019/11
Revision 3 | Valid from 28. 2. 2024

HOT-AIR HEATER
MONZUN-TE

INSTALLATION,
OPERATION INSTRACTIONS
AND MAINTENANCE MANUAL

MANDÍK®

EN

This manual is an integral part of the product and must be given to the end user together with the equipment.

a) Hot-air heaters MONZUN-TE may only be used by a person who has been instructed in the normal use of the appliance and who understands the possible dangers.

b) Persons with reduced physical, sensory or mental abilities or a lack of experience and knowledge may only use the heater under the supervision of a person trained according to point a).

c) Children cannot use or play with the MONZUN heater.

CONTENT

EN

I. GENERAL

Description

The MONZUN-TE units are designed for ecological hot-air heating of rooms and halls, the heating medium is hot water. Three sizes of heaters are produced, each size with single-row to four-row heating coil. The air is driven trough the heating coil by axial fan. The heaters can be installed horizontally on walls or vertically bellow the ceiling. The power range is from 9.6 kW to 88.7 kW (with the airflow from 1,500–7,500 $m^3.h^{-1}$).

Optional accessories for installation, air distribution, ventilation and unit control are available. Forming ventilation set with mixing chamber, the units can be used for ventilation (Fresh air supply).

The MONZUN-TE units are intended for environment protected against weather impacts with the classification of climatic conditions class 3K5, without condensation, frost, ice formation, and without water even from other sources than rain according to EN 60 72133, change A2, with temperature range from 0 °C to +40 °C, and for the spaces without explosion hazard.

The air passing through the unit must not contain solid, fibrous, sticky, or aggressive particles.

The maximum heating water temperature at the heater inlet is to 100 °C and the maximum heating pressure is 1.4 MPa. The unit has IP54 enclosure protection.

The fans used in the Monzun units comply with Directive ErP 2015.

Design

Design of hot water air heater unit MONZUN-TE

- MONZUN-TE units are produced in three sizes (1, 2, and 3).
- The heaters are produced with one-row to four-row heating coil.
- The units are delivered with the following diffusers at the discharge.
  - basic louver grille
  - induction louver grille
  - vertical louver grille
  - vertical induction louver grille
  - vertical four-sided vent
- The units can be connected to heating water distribution through.
  - left-side connection (standard version)
  - right-side connection (must be specified in the order)

The units can be supplied in terms of the electrical installations:

B	basic wiring (thermostat control is not supported)
BT	enables control of the heater by thermostat, each heater has to have its own thermostat
BTM	enables control of several heaters by single thermostat (not suitable for fan speed control by voltage)
BTPM	variant BTM plus fan motor thermal protection (three phase fans only)

For other optional accessories see chapter XI.

Function

The heater starts operation switching-up the fan. The fan blows heated air through the heating coil into the heated area. The air may be drawn in directly from the room or from outside through the mixing chamber, see Chapter optional accessory (in this case, fresh air into the room can be supplied).

