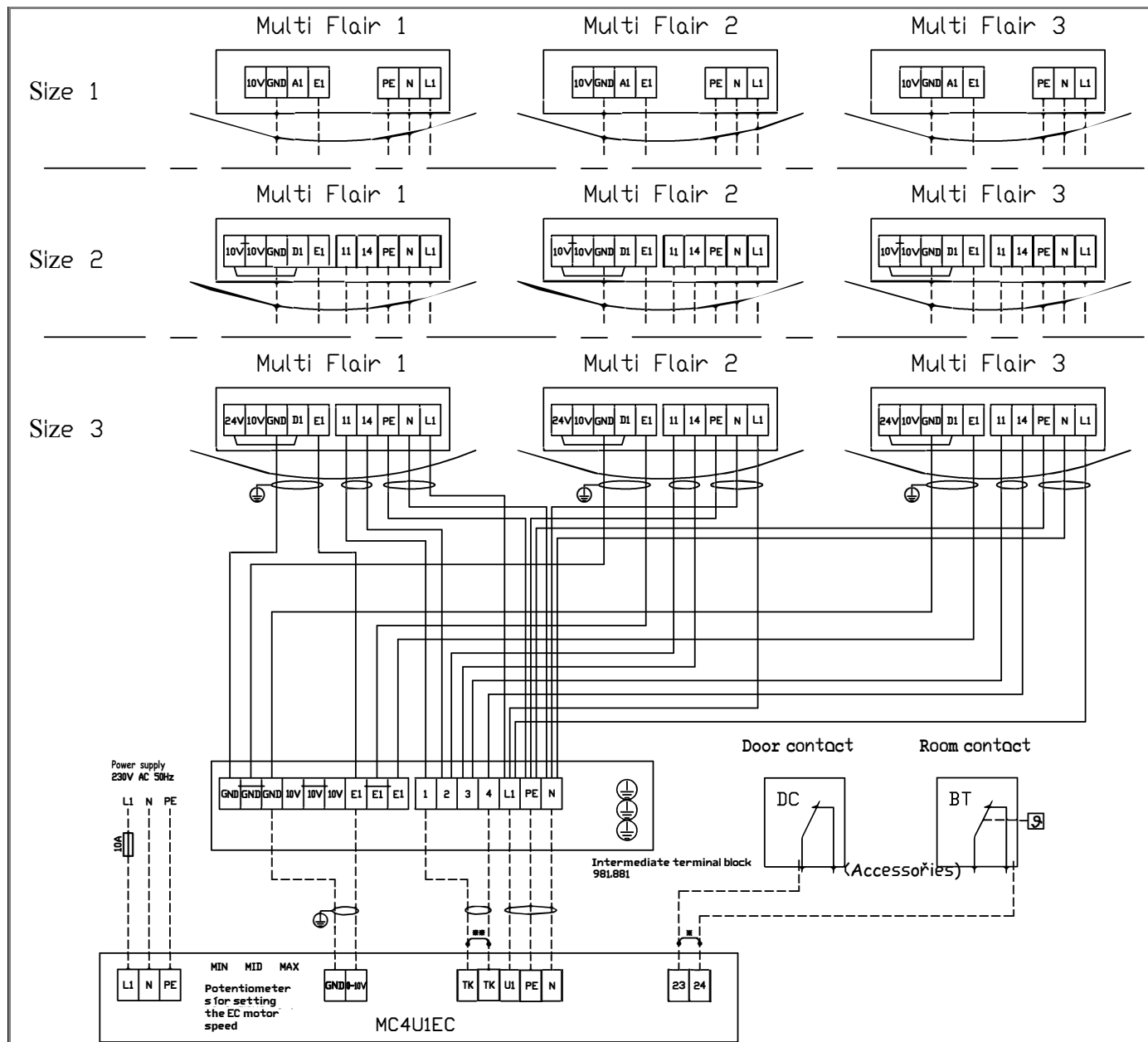


Fig. 6-17: Connection of multiple unit heaters with a 230 V EC motor to a single MC4U1EC.000 controller

- Up to 4 unit heaters can be connected via intermediate terminal block 981.101 to a single MC4U1EC.000 controller.
- The indication contacts of the thermal contact must be connected in series.
- Terminals 23-24 of the MC4U1EC.000 controller must be interconnected using a jumper cable if a room thermostat is not used.
- Max. overcurrent protection is 9 A.

6.5.10 Connection of multiple unit heaters with EC motors to a single 950EC1 controller

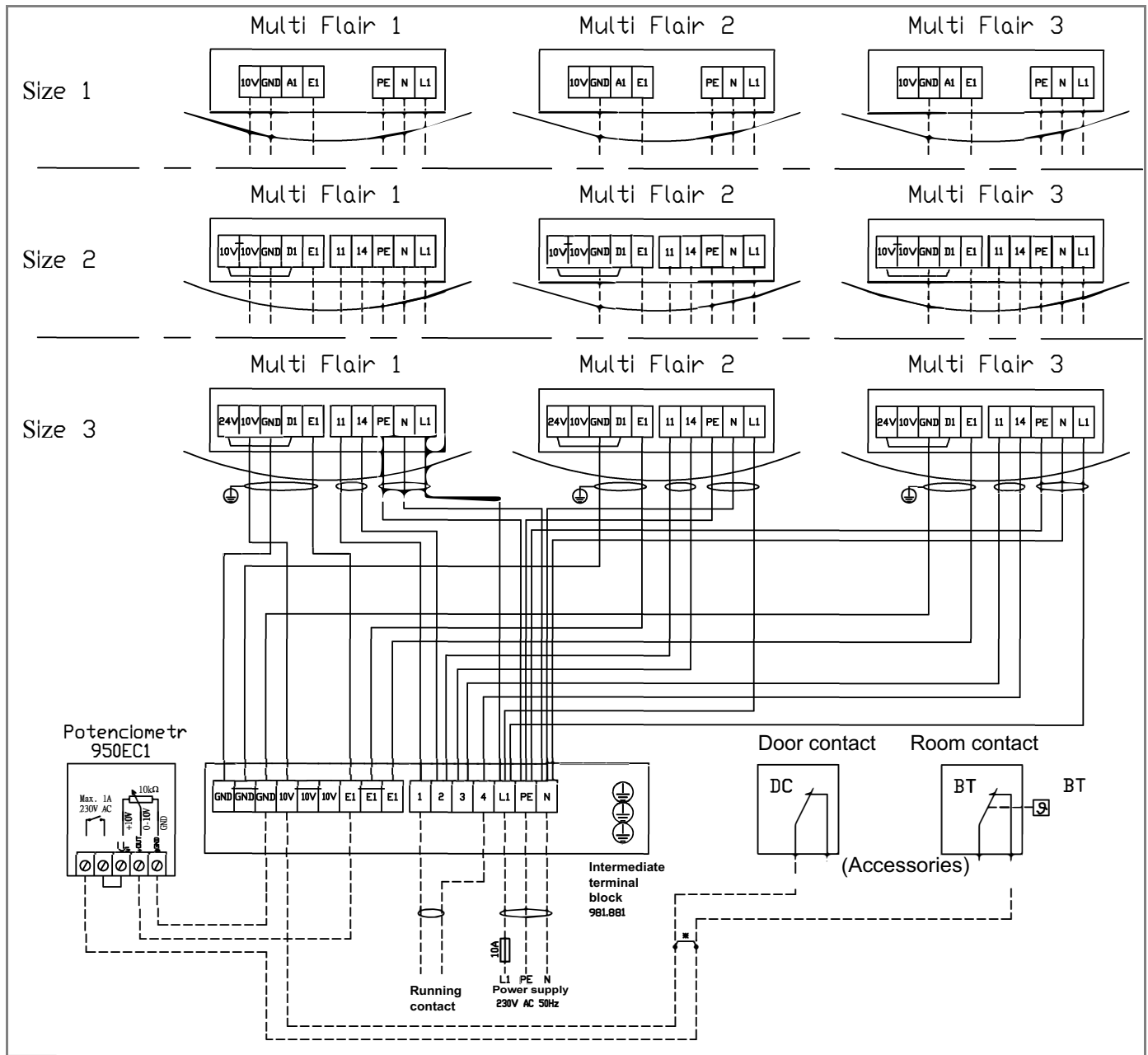


Fig. 6-18: Connection of multiple unit heaters with a 230 V EC motor to a single 950EC1 controller

- Up to 4 unit heaters can be connected via intermediate terminal block 981.101 to a single 950EC1 potentiometer.
- The indication contacts of the thermal contact must be connected in series.
- Terminals TK1-4 of the 981.101 controller intermediate terminal block must be interconnected using a jumper cable if a room thermostat is not used.
- Max. overcurrent protection is 10 A

6.6.2 Control cabling connection



Attention!

For connection use the following control cables:

- In short lines and / or in environments without interference: multi-core control cable 0.5 mm² shielded using aluminium coated plastic foil, e.g. J-Y(ST)Y 1x2x0.8 / 3x2x0.8 / 4x2x0.8.
- In long lines and / or in environments with interference: multi-core control cable 0.5 mm² shielded using copper braiding.

MATRIX			
2001	2002	3001	4001
✓			

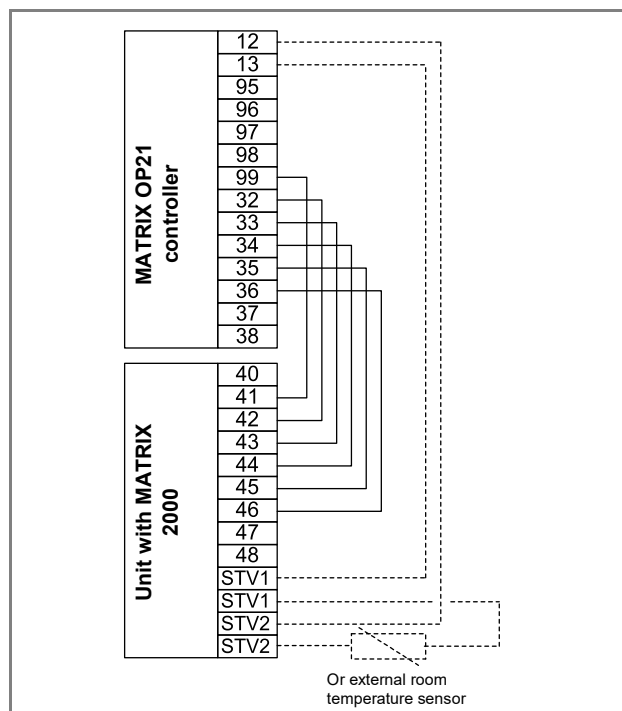


Fig. 6-21: Controller-to-unit heater connection without valves

Controller-to-unit heater connection without valves External room temperature sensor (optional)

Only unit heaters with the MATRIX 2000 control system can be operated using the MATRIX OP21 controller.

- Connect the control cables in accordance with the wiring diagram provided.
- The controller must be connected on the control panel
- Control cables: see the note on fig. 51 above.
- The external room temperature sensor can be connected directly to terminals 12 and 13 of the controller or auxiliary terminals STV1, STV2.

MATRIX			
2001	2002	3001	4001
	✓		

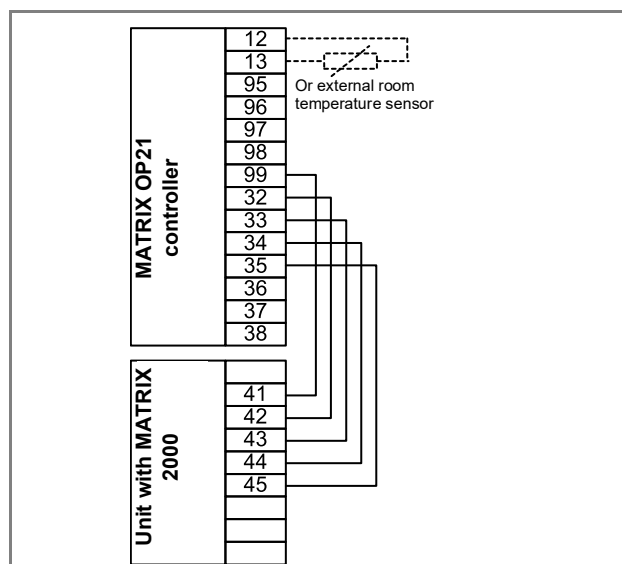


Fig. 6-22: Controller-to-unit heater connection without valves

Controller-to-unit heater connection without valves External room temperature sensor (optional)

Only unit heaters with the MATRIX 2000 control system can be operated using the MATRIX OP21 controller.

- Connect the control cables in accordance with the wiring diagram provided.
- The controller must be connected on the control panel
- Control cables: see the note on fig. 51 above.