Fig. 1: MONZUN-TE, basic louver grille, left connection

Dimensions

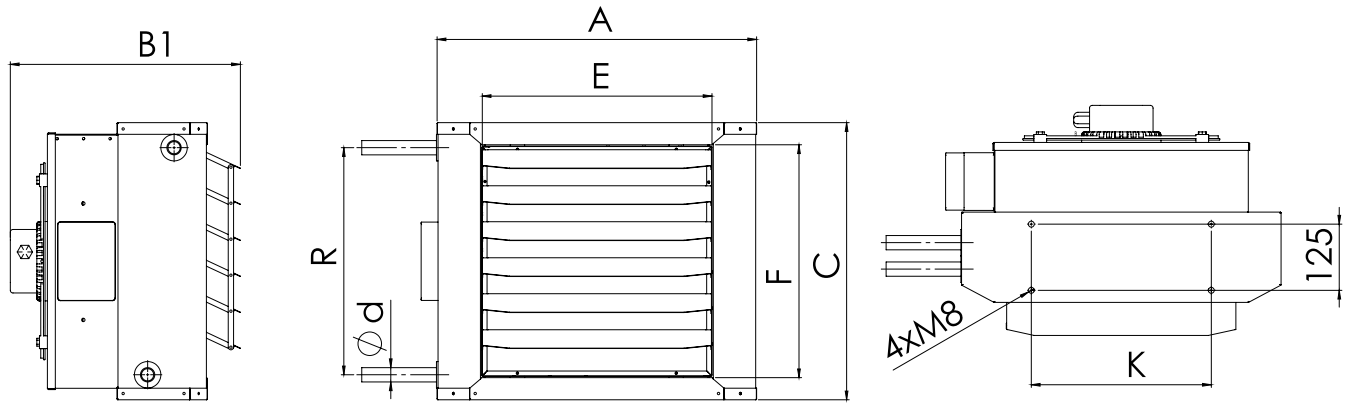


Fig. 2: MONZUN-TE

Dimensional series	Dimension [mm]							
	A	B1	C	d	E	F	K	R
1	595	380	530	G3/4“	470	460	340	430
2	720	420	610	G1“	585	535	440	500
3	900	410	760	G5/4“	750	680	615	660

Tab. 1: Dimensions of MONZUN-TE units

Weights

MONZUN-TE	Weight [kg]	MONZUN-TE	Weight [kg]	MONZUN-TE	Weight [kg]
1.1.150	20	2.1.200	32	3.1.450	55
1.1.180	23	2.1.250	34	3.1.600	56
1.1.220	22	2.1.400	36	3.1.800	58
1.2.150	25	2.2.250	36	3.2.420	58
1.2.200	24	2.2.320	38	3.2.500	59
1.2.250	25	2.2.420	38	3.2.700	61
1.3.180	26	2.3.220	39	3.3.400	62
1.3.220	27	2.3.280	39	3.3.500	63
–	–	2.3.400	41	3.3.600	65
1.4.150	29	2.4.200	41	3.4.350	65
1.4.180	29	2.4.250	41	3.4.450	66
–	–	2.4.350	43	3.4.520	68

Tab. 2: Weights of MONZUN-TE heaters including basic louver grille

Diffuser types

The diffusers are made of galvanized sheet steel and powder coated.

Basic louver grille

It is standard installed on the air outflow of the MONZUN-TE and MONZUN-TEC hot-air heater for horizontal installation. Its adjustable horizontal blades direct the air flow elevation, see *Fig. 1*.

Dimensional series	Dimension			Weight [kg]
	E	F	H	
1	435	435	34	2.1
2	525	525	34	2.8
3	685	685	34	4.7

Induction louver grille horizontal

Is designed to admix surrounding air into the heated air flow. Air flow increases by 20 %, which decreases the flow temperature and increases the air throw in the same time.

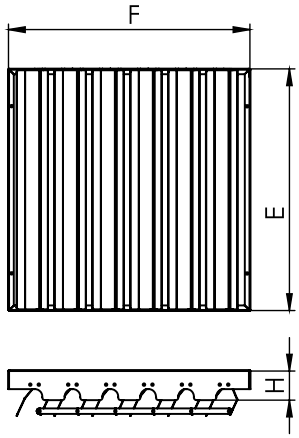


Fig. 3: Induction louver grille horizontal

Dimensional series	Dimension			Weight [kg]
	E	F	H	
1	435	435	54	2.9
2	525	525	54	4.5
3	685	685	54	7.2

Vertical grille

It is designed for vertical installation of the MONZUN-TE heater. It can direct the hot air flow vertically or sideways. Each blade of the grille can be adjusted individually.

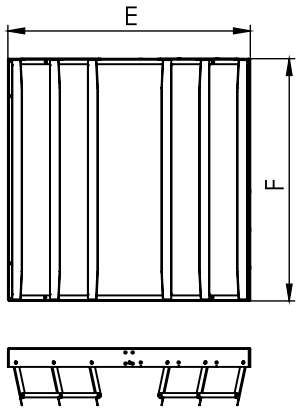
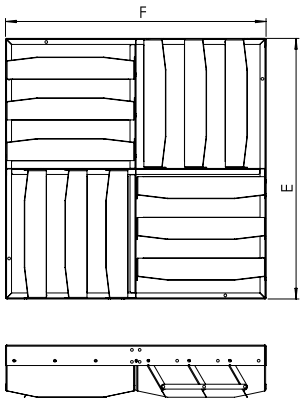


Fig. 4: Vertical grille

Dimensional series	Dimension			Weight [kg]
	E	F	H	
1	435	435	34	2.1
2	525	525	34	3.3
3	685	685	34	5.3

Vertical grille

It is designed for vertical installation of MONZUN-TE heater. It directs the air outflow to four sides. The vent is fitted to the front of the heater for ceiling installation.

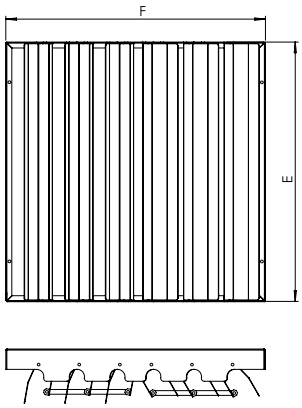


Dimensional series	Dimension			Weight [kg]
	E	F	H	
1	435	435	34	2.2
2	525	525	34	3.5
3	685	685	34	5.7

Fig. 5: Vertical four-side vent

Induction louver grille vertical

Is designed to admix surrounding air into the heated air flow. Air flow increases by 20 %, which decreases the air flow temperature and increases the air throw in the same time



Dimensional series	Dimension			Weight [kg]
	E	F	H	
1	435	435	54	2.9
2	525	525	54	4.5
3	685	685	54	7.2

Fig. 6: Induction louver grille vertical

EN

Ordering key

Hot water air heater unit MONZUN-TE

MONZUN-TE 1.1.150 P/IH/B1

- size 1–3
- number of heating coil rows 1 až 4
- air flow prameter
- Heating water connection:
  - L – left (standard)
  - P – right
- Diffuser on discharge:
  - Z – Basic louver grille
  - IH – Induction horizontal
  - V – Vertical
  - IV – Induction vertical
  - K – Four-sided vent
- Electric parameters:
  - 1 – single-phase fan motor
  - 3 – three-phase fan motor
  - B – basic wiring
  - BT** – preparation for thermostat
  - BTM – enables control of several heaters by single thermostat
  - BTPM* – variant BTM plus fan motor thermal protection

** For three-phase fan only*

*** For one-phase fans only*

Example of marking for an order: **MONZUN-TE 1.1.150 P/IH B1**

Hot water air heater unit MONZUN-TE size 1, single-row heating coil, air output parameter 150 (1,500 $m^3.h^{-1}$), connection to the heating water right, diffuser induction grille horizontal, basic wiring (thermostat control is not supported), with single-phase motor of the fan.

Ventilation set with hot water air heater unit MONZUN-TE

Mixing chamber KS 1/F-.57

- Damper control:
  - .01 – hand
  - .57 – actuator Belimo (position adjustment)
- Filter in the mixing chamber
  - F – with filter fabric (filtration class G2)
  - X – without filter fabric
- size 1 to 3

TVM **500 × 500** **TPM 003/96** (Damping pad)

- Size 1 (500 × 500) up to 3 (710 × 710)

Vertical duct **DS** **1**
Roof air intake head **HS** **1**
Horizontal duct **DP** **1**

- Size 1 up to 3

PDZM **500 × 500** – **.101** **TPM 079/10** (Rain protection louver)

- galvanized sheet, without holes in the visible parts, with screen against birds
- size 1 (500 × 500) up to 3 (710 × 710)

Other variants of rain protection louver have to be specified acc. To TPM 079/10.