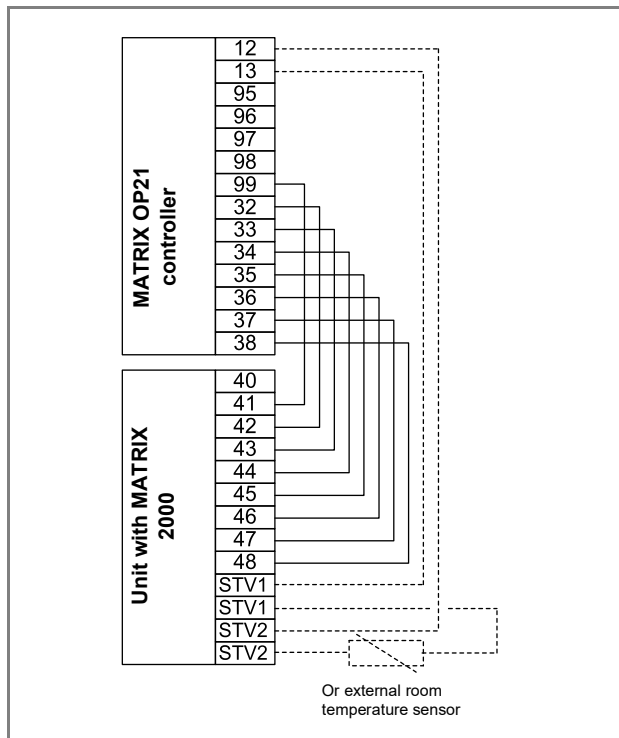


Fig. 6-23: Controller-to-unit heater connection with external valve control

MATRIX			
2001	2002	3001	4001
✓			

Controller-to-unit heater connection with external valve control

External room temperature sensor (optional)

Only unit heaters with the MATRIX 2000 control system can be operated using the MATRIX OP21 controller.

- Connect the control cables in accordance with the wiring diagram provided.
- The controller must be connected on the control panel
- Control cables: see the note on fig. 51 above.
- In addition, terminals 12 and 13 must be interconnected if an external room temperature sensor is connected to auxiliary point terminals STV1, STV2.

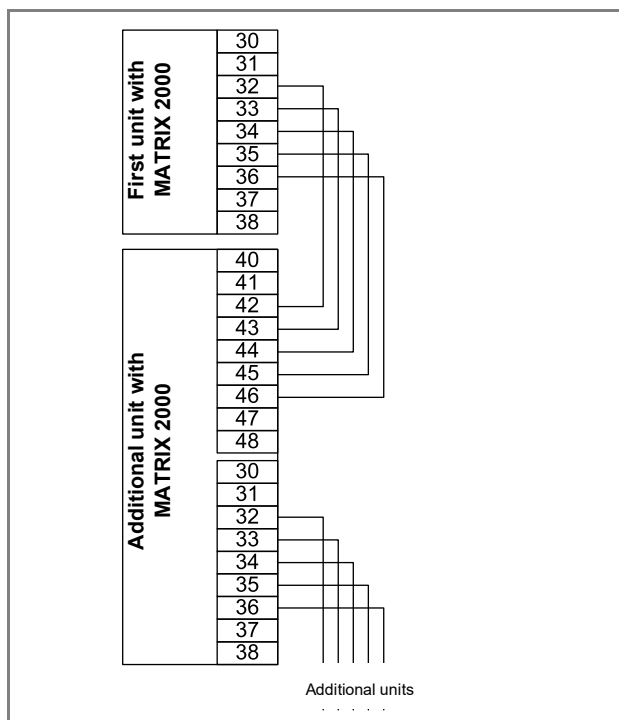


Fig. 6-24: Connection between the first unit and an additional unit without valves

MATRIX			
2001	2002	3001	4001
✓	✓		

Connection between the first unit and an additional unit without valves

Additional units may only be connected if they have MATRIX 2000 controls.

- Connect the control cables in accordance with the wiring diagram provided.
- The MATRIX 2001 control system is connected on the control panel; MATRIX 2002 control systems are connected on the unit PCB.
- Control cables: see the note on fig. 51 above.
- The cable connecting 36-46 is not used in MATRIX 2002 control systems.

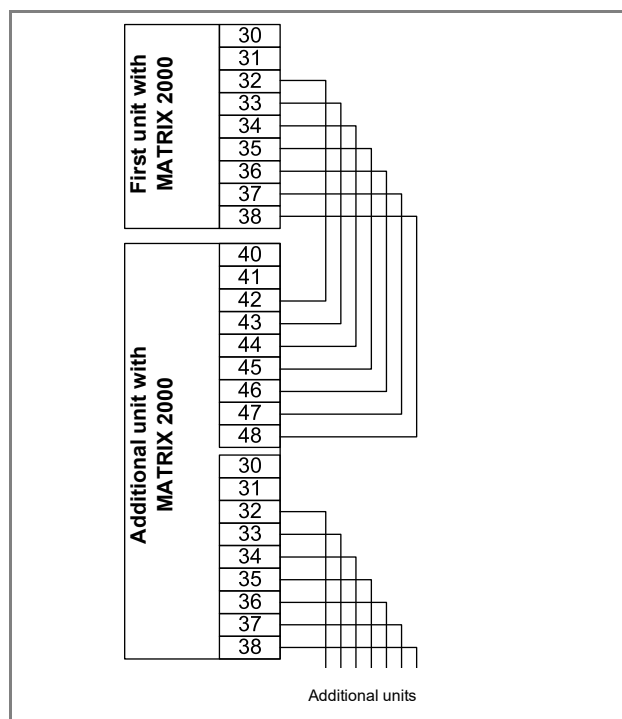


Fig. 6-25: Connection between the first unit and an additional unit with external valve control

MATRIX			
2001	2002	3001	4001
✓			

Connection between the first unit and an additional unit with external valve control

Additional units may only be connected if they have MATRIX 2000 controls.

- Connect the control cables in accordance with the wiring diagram provided.
- Make connections on the control panels (only in MATRIX 2001).
- Control cables: see the note on fig. 51 above.

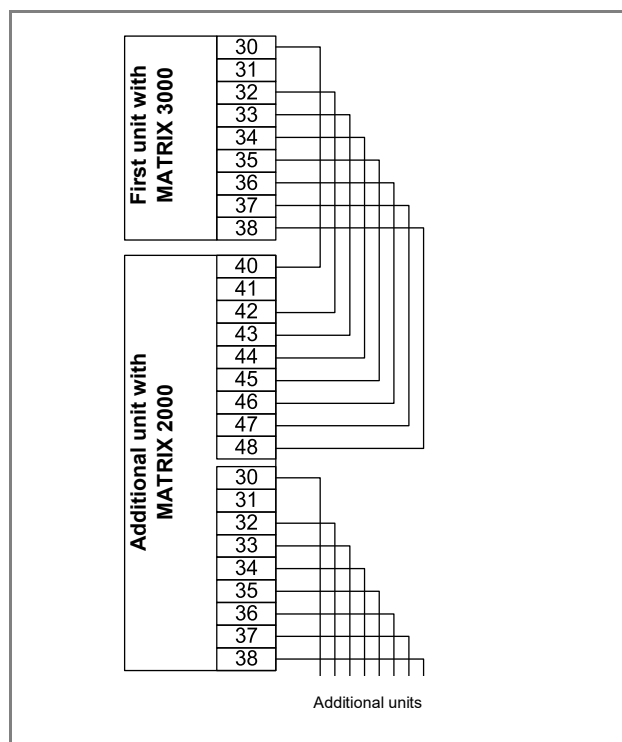


Fig. 6-26: Connection between the first unit with MATRIX 3000 and an additional unit with MATRIX 2000

MATRIX			
2001	2002	3001	4001
✓			

Connection between the first unit with MATRIX 3000 and an additional unit with MATRIX 2000

Units with the MATRIX 2000 control system can be operated via units with the MATRIX 3000 control system.

- Connect the control cables in accordance with the wiring diagram provided.
- Always connect on the control panel.
- Control cables: see the note on fig. 51 above.
- Terminals 37-47 and 38-48 are only to be interconnected for valve control.

6.6.3 Bus line connection

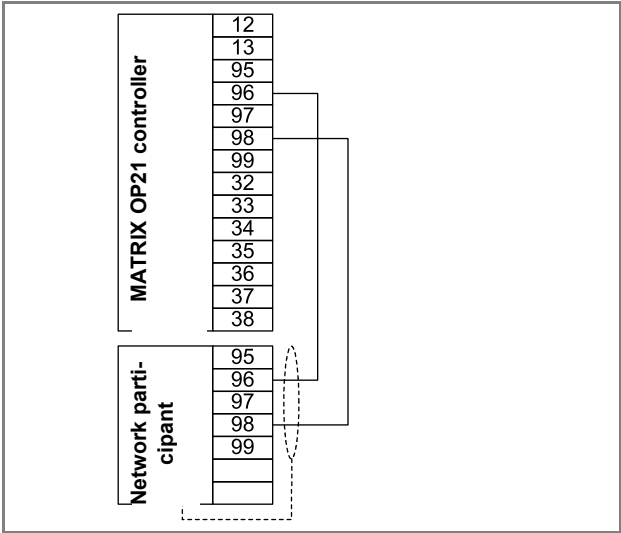


Fig. 6-27: Controller-to-network participant connection

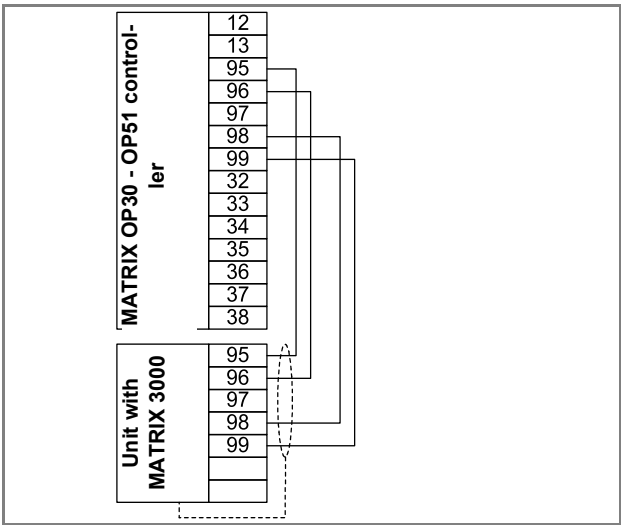


Fig. 6-28: Controller-to-unit heater connection

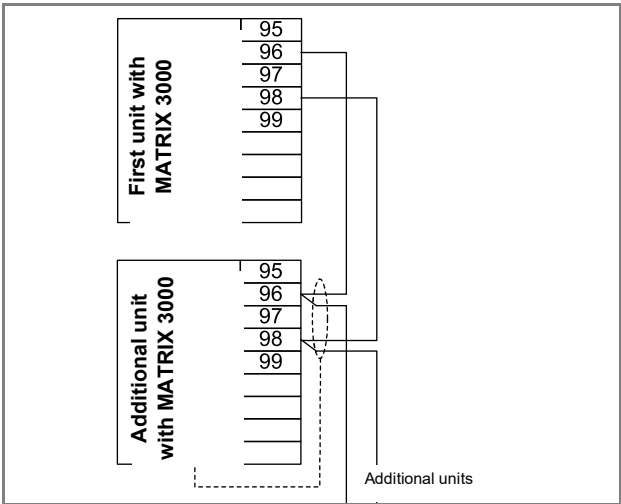


Fig. 6-29: Connection between the first unit and an additional unit

MATRIX			
2001	2002	3001	4001
✓	✓		

Controller-to-network participant connection

To connect a MATRIX OP21 controller to a MATRIX.NET network 2-core bus cables must be used.

- Connect the control cables in accordance with the wiring diagram provided.
- As a bus cable we recommend using HELUKABEL, type CAN-BUS 2 x 2 x ... mm²

Note: Only data cables with twisted pair cores and shielding should be used for connection (according to CSN EN 50 170).

MATRIX			
2001	2002	3001	4001
		✓	

Controller-to-unit heater connection

Only units with the MATRIX 3000 control system can be operated using MATRIX OP30 to MATRIX OP51 controllers.

- Connect the control cables in accordance with the wiring diagram provided.
- Always connect on the control panel.
- As a bus cable we recommend using HELUKABEL, type CAN-BUS 2 x 2 x ... mm²

Note: Only data cables with twisted pair cores and shielding should be used for connection (according to CSN EN 50 170).

Connection between the first unit and an additional unit

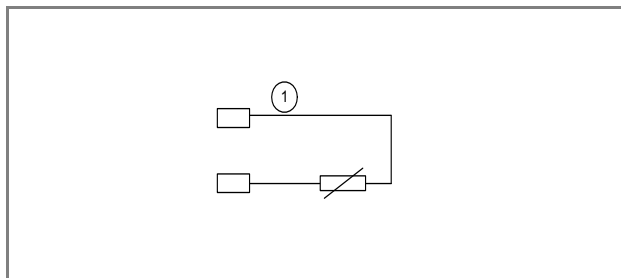
To connect units with the MATRIX 3000 control system to each other a 2-core bus cable must be used.