Example of marking for an order: **MONZUN-TE 1.1.150 P/IH B1**

Mixing chamber
Horizontal duct DP1
PDZM 500×500.101 TPM 079/10

Hot water air heater unit MONZUN-TE viz 2.1., mixing chamber size 1 without filter fabric hand control, horizontal duct size 1, rain protection louver size 1 galvanized sheet without holes in the visible parts with screen against birds.

Material, finishing

The casing of MONZUN-TE and MONZUN-TEC is made of galvanized sheet powder coated RAL 7040. Upper and lower part of the casing, vents and diffusers have RAL 7016 coating.

The heating coil frame for MONZUN-TE is made of galvanized steel sheet, copper heating tubes, aluminium fins, manifolds with steel connecting pipes.

Product data label

The product data label is located on the rear side of the unit cabinet.

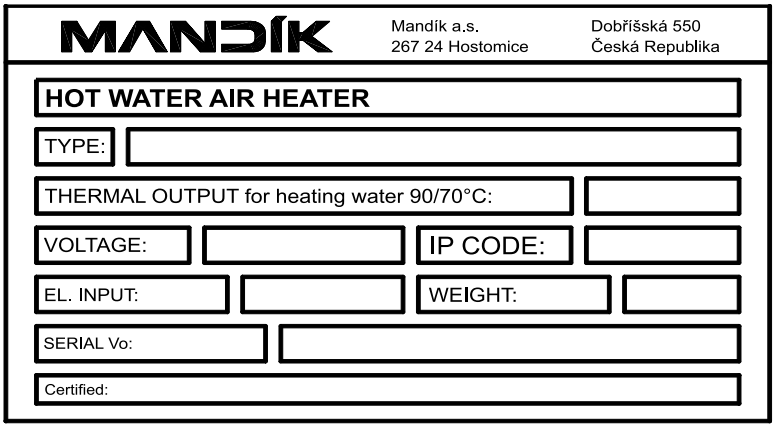


Fig. 7: Product data label

Inspection, testing

The equipment is inspected by the manufacturer, its operation is dependent on the correct installation.

All devices are tested in terms of safety and operability after production.

Logistical data

The heaters and accessories are supplied freely loaded and are wrapped into the packing foil. Other methods of packaging must be agreed in advance with the manufacturer.

The heaters are transported by freight cabinet vehicles. Units must be protected against mechanic damages when transported and manipulated. There must not occur any sharp shocks and ambient temperature must not exceed +50 °C.

If not otherwise agreed, the handover is considered when the goods is forwarded to the carrier.

The units must be stored in the indoor environment without any aggressive vapours, gases or dust. Indoor temperature must be in the range from -5 °C to +40 °C and maximum relative humidity 80 %. Units must be protected against mechanic damages when transported and manipulated.

The delivery includes MONZUN-TE, the certificate of quality and completeness with stamp checks and the instructions for installation, operation and maintenance.

II. INSTALLATION MANUAL

Dimensions for MONZUN-TE installation

The unit MONZUN-TE has four fixation points on the top and four on the bottom panel, where it can be fixed to supporting structure. It can be installed on the wall using a bracket or below the ceiling by hanger, see chapter Optional accessoryl.

Size	Dimension [mm]						
	A	B	B1	C	K	T	min. Z*
1	595	315	380	530	340	350	2,300
2	720	325	420	610	440	350	2,300
3	900	334	410	760	615	350	2,300