- Connect the control cables in accordance with the wiring diagram provided.
- Always connect on the control panel.
- As a bus cable we recommend using HELUKABEL, type CAN-BUS 2 x 2 x ... mm²

Note: Only data cables with twisted pair cores and shielding should be used for connection (according to CSN EN 50 170).

6.6.4 Connection of an outdoor air temperature sensor (optional)

MATRIX			
2001	2002	3001	4001
✓	✓	✓	



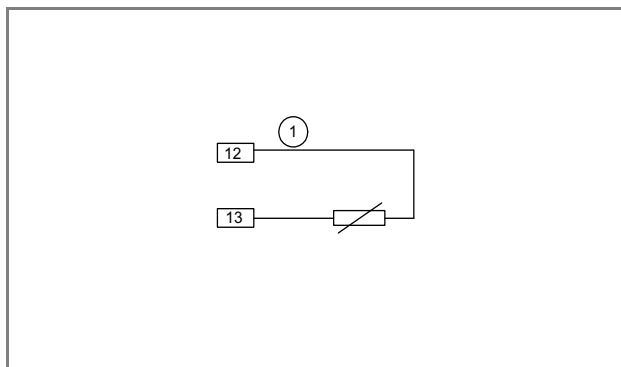
Pos. 1: Connecting cable
(see the note on fig. 51 above)

- Connecting the sensor in accordance with the wiring diagram provided.
- To do this, a MATRIX AI analogue input module is necessary for connection in the electrical box. For more details see the “Global modules” operation manual.

Fig. 6-30: Connection of an outdoor air temperature sensor (optional)

6.6.5 Connection of a supply air temperature sensor (optional)

MATRIX			
2001	2002	3001	4001
✓	✓		

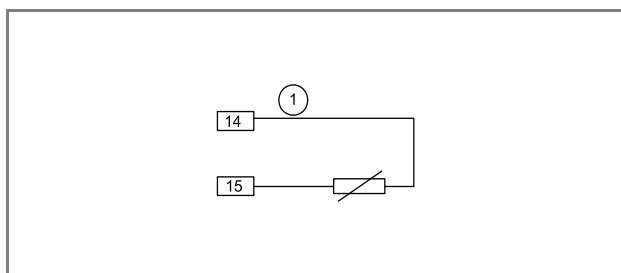


Pos. 1: Connecting cables (see the note on fig. 51 above)

- Connect the supply air temperature sensor in accordance with the wiring diagram.
- In MATRIX 2001/2002 control system connection can be made on the OP21 controller (terminals 12-13) or using the auxiliary terminals of the unit with MATRIX 2001 (see fig. 51 and fig. 52).
- If a supply air temperature sensor is connected, no other sensor can be used (e.g. a room temperature sensor).

Fig. 6-31: Connection of a supply air temperature sensor (optional)

MATRIX			
2001	2002	3001	4001
		✓	



Pos. 1: Connecting cables (see the note on fig. 51 above)

- Connect the supply air temperature sensor in accordance with the wiring diagram.
- Connection must be made on the MATRIX 3001 control panel.

Fig. 6-32: Connection of a supply air temperature sensor (optional)

6.6.6 Connection of a room temperature sensor (optional)

MATRIX			
2001	2002	3001	4001
✓	✓	✓	

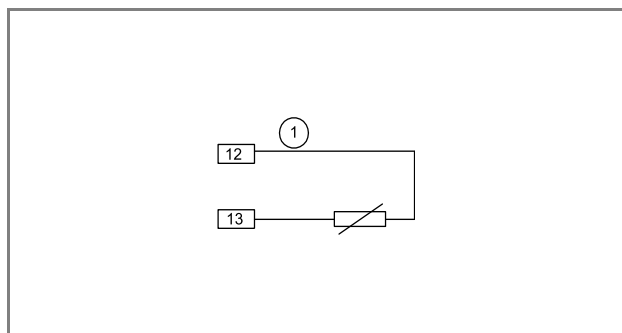


Fig. 6-33: Connection of a room temperature sensor (optional)

Pos. 1: Connecting cables (see the note on fig. 51 above)

- Connect the room temperature sensor in accordance with the wiring diagram.
- In Change Over (2-pipe system) with MATRIX 2000 controls an additional room temperature sensor can only be connected via an AI module.
- In MATRIX 2001/2002 control systems connection can be made on the OP21 controller (terminals 12-13) or using the auxiliary point terminals for MATRIX 2001 (see fig. 51 and fig. 52).

6.6.7 Connection of operational status and fault indication

MATRIX			
2001	2002	3001	4001
		✓	

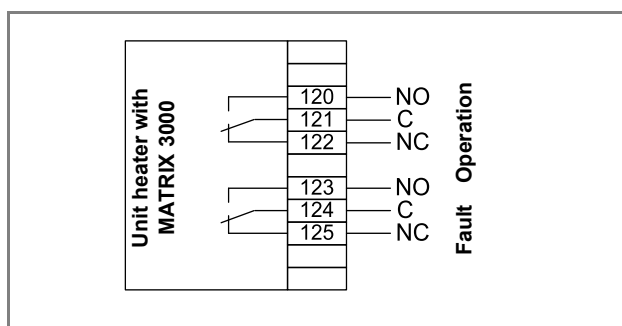


Fig. 6-34: Connection of operational status and fault indication

Control systems make it possible to detect operational status and fault indication via dry contacts. Maximum contact loading at 230 V AC is 4 A resistive / 2 A inductive.

- Connections must be made in accordance with the wiring diagram.

Operation: Closed contact on terminals 120-121.

Fault: Closed contact on terminals 124-125.

6.6.8 Connection of a function input

MATRIX			
2001	2002	3001	4001
		✓	

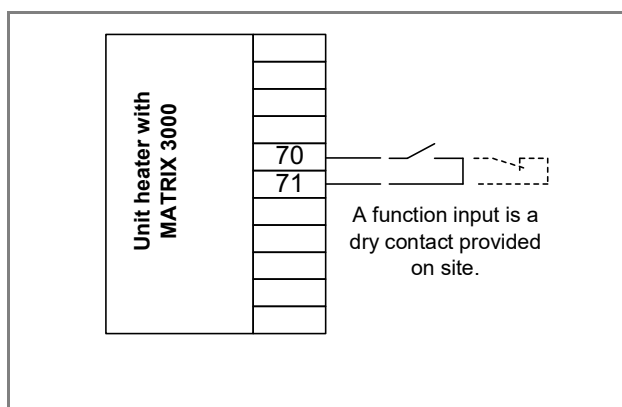


Fig. 6-35: Connection of a function input

A function input can be used to connect various functions which depend on the actual unit configuration.

To activate a function this contact must be:

- closed in economy mode,
- open when unit frost protection is off.

Functions can be changed using the service software MATRIX PC.

- Connections must be made in accordance with the wiring diagram.

The resistance of the loop may not exceed 500 Ω .

6.6.9 Connection of valves 230 V

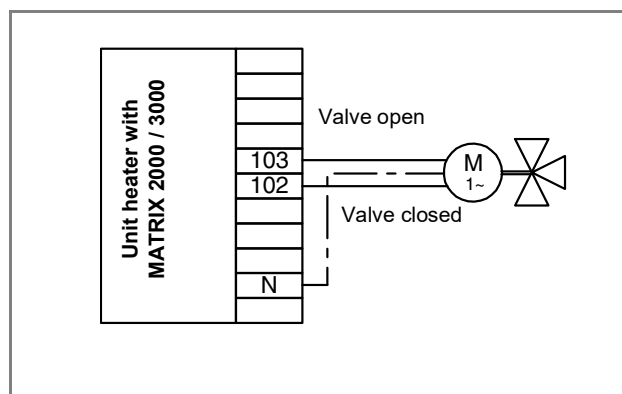


Fig. 6-36: Connection of valves 230 V

MATRIX			
2001	2002	3001	4001

Connection of an external valve actuator

- A valve with a 230 V reversible actuator motor is necessary.
- Depending on the unit's equipment and the configuration of the control system, a valve for a 2-pipe, only Heating / only Cooling / Heating or Cooling system is used.
- Connect the valve actuator in accordance with the wiring diagram.
- Terminal 102: Valve closed
- Terminal 103: Valve open

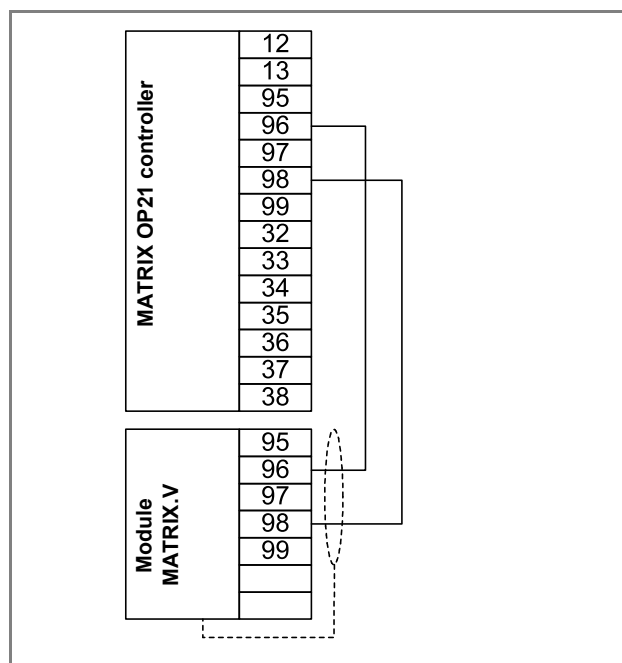


Fig. 6-37: Controller-to-MATRIX.V valve module connection

MATRIX			
2001	2002	3001	4001

Controller-to-MATRIX.V valve module connection

In units with the MATRIX 2002 control system and necessary valve control a separate MATRIX.V valve module must be used.

To connect a MATRIX OP21 controller to a MATRIX.Net network 2-core bus cables must be used.

- The MATRIX.V valve module is used to control external valves.
For more details on valve connection see the MATRIX Global modules manual.
- Connect the bus cables in accordance with the wiring diagram provided.
- As a bus cable we recommend using HELUKABEL, type CAN-BUS 2 x 2 x ... mm²

Note: Only data cables with twisted pair cores and shielding should be used for connection (according to CSN EN 50 170).

6.7 MATRIX. Net network and connection of shielding

This chapter provides information about MATRIX.Net and the proper way to set up a network.

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

The following can be network participants:

- Adjustment controllers
- Controllers
- Global modules
- LON interfaces
- WBE interfaces
- Service software

6.7.1 Group structure

One group consists of at least 2 and up to 20 participants (a controller, 16 unit heaters, a valve module, a DV module, a LON module). For example, one controller and one control panel on the unit constitute a group. A group can also be made up of a LON module and the unit control panel. In units with MATRIX 3000 and MATRIX 4000 control systems the controller can be replaced by a global module such as MATRIX.LON so that even these units form a group.

MATRIX 2000 system group structure

It is possible to create a group with a MATRIX 2000 system as shown in the example on Fig. 6-38.

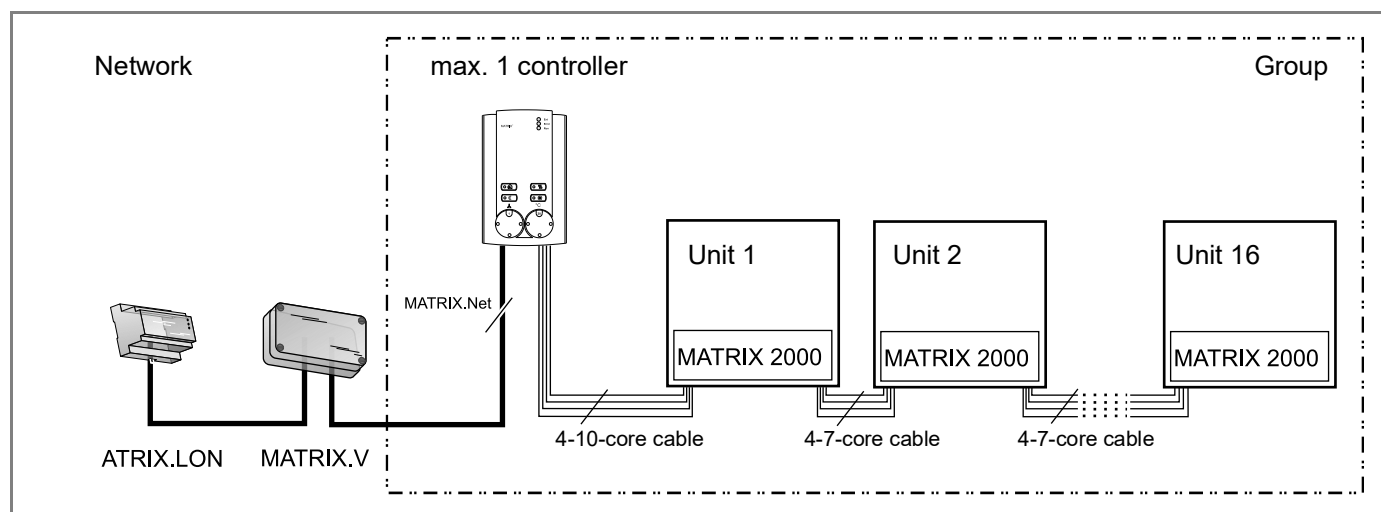


Fig. 6-38: MATRIX 2000 control system group structure

The group address is assigned using the group address button on the controller – see the “MATRIX controller” operation manual, “Commissioning and testing” chapter. A MATRIX OP71 controller is assigned to this group via cluster configuration – see “Cluster configuration sub-menu” in the “MATRIX OP71 controller” operation manual. In the MATRIX.V module, modules (MATRIX.V, MATRIX.LON) are assigned using the group address button; in the MATRIX.LON module using software – see the applicable “Commissioning and testing” chapter in this operation manual and the “MATRIX.LON” operation manual.