Tab. 2: MONZUN-TE – dimensions for installation

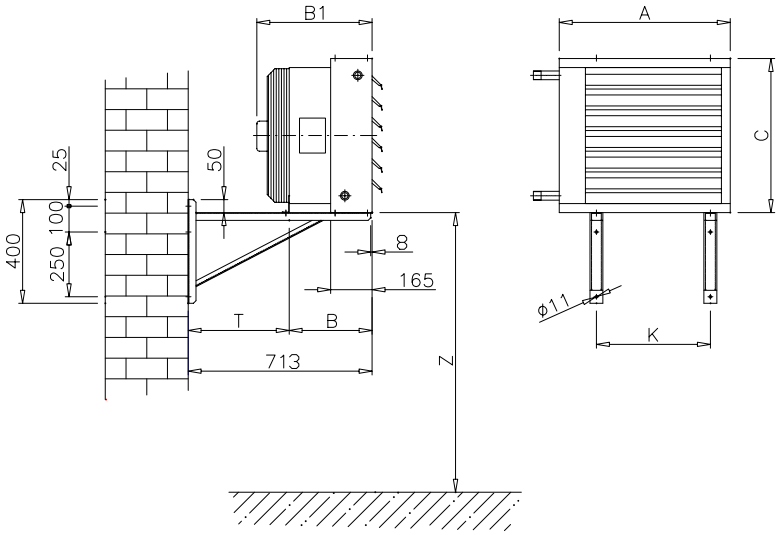


Fig. 8: MONZUN-TE installation on wall bracket

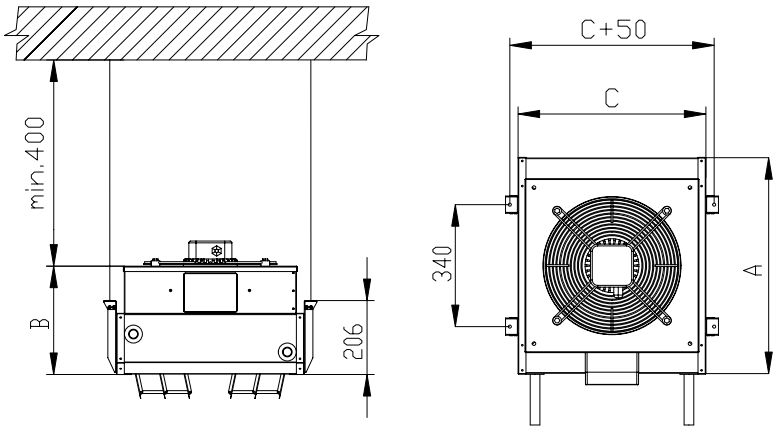


Fig. 9: MONZUN-TE vertical installation

Installation

The units MONZUN-TE and must be installed according to applicable standards. Safety standard EN ISO 12 100-2 must be observed.

MONZUN-TE as part of ventilation set for fresh air supply must be equipped with anti-freeze thermostat. This eqiupment is recommended for all hot water air heaters.

Conditions for putting MONZUN-TE units into operation:

- MONZUN-TE units and their accessories must be installed according to the applicable installation regulations issued by the equipment manufacturer.
- The units and their accessories must only be connected to a mains voltage of 230 V / 50 Hz or 3× 400 V / 50 Hz respectively.
- The electrical distribution to which the units are connected must comply with valid regulations.
- Access must be allowed to the subsidiary (electrical) switchboard to which the units are connected.

During installation, it is necessary to respect above all the applicable standards regarding:

- fire protection
- electrical installation
- **The use of MONZUN-TE units in a corrosive environment is prohibited.**

Connecting the units to the heating water distribution

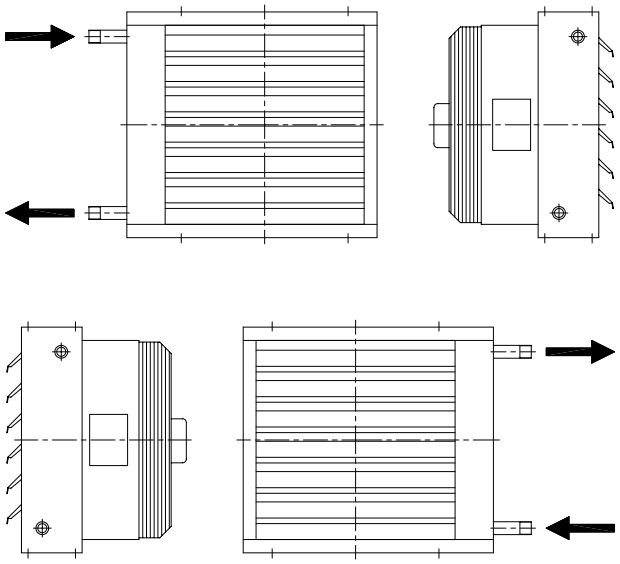


Fig. 10: Counterflow connection of MONZUN-TE

The connecting pipes of the MONZUN-TE units are terminated with an external thread:

- dimension series 1 – G3/4“;
- dimension series 2 – G1“;
- dimension series 3 – G5/4“.