The MATRIX.Net network is connected on the controller.

MATRIX 3000 system group structure combined with a MATRIX 2000 system

A group can be created with MATRIX 2000 and MATRIX 3000 systems. Fig. 6-39 The example shows a network consisting of a controller, MATRIX 2000 and MATRIX 3000 systems and various global modules.

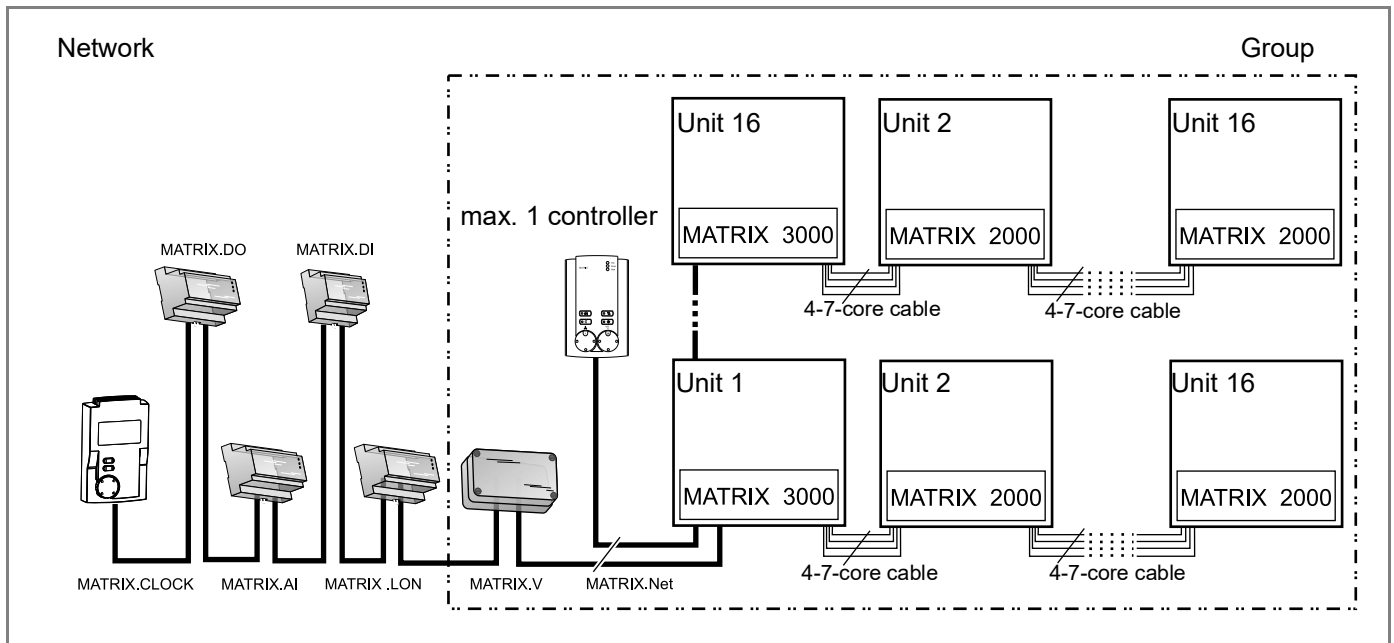


Fig. 6-39: Group structure combining MATRIX 2000 and MATRIX 3000 controller types

The group address is assigned:

- using the group address button on the controller – see the “MATRIX controller” operation manual, “Commissioning and testing” chapter.
- on the MATRIX 3000 PCB – see the operation manual.

A MATRIX OP71 controller is assigned to this group via cluster configuration – see “Cluster configuration sub-menu” in the “MATRIX OP71 controller” operation manual. MATRIX.LON module data are assigned using configuration on the LON side. A MATRIX.V module can be connected to this group by the group address button – refer to the “Commissioning and testing” chapter in this operation manual and the “Global module MATRIX” operation manual.

Units 2-16 can be arranged in any sequence.

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

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

If a system includes global modules such as MATRIX.LON, DI, DO, AI and OP71 and they are used to provide the necessary operation parameters and required values, a controller can be left out.

Group structure with MATRIX 3000 and/or MATRIX 4000 systems

A group can be created with MATRIX 3000 and MATRIX 4000 systems. fig. 6-40 The example shows a network consisting of a controller, MATRIX 3000 and MATRIX 4000 systems and various global modules.

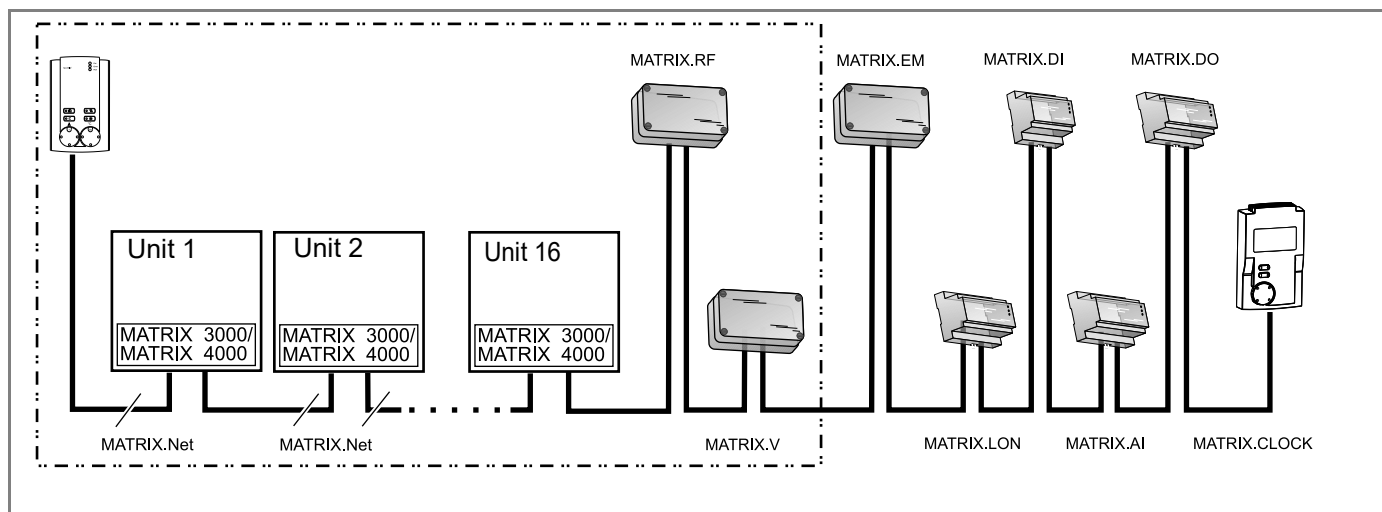


Fig. 6-40: Group structure combining MATRIX 3000 and MATRIX 4000 controller types

Controllers / units can be arranged in any desired sequence. It is also possible to exclusively use a MATRIX 3000 or MATRIX 4000 system.

We recommend putting the controller in the first position in the group.

The group address is assigned:

- using the group address button on the controller – see the “MATRIX controller” operation manual, “Commissioning and testing” chapter.
- on the MATRIX 3000 / 4000 PCB – see the operation manual.

A MATRIX OP71 controller is assigned to this group via cluster configuration – see “Cluster configuration sub-menu” in the “MATRIX OP71 controller” operation manual. MATRIX.LON module data are assigned via LON configuration.

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



Attention!

In this group structure it is possible to combine units with MATRIX 3000 and MATRIX 2000 systems – see “MATRIX 3000 system group structure combined with a MATRIX 2000 system” on page 59. Units with MATRIX 4000 and MATRIX 2000 systems cannot be combined.

6.7.2 MATRIX.Net network structure

The network can consist of one or more (up to 16) groups. Global modules can be integrated into the network later. A MATRIX.Net system network configuration / topology must be created in a line structure – see “MATRIX.Net network topology” on page 62. An example of the maximum MATRIX.Net network structure is shown in Fig. 6-41.

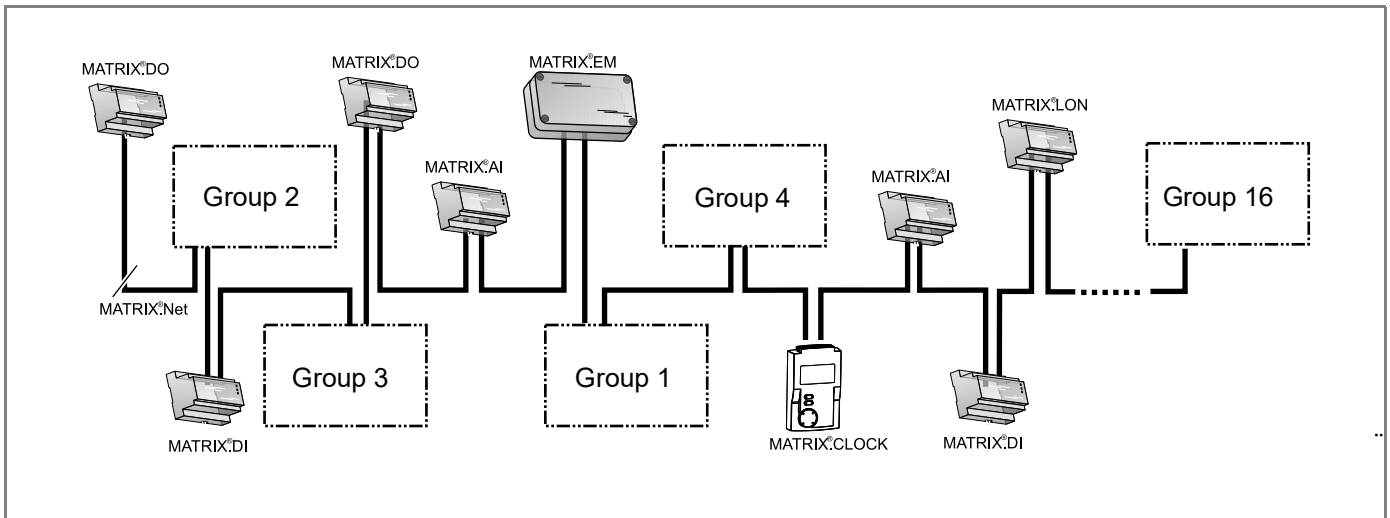


Fig. 6-41: Maximum network structure example

- Up to 16 groups of units – see “MATRIX.Net network topology” on page 62.
- 2 modules with digital input (MATRIX.DI)
- 2 modules with analogue input (MATRIX.AI)
- 2 modules with digital input (MATRIX.DO)
- 1 exhaust fan module (MATRIX.EM)
- Up to 16 modules LON modules (MATRIX.LON).
- Up to 1 MATRIX.LON module in 1 group
- 1 group controller (MATRIX OP71) *

* If a control module (LON module) logs into a group which is connected to a MATRIX OP71 cluster, a conflict of addresses occurs. Therefore, the LON module and the MATRIX OP71 controller should serve different groups.

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

- the setting of the group address button (see the “Commissioning and testing” chapter in this operation manual)
- and assigning the input and output on the module to the group of units using the service software MATRIX PC (see Online help for the service software MATRIX PC)

and the physical arrangement.

6.7.3 MATRIX.Net network topology

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

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

6.7.4 Line structure

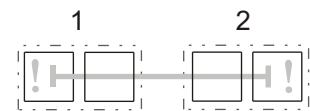


Fig. 6-42 shows a MATRIX.Net system configuration with a line structure. For example: in this case two groups are each in a network with one controller and global module.

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

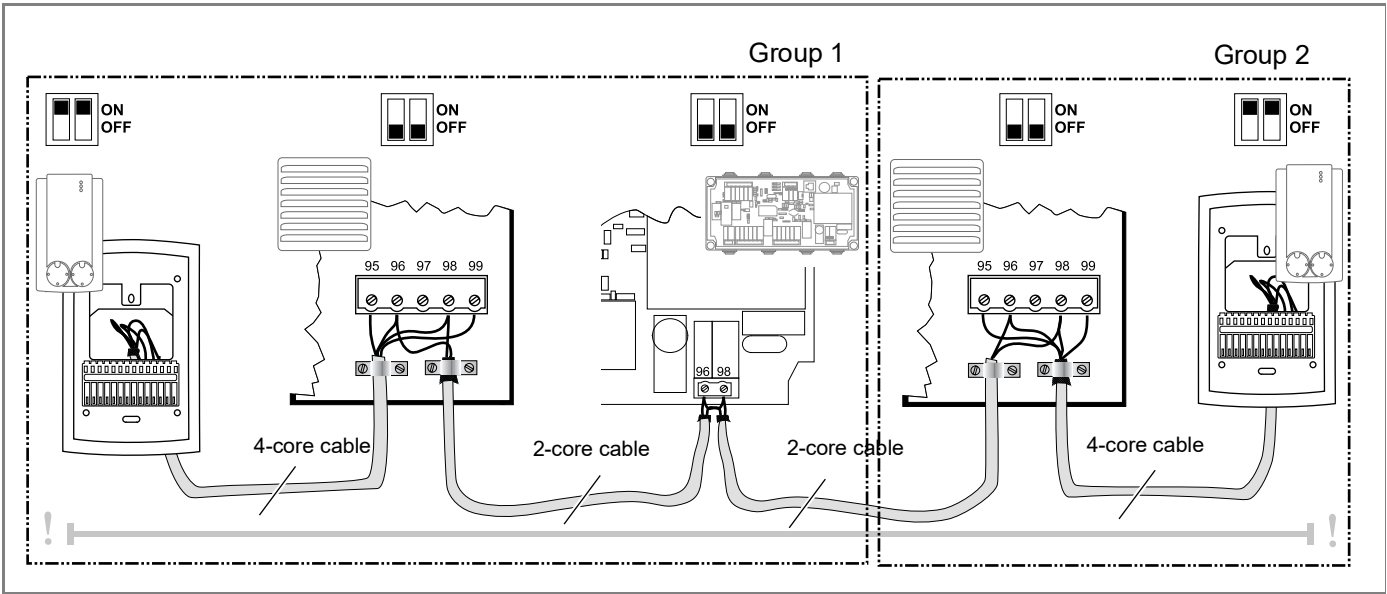


Fig. 6-42: MATRIX.Net network configuration with a line structure



Attention!

The data cable must be routed as shown in Fig. 6-42 so that the shielding is applied along one side only – see “Shielding / earthing” on page 65.

6.7.5 Line structure with branches

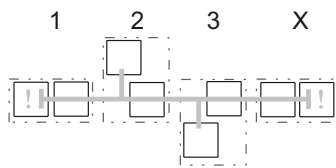


Fig. 6-43 shows a MATRIX.Net system configuration with a line structure with a branch. The example shows the connection of the controller via a branch in multiple groups. The maximum permitted branch length is 25 metres.

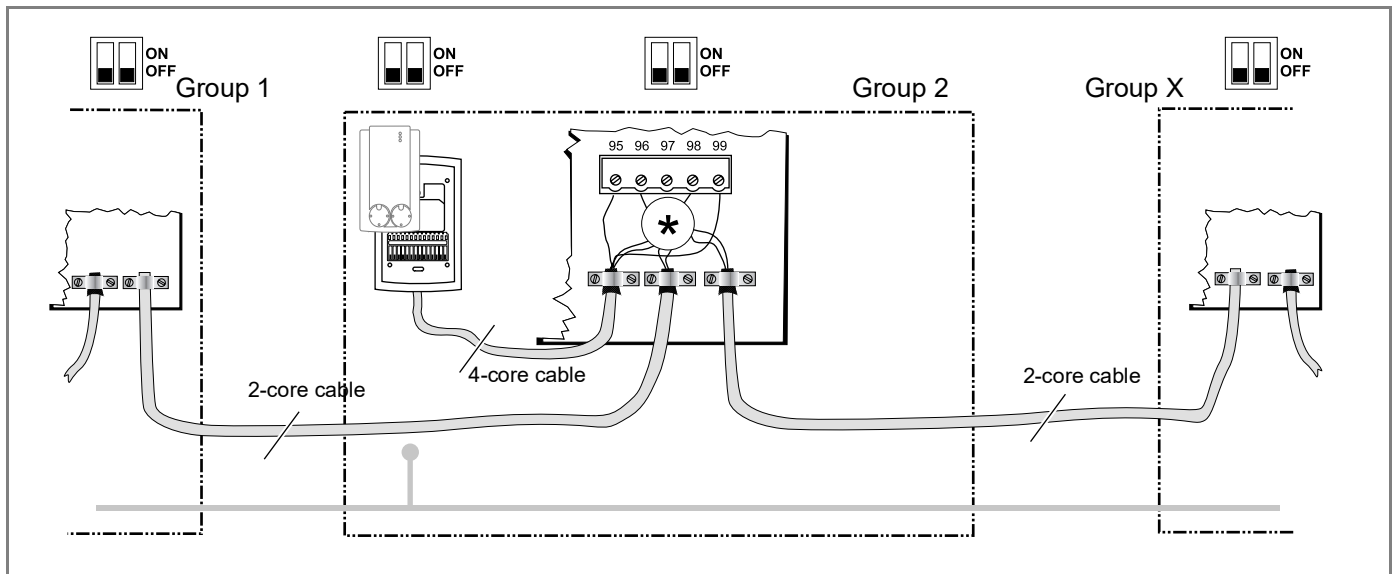


Fig. 6-43: MATRIX.Net network configuration with a line structure with a branch

**As connecting 3 cable cores via terminals is not permitted, the use of an intermediate terminal must be contemplated. The auxiliary terminals (STV) on the PCB can be used for that purpose, unless they are already occupied, or dedicated terminals on site.*



Attention!

The data cable must be routed as shown in Fig. 6-43 so that the shielding is applied along one side only – see “Shielding / earthing” on page 65.

6.7.6 MATRIX.Net network configuration

Data cable

To create a MATRIX.Net network only data cables with twisted pair cores and shielding should be used (e.g. according to DIN 19245 T3).



Attention!

We recommend that the following data cable be used:
e.g. HELUKABEL, type: CAN-BUS 2 x 2 x ... mm²

Line length

Regardless of the cross-section and the number of participants, the maximum line length including branch feeders must not exceed 600 metres.
The length of one branch feeder must not exceed 25 metres.
The total length of all branches must not exceed 150 metres.



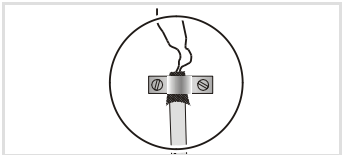
Attention!

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

The cross-section of the bus cable must always be adapted to the MATRIX.Net network line length.

Line length	Line type
Up to 50 m	2 x 2 x 0.22 mm ² * 1 x 2 x 0.22 mm ²
Up to 600 m	2 x 2 x 0.5 mm ² * 1 x 2 x 0.5 mm ²
* The cable includes 2 cores for the power supply of the controller or modules.	

Shielding / earthing



- The data cable (MATRIX.Net) for FläktGroup units is connected to a terminal at one end to ensure the best possible electrical contact.
- The shielding and shielding terminal should be connected to the frame in such a way that maximizes the contact surface area!

In systems with a large network, or if large-scale EMC impairment is likely, the shielding should be applied at each end of the cable. Ensure beforehand that there is no difference in potential.

7 Commissioning



Risk of electrocution!

Before performing any work on the unit, ensure that the unit is disconnected from the power supply. Ensure that the unit cannot be restarted by securing the on-site power supply.



Risk of scalding!

Before commencing work on air conditioning units:

Before conducting any work on valves or connections, shut off the supply of heating medium.

Secure the stop valves against inadvertent opening.

Do not start work until the heating medium has cooled down.



Risk of injury from rotating mechanical parts!

Risk of injury from rotating fan wheels!

Before performing any work on the unit, ensure that the unit is disconnected from the power supply. Ensure that the unit cannot be restarted by securing the on-site power supply.

7.1 Safety test

7.1.1 Pre-commissioning check list

- The mechanical and electrical installation of the system that this Multi Flair unit heater is part of has been completed.
- The system and the Multi Flair unit are de-energised.
- All media lines have been flushed and are free of residue and foreign objects.
- The system is properly filled with the medium (see “Use” on page 9).



Attention!

Before commissioning make sure that

- the unit discharge (heat exchanger)
 - condensate pans and condensate pump suction (optional)
 - and filters
- are clean.

If necessary, these parts must be cleaned / filters replaced.

7.1.2 Before commissioning, the following checks must be carried out:

- Check that the Multi Flair unit is properly mounted and secured in the ceiling.
- Manually check that actuators are securely mounted.
- Tighten all media threaded connections.
- Use wiring diagrams to check all electrical connections and check that terminal block screws are tightly secured.
- Open the valves on the piping.
- If the medium lines/heat exchanger are empty following installation, refill and bleed them.
- Make sure that all pipes and connections are tightly secured.

7.1.3 Setting secondary air fins

- Hold the air fin profiles on the top right and bottom left sides simultaneously.
- Move the fin profiles simultaneously in the required position.

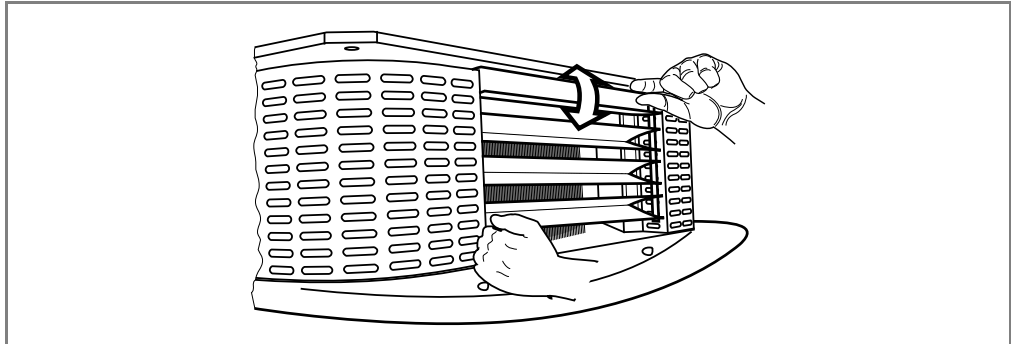


Fig. 7-1: Setting secondary air fins



Attention!

The discharge air direction must be set in such way as to prevent air draughts!

7.1.4 Following commissioning:

- Close the terminal box and mount corner covers.

7.2 Bleeding the heat exchanger

To make sure the heat exchanger is filled with a heating / cooling medium, any trapped air must be released.



Attention!

Protect electric devices and furniture from splashing water.

- Open all shut-off and stop valves.
- Using a bleeding key open the bleed screw (see fig. 7-2).
- If only the medium starts flowing out, close the bleed screw again.
- Repeat these steps with all bleed screws.

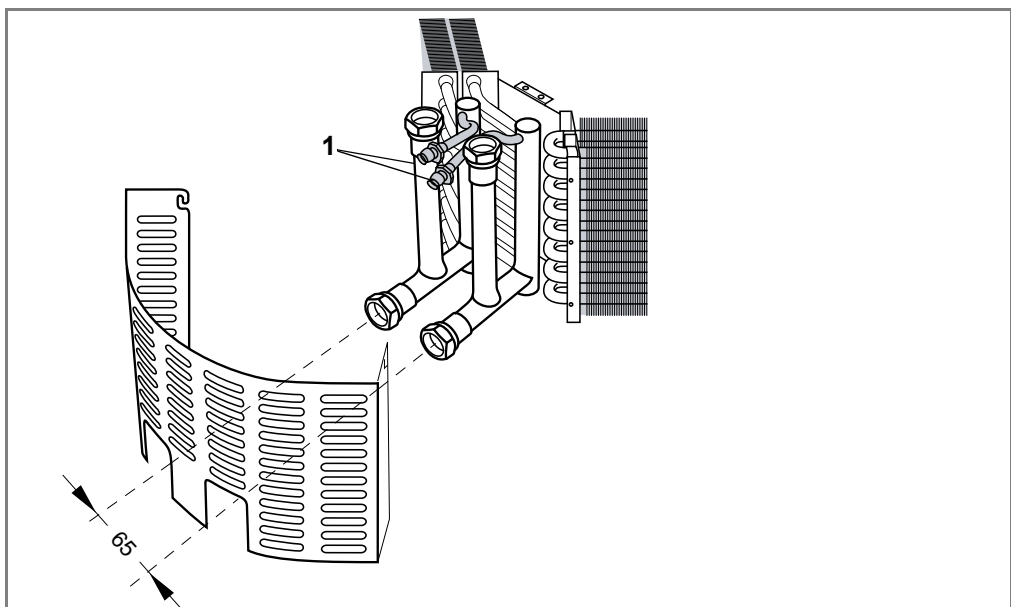


Fig. 7-2: Bleeding the heat exchanger
Pos. 1: Bleed screw

7.3 Condensate pump check (only in cooling)



Attention!