Electric connection

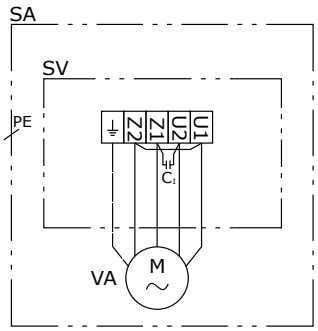
MONZUN-TE units must be connected according to applicable standards.

The power supply must have the prescribed protection.

According to EN 61140, MONZUN-TE units are class I electrical appliances and are equipped with a clamp for connecting a protective conductor. This terminal must be connected according to the above standard.

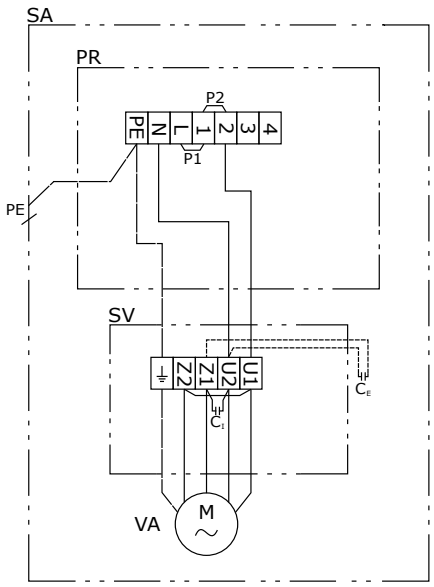
In the connection to the electric grid must be included switch that disconnects all operating conductors. Electrical power supply is connected into the clamps which are housed in the connection box or in the fan terminal box. The installation of electrical connection must be done by authorised person only

Single-phase motor units include an internal thermal fuse that stops the fan if it overheats. Units with a three-phase fan contain an externally connected thermal contact and must therefore use motor thermal protection in the connection.



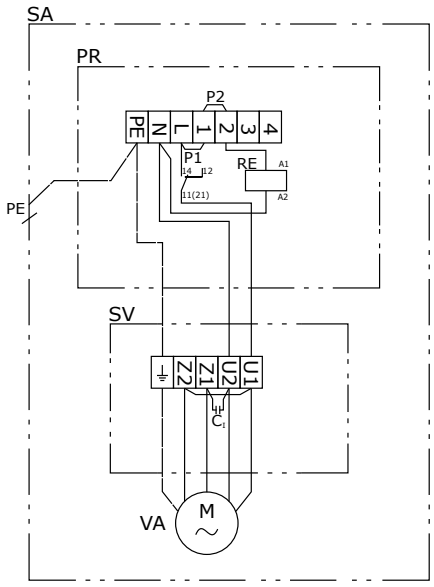
Legend:
SA heater casing
SV terminal board of the fan
VA axial fan

Fig. 11: Diagram of single-phase fan with basic wiring (B1)



Legend:
P1 jumper – room thermostat
P2 jumper – antifreeze thermostat
PR BT1 connection box
SA heater casing
SV terminal board of the fan
VA axial fan

Fig. 12: Wiring diagram supporting thermostat control of single-phase fan (BT1)



Legend:
P1 jumper – room thermostat
P2 jumper – antifreeze thermostat
PR BTM1 connection box
RE relay
SA heater casing
SV terminal board of the fan
VA axial fan

Note: Not suitable for voltage speed control of the fan.