To prevent the transmission of structure-borne noise, suction and pressure lines must be routed in such a way that there is no contact between the base unit and pipework.

Before commissioning make sure that

- the unit discharge (heat exchanger)
- the condensate pan and the condensate pump space
- and filters are clean.

If necessary, these parts must be cleaned / filters replaced.

7.3.1 Condensate pump test

When the unit is running, condensate forms on the uninsulated sections of the pipework.

- Check that
 - the supply pipes upstream of the condensate pan are laid in such a way that the pan collects all condensate.
 - the condensate pan is clean and secure.
- If you have not done so, start the power supply.
- Check the condensate pump for proper function.
 - To do that fill the condensate pan with water until the pump starts.
 - After a short while, once the water has been almost pumped away, the pump should stop.

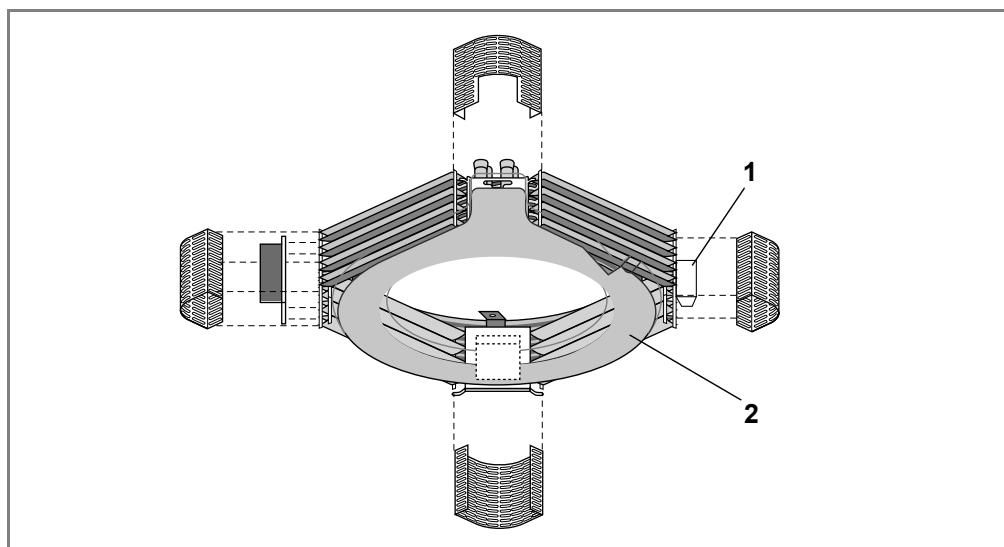


Fig. 7-3: Condensate pump test

Pos. 1: Condensate pump

Pos. 2: Condensate pan

7.4 Terminating resistors

MATRIX			
2001	2002	3001	4001
✓	✓		

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

The terminating resistors must be activated or deactivated on the control panel (controller) only if a MATRIX.Net network is to be established or additional modules such as input and output modules are to be connected.

Activation of terminating resistors at the beginning and end of the line (fig. 7-4):

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

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

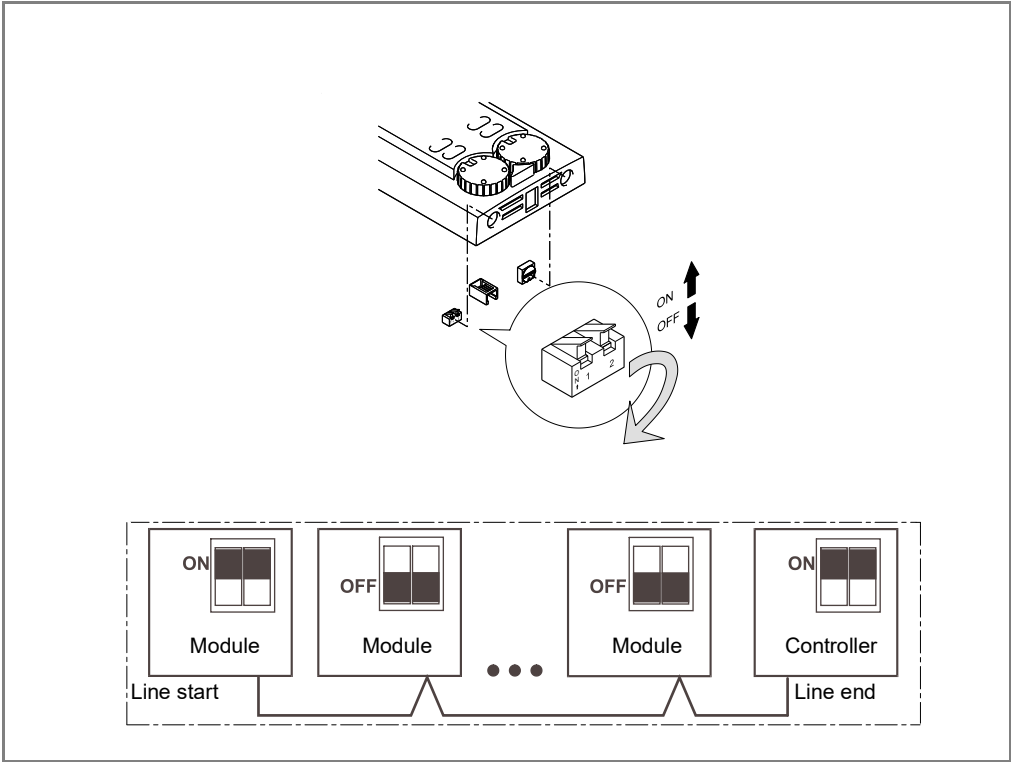


Fig. 7-4: Setting terminating resistors

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



Attention!

The default setting of the DIP switches from the factory are “ON/ON” and must be switched off if used with the first and last unit.

MATRIX			
2001	2002	3001	4001
		✓	

The printed circuit boards of the MATRIX 3000 control system and MATRIX OP3X/44/5X are equipped with terminating resistors.

Activation of terminating resistors at the beginning and end of the line (fig. 7-5):

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

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

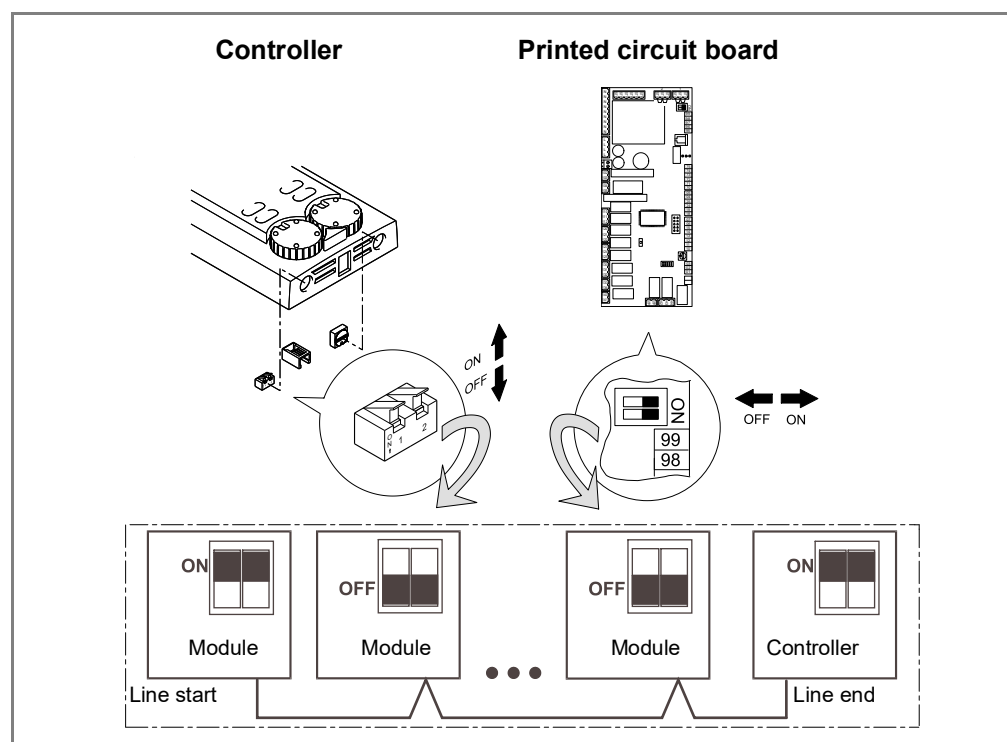


Fig. 7-5: Setting terminating resistors

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



Attention!

The default setting of the DIP switches from the factory are “ON/ON” and must be switched off if used with the first and last unit.

7.5 Address settings

MATRIX			
2001	2002	3001	4001
✓	✓		

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

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

Single group (without networking multiple unit groups)

- On the control panel, set the address to “0” (factory default setting). The MATRIX.V module must also have its address set to “0”.

Networking multiple groups

- On the control panels, 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.



Attention!

Assigning duplicate addresses causes malfunctions.
The default setting for the group address switch is “0” and must be changed if required.

1 2 3

Group addresses:

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

Fig. 7-6: Setting the address on the controller
Pos. 1: Group 0 controller (address 0)
Pos. 2: Group 1 controller (address 1)
Pos. 3: Group 2 controller (address 2) etc.

MATRIX			
2001	2002	3001	4001
		✓	

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

Single group (without networking multiple unit groups)

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

Networking multiple groups

- On the control panels, 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.



Attention!

Assigning duplicate addresses causes malfunctions.

The default setting for the group address switch is “0” and must be changed if required.

Controller

Printed circuit board

Group addresses:

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

1

2

3

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

Pos. 1: Controller, Multi Flair group 0 (address 0)

Pos. 2: Controller, Multi Flair group 1 (address 1)

Pos. 3: Controller, Multi Flair group 2 (address 2) etc.

7.6 Starting the unit



Risk of electrocution!

The terminal box is open.

Tampering with the terminal box is prohibited!

Before starting the unit, the terminal box must be properly closed (see “Electrical connections” on page 33).

- Start the power supply.
- The unit is started using a MATRIX controller, a FläktGroup controller or an external controller. For instructions on how to control the unit see the user manual of your controller.
- Start the unit using the controller.
- Test the fan speed.

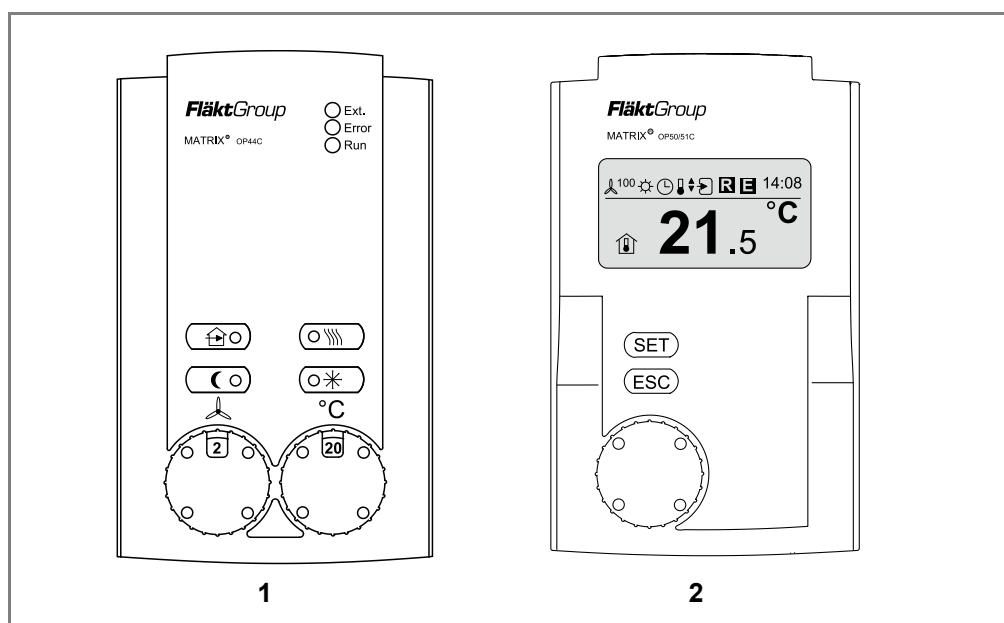


Fig. 7-8: Starting the unit on the controller

Pos. 1: MATRIX OP44C controller

Pos. 2: MATRIX OP50/51C controller



Attention!

The position of the speed selector (OP5X/OP21X/OP3XX/OP4XX only) can be mechanically limited.

This limitation should be set in such a way that the maximum fan speed corresponds to that of the unit.

For the instructions on how to set this limitation see the user manual of your controller.

7.7 Data connection check



Risk of electrocution!

Before correcting any data connection faults, power down the entire system. Ensure that the unit cannot be restarted by securing the on-site power supply.

7.7.1 Checking control cables

MATRIX			
2001	2002	3001	4001
✓	✓	✓	

The data/commands are transmitted via control cables. Depending on the unit's equipment, the cables must be connected / checked in accordance with the wiring diagram enclosed with the unit's terminal box (see "Connecting control cables" on page 50).

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

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

7.7.2 Checking data lines

MATRIX			
2001	2002	3001	4001
		✓	

Data communication takes place via a 2/4-core data cable. This must be connected / checked in accordance with the wiring diagram enclosed with the unit's terminal box (see "Connecting bus cables" on page 53).

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

LED colour	LED status	Operational status	Action / remedy
Yellow	On	Power supply to electronics OK	–
	Off	Power supply to electronics not OK	Check the 230 V power supply on the unit.
Green	On	The operating system and controller software have been started and are working properly	–
	Off	Defective software or processor	Replace the PCB
Red	Permanently on	Electronic fault	Disconnect the PCB from the power supply and wait for a while. Reconnect the PCB. If the fault indication is still present, replace the PCB.
	Flashing	Data bus fault	Check the connection of the data cables and the setting of the terminating resistors on all units.

Tab. 7-1: Operational status and troubleshooting the data connection (MATRIX 3000)

7.8 Checking control inputs and outputs

MATRIX 3000 control systems have control inputs and outputs. When checking control inputs and outputs, pay attention to the factory settings. To see what functions your control system has, refer to the unit’s wiring diagram (enclosed in the terminal box).

Configuration changes made on site (via MATRIX.PC servicing software) are not covered here.

7.8.1 Functional input

MATRIX			
2001	2002	3001	4001
		✓	

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

Door contact (units with frost protection)

- Couple the input terminals using a jumper.
- Switch on the unit and adjust the temperature setting as required to activate the fan.
- Open the jumper.
- ✓ The fan must stop and valves close (the unit remains in frost-protection monitoring mode).

Economy mode

- Switch on the unit and adjust the temperature setting as required to activate the fan.
- Couple the input terminals using a jumper.
- The fan must stop and valves close.
The required economy mode value must be set as necessary (the unit remains in frost-protection monitoring mode).

7.9 Functions when used with the MATRIX control system

7.9.1 Fan

The fan is operated according to the control system configuration and the control mode selected on the unit's controller. The following fan modes can be set:

- Manual fan control
- Automatic fan control
- Automatic fan control in economy mode

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

- Motor thermal monitoring triggered
- Insufficient operating data due to a sensor fault
- Defective hardware

Manual control

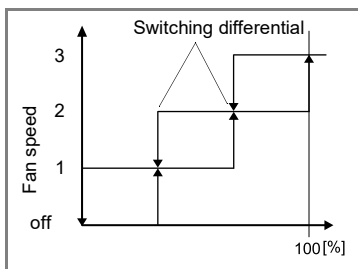
The fan runs at the pre-set fan speed. The fan speed can be set via the controller, control electronics or via external modules (e.g. digital input module MATRIX.DI).

Automatic control

The fan is controlled based on the difference from the temperature setpoint. In economy mode the top speed level of the fan is blocked.

The fan speed is controlled based on a difference between the required and actual temperature. The control system's response is affected by both the size and duration of the deviation. In multi-speed fans the switching deviations are determined by speed-change points.

The number of available levels in multi-speed and continuous-control electric motors depends on the type of the unit.



Available versions:

- Number of fan speed levels: 0...3-speed fans
- Number of fan speed levels: 0...2-speed fans (only MATRIX 2002)

Recirculating function

This function enables the fan to remain on irrespective of the selected control mode if the temperature setpoint has been reached. The fan speed must be selected manually. This should ensure optimum air circulation in the room. This function is supported only by MATRIX OP50 and MATRIX OP51 controllers and servicing software MATRIX.PC.

7.9.2 Valves

Depending on the selected equipment of the MATRIX control system the integrated valve controller supports the control of 2-way and 3-way valves.

Valve control is available in the following operating modes:

- Heating
- Cooling
- Heating or Cooling

In order to reach a common starting position the factory-set synchronization moves all connected valves (only in 3-point control) every 12 hours to the OPEN or CLOSE position.

7.9.3 Condensate pump

The condensate pump is used to drain the condensate which is formed in cooling units. The condensate pump starts when necessary based on humidity sensor readings.

When the condensate limit level is exceeded, the fan stops, the valve in the cooling circuit closes and the controller displays an error message.

7.9.4 Standby mode

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

The standby mode is activated if a room-temperature sensor is connected but no room temperature setpoint – i.e. no controller – is available (e.g. during the time when the building is being dried out).

The standby mode is interrupted once the room temperature setpoint has been entered.

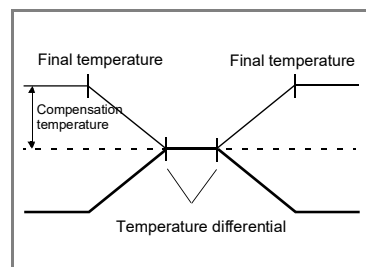
7.9.5 Indoor frost protection

This function protects the room from freezing temperatures when the unit is switched off.

At room temperatures $< 4^{\circ}\text{C}$, the valve is fully opened and the fan starts running at the lowest speed level regardless of the inlet media temperature.

Once room temperatures reaches $> 6^{\circ}\text{C}$, the valve closes and the fan stops. The control system returns to the standard mode of control.

7.9.6 Summer / winter compensation



This function requires an outside temperature sensor.

This function adjusts the required room temperature in relation to outside temperature.

Example:

Starting from 26°C outside temperature, a request is made for the room temperature to increase by 0.5°C for each 1°C increase in outside temperature. The room temperature should not increase any further if the outside temperature reaches 32°C . Consequently, 26°C should be entered as the starting temperature and 32°C as the final temperature. (final temperature – starting temperature) * 0.5°C (an increase in $^{\circ}\text{C}$ in relation to outside temperature):

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

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

7.9.7 Filter replacement indication

This function calculates the degree of filter contamination using the time of operation of each of the fan speed levels. When the filter needs replacing, this is indicated as a warning message displayed or confirmed on the display of the MATRIX OP50 / MATRIX OP51 controller.

The “Filter replacement” indication appears once the filter’s service life has expired or the minimum service interval has been exceeded or by a contact signal from a differential pressure switch.

After this warning message has been confirmed, a new filter service life count begins.

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

8 Maintenance and troubleshooting

**Attention!**

Maintenance may only be carried out by qualified staff following the instructions in this user manual and the applicable regulations.

**Risk of injury from rotating mechanical parts!**

Risk of injury from rotating fan wheels!

Before performing any work on the unit, ensure that the unit is disconnected from the power supply. Ensure that the unit cannot be restarted by securing the on-site power supply.

**Risk of scalding!**

Before commencing work on air conditioning units:

Before conducting any work on valves or connections, shut off the supply of heating medium.

Secure the stop valves against inadvertent opening.

Do not start work until the medium has cooled down.

**Risk of electrocution!**

Power down the unit before carrying out any kind of work that involves removing any covers. Ensure that the unit cannot be reconnected by securing the on-site power supply.

8.1 Maintenance

Multi Flair unit heaters are high-quality and reliable devices. In order to guarantee the durability and trouble-free performance of your Multi Flair unit, regular maintenance and inspection must be performed by technical experts.

**Attention!**

The manufacturer's warranty will become void if damage is attributed to a failure to carry out regular maintenance and inspections.

For this reason, written maintenance records, according to the table below, are to be kept to maintain the warranty.

8.2 Regular maintenance interval schedule

The following maintenance must be performed at the intervals specified in this schedule.

Components	Maintenance interval			
	Quarterly	Semi-annually	Annually	Before the cooling period
Filter inspection	x			
Heat exchanger cleaning *			x	
Inspection of hydraulic line threaded connections**			x	
Inspection of electrical connections			x	
Earthing inspection			x	
Bleeding the heat exchanger**			x	
Condensate drain inspection and condensate pan cleaning**			x	
Condensate pump performance inspection			x	x
* if necessary, clean and remove foreign objects				
** depending on the model				

Tab. 8-1: Regular maintenance

8.3 Quarterly maintenance

8.3.1 Filter cleaning / replacement

When checking and replacing the filter according to fig. 8-1 proceed as follows:

- Open the rotary catches and remove the filter cover panel.
- Remove the filter cassette.
- Replace or clean the filter mat. Wash the filter mat in lukewarm water with a mild detergent.



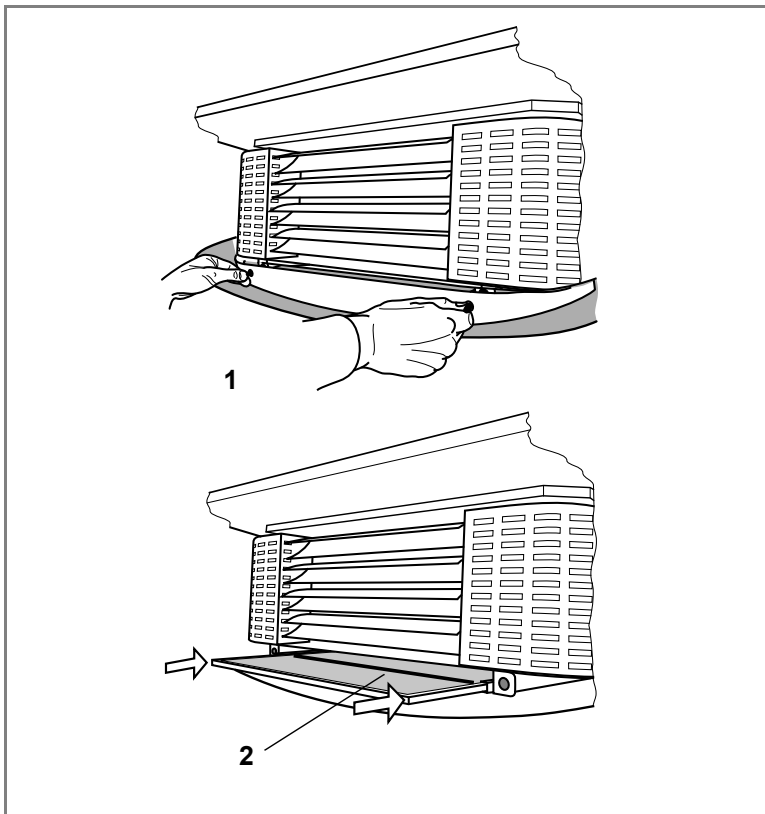
Attention!

Do not use any solvents to clean the filter!

The best results will be achieved by installing a new filter.

A spare filter set (2 pieces) can be ordered from FläktGroup under codes 4622 10 to 30.

- Insert the filter cassette so that its transverse wire brackets face upwards.
- Close the filter cover panel.



Pos. 1: Open the filter cover panel

Pos. 2: The transverse wire brackets must face upwards

Fig. 8-1: Filter cassette removal and installation

8.4 Annual maintenance

8.4.1 Cleaning the heat exchanger

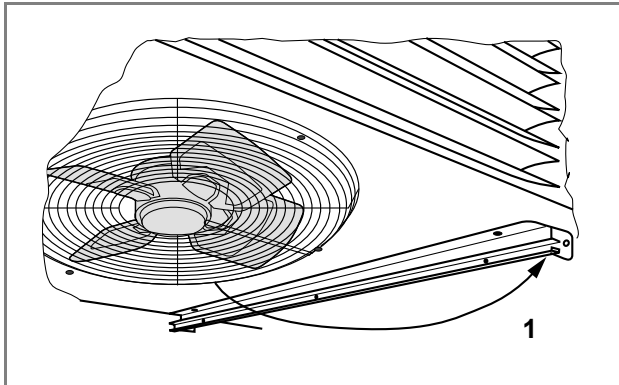


Fig. 8-2: Removing the fan

- After removing the motor at the bottom of the unit, it is possible to use that space to clean the inside of the heat exchanger including the suction area.



Attention!

When cleaning the heat exchanger be careful not to bend or damage the fins.