Fig. 13: Wiring diagram supporting thermostat control of multiple units with single-phase fan using single thermostat (BTM1)

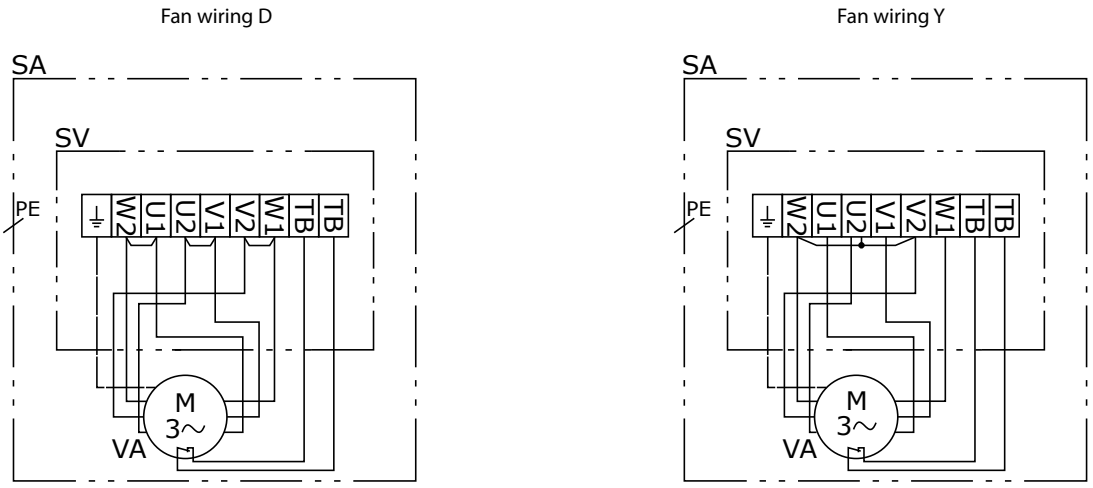
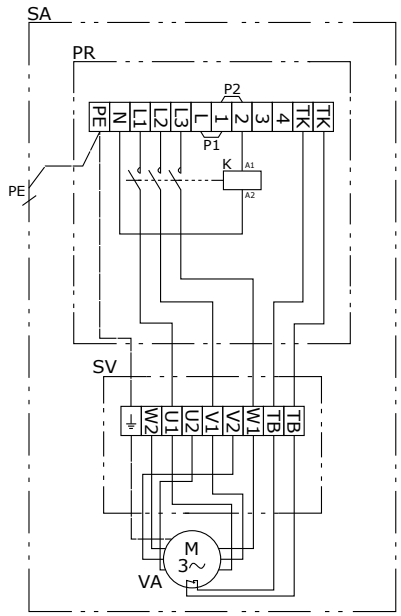


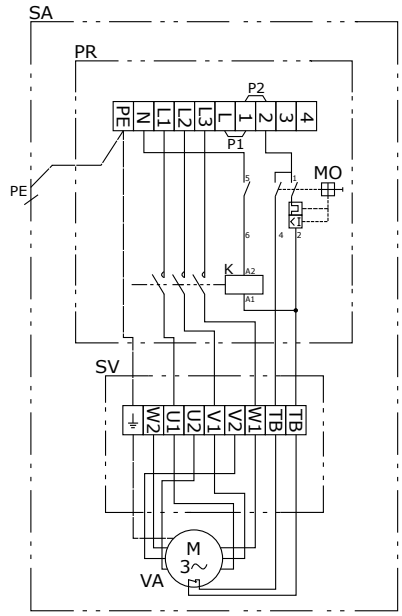
Fig. 14: Diagram of three-phase fan with basic wiring (B3)



Legend:

- **P1** jumper – room thermostat
- **P2** jumper – antifreeze thermostat
- **PR P1** jumper – room thermostat
- **P2** jumper – antifreeze thermostat
- **K** contactor
- **SA** heater casing
- **SV** terminal board of the fan
- **VA** axial fan

Fig. 15: Wiring diagram supporting thermostat control of multiple units with three-phase fan using single thermostat (BTM3)



Legend:

- **MO** motor