8.4.2 Checking hydraulic threaded connections

- Check that the inlet and outlet hydraulic threaded connections are leaktight.
- Manually check that actuators are securely mounted.

8.4.3 Condensate pump test

- Check the condensate pump for proper function as described in chapter 7.3.

8.4.4 Checking electrical cables and earthing



Risk of electrocution!

Before conducting the following work disconnect the unit from the power supply and ensure that the unit cannot be reconnected by securing the on-site power supply. Before leaving the unit, the terminal box must be properly closed (see chapter 6.2).

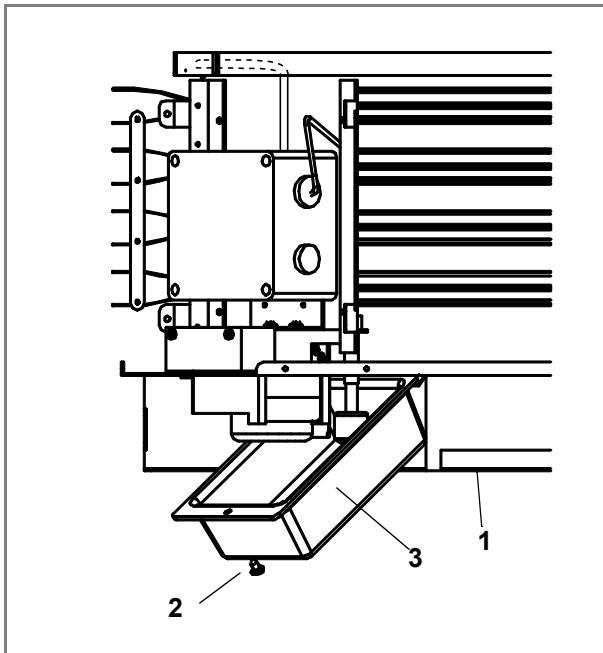
- Open the terminal box.
- Check that connections on the terminal blocks are secure.
- Use an appropriate measurement instrument to check the unit for proper earthing.
- Close the terminal box.

8.4.5 Heat exchanger bleed check

- Bleed the heat exchanger as described in chapter 7.2.

8.4.6 Condensate pan and condensate pump cover cleaning

- Clean the condensate pan.
- Check and clean the main condensate pan drain point. This may include cleaning the condensate drain / condensate pump cover and the non-return valve.



- Loosen the screw (pos. 2).
- Tilt the condensate pump cover (pos. 3) downwards.
- Clean the condensate pump cover.
- Close the condensate pump cover again properly.
- In units without a condensate pump the condensate drain must be opened first (pos. 1).

Pos. 1: Condensate drain

Pos. 2: Screw

Pos. 3: Condensate pump cover

Fig. 8-3: Condensate pump lid cleaning

8.5 Before the cooling period

8.5.1 Condensate pump performance inspection

- Check the condensate pump for proper function as described in chapter 7.3.

8.6 Filter retrofitting

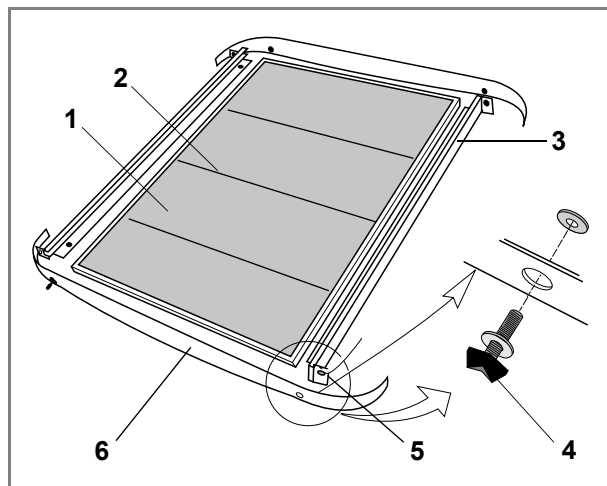


Fig. 8-4: Filter

Pos. 1: Filter cassette with filter mat

Pos. 2: Transverse wire brackets (wire brackets face the unit side)

Pos. 3: 2 guide rails

Pos. 4: 4 screws with plastic heads

Pos. 5: Rivet nut

Pos. 6: 2 filter covers

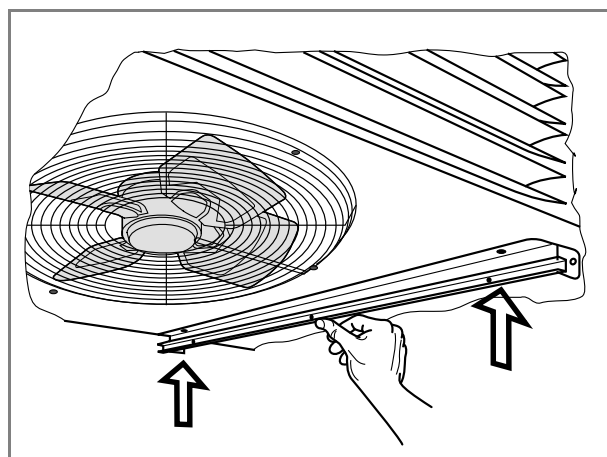


Fig. 8-5: Guide rail installation

The filter is installed onto the bottom of the unit.

- Screw the guide rails onto the bottom of the unit (holes are pre-drilled, self-tapping screws 4.8 x 9.5 mm are provided).
- Insert the filter mat with wire brackets so that it faces the unit.
- Insert the plastic-head screws through the filter cover panel and screw them into the rivet nuts.



8.7 Operational faults

Exceptions to the normal operating conditions of the unit heaters indicate a malfunction and as such must be investigated by maintenance personnel.

The following table should serve as a starting point for maintenance personnel regarding the possible causes of a malfunction and troubleshooting it.

Fault	Cause	Troubleshooting
Fan not working Fan switch (optional) is on Fan speed switch LED (1-2-3) and I/O LED on MC4 controlled is not on	The unit has not been started	Start the unit
	No power supply	Check circuit breakers/power supply connection (only qualified personnel)
	Electric cables not connected	Connect electric cables (only qualified personnel)
	Faulty circuit breaker	Change the fuse (only qualified personnel)
	The controller disconnected the fan after room temperature had been reached	See the MATRIX or 985... series controller operation manual
The unit is excessively noisy	Set speed too high	Reduce speed settings
	Blocked air intake or exhaust	Clear air intake / exhaust
	Fan bearing noise	Replace faulty fan (only qualified personnel)
	Clogged filter	Clean / replace the filter
The unit is not heating / heating insufficient	The fan has not been started	Start the fan
	Low air flow rate	Increase fan speed
	Blocked air intake or exhaust point	Unblock or clean the air duct
	Faulty / blocked fan	Check / replace the faulty fan (only qualified personnel)
	Clogged filter	Replace or clean the filter
	Heating medium not hot	Start the heating appliance (boiler)
		Start the circulation pump
		Bleed the unit
	Low medium flow rate	Check power to the pump (only qualified personnel)
		Check line balancing and adjust using the calculated pressure drop (only qualified personnel)
	Selected temperature setpoint of the controller too low	Increase the temperature setpoint on the controller
	Controller / sensor located above heat source or exposed to direct sunlight	Move the controller / sensor to a more appropriate position (only qualified personnel)
	Control valve fails to open	Replace the faulty valve (only qualified personnel)

Fault	Cause	Troubleshooting
The unit is not cooling / cooling insufficient	The fan has not been started	Start the fan
	Blocked air intake or exhaust point	Unblock or clean the air duct
	Low air flow rate	Increase fan speed
	Faulty / blocked fan	Check or replace the faulty fan see page 81 (only qualified personnel)
	Clogged filter	Replace or clean the filter
	Cooling medium is not chilled	Start the chiller unit
		Start the circulation pump
		Bleed the unit
	Low medium flow rate	Check the power to the pump (only qualified personnel)
		Check line balancing and adjust using the calculated pressure drop (only qualified personnel)
Water leak in the unit	Selected temperature setpoint on the controller / thermostat too high	Set the temperature setpoint on the controller / thermostat lower
	Controller / sensor located in a cold air zone	Move the controller / sensor to a more appropriate position (only qualified personnel)
	Control valve fails to open	Replace the faulty control valve (only qualified personnel)
	Dirty condensate pan	Clean the condensate pan and condensate drain
	Clogged condensate drain	Clean the condensate drain
	Coolant line not (properly) insulated	(Properly) insulate the coolant line
	The unit is not installed horizontally	Level the unit and install it horizontally (only qualified personnel)
Control system keeps starting	Leaking heat exchanger and connections	Check heat exchanger connections for leak-tightness, check bleeding and valves
		Check valves for free movement, clean sealing surfaces / replace seals (only qualified personnel)
		Check heat exchanger welded connections for leaktightness, replace the heat exchanger if they are not leaktight (only qualified personnel)
	Controller / thermostat / sensor located in an inappropriate measuring point (e.g. by an open door)	Position the controller / thermostat / sensor in an appropriate location (only qualified personnel)
Control system keeps starting	Heating medium temperature too high / low	Adjust the external temperature curve on the controller (only qualified personnel)
	Coolant temperature too high / low	Adjust the inlet temperature on the controller (only qualified personnel)
	Other heating elements with individual controls are in the same pipe line (e.g. radiators with thermostat valves)	Separate media lines (only qualified personnel)

Fault	Cause	Troubleshooting
Condensate pump		
The fan is not running Red controller LED: Flashing light codes:  = TC fault  = condensate pump fault	The thermal contact (TC) of the fan motor and/or alarm contact of the condensate pump are active/tripped Fan stopped Power electronics/controller and/or fan faulty	Check the fan motor thermal contact of the fan motor (connection) Replace the electronics and/or fan motor (only qualified personnel)
	Faulty T630 mA fuse	Change the fuse (only qualified personnel)
	Faulty condensate pump coil	Change the fuse (only qualified personnel)
Water leaking from the unit, no fault indicated	Faulty T630 mA fuse	Change the fuse (only qualified personnel)
Water leaking from the unit, the pump is (nearly) still running	Pump head too high	Lower pump head
	Pump hose on the pressure side clogged	Clear or replace the hose
Condensate pump not running	Faulty condensate pump thermal contact	Replace the condensate pump (only qualified personnel)
	Faulty condensate pump coil	Replace the condensate pump (only qualified personnel)
	Loose terminals	Reconnect terminals (only qualified personnel)
Condensate pump too noisy	The pump is not taking in condensate	Replace the condensate pump (only qualified personnel)
	Suction or pressure hoses not properly secured (or noise propagation through the unit)	Secure hoses properly, prevent noise from propagating through the unit
	Loose condensate pump	Tighten the condensate pump connections.
Pump run time too short; too little condensate taken in	Thermal contact opens due to pump overheating	Replace the condensate pump (only qualified personnel)
Unit and condensate pump too noisy (vibration)	Loose condensate pump	Tighten the condensate pump connections.
	Condensate pump drawing in air	Properly position or clean the suction hose / condensate pump suction unit
	The unit is not installed horizontally	Level the unit

Tab. 8-2: Faults and troubleshooting

**Attention!**

If a fault cannot be rectified by maintenance personnel, contact an authorised service centre.
 We recommend having a service agreement in place with a FläktGroup-trained service company.

EC DECLARATION OF CONFORMITY

pursuant to Directive 2006/42/EC of the European Parliament and of the Council (government regulation No. 176/2008 Coll.)
(original EC Declaration of Conformity) 2021/068/5AB24236

Manufacturer:

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

Entity authorized to compile technical documentation:

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

Description and identification of machinery:

Heating units

MULTI FLAIR®

Type designation: M####.#####.###

Multi Flair® unit heaters including accessories are used for the heating, ventilation, cooling and filtration of indoor air. They are installed in industrial, storage, retail and exhibition premises; they are designed to be ceiling-mounted. Multi Flair® unit heaters can only be used indoors.

Declaration:

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

Notified body involved in conformity assessment:

Strojirensky zkusebni ustav, s.p., authorized body 202, Hudcova 424/56b, 621 00 Brno, IC (Company ID) 00001490

List of harmonized standards applied in conformity assessment:

CSN EN 12100:2011, CSN EN ISO 14120:2017, CSN EN ISO 13857:2020, CSN EN ISO 11202:2010,
CSN EI ISO 3746:2011, CSN EN 60335-1 ed.3:2012, CSN EN 60335-2-40 ed.2:2004.

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 in Liberec on: 13/10/2021

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


Signature

Year of production:

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EXCELLENCE IN SOLUTIONS

FläktGroup is the European market leader for energy-efficient solutions for air handling applications suitable for every application area according to your requirements. We offer our customers innovative technologies, high quality and outstanding performance supported by more than a century of accumulated industry experience. Our wide product range and market presence in 65 countries worldwide, guarantee that we are always by your side, ready to deliver excellent solutions.

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

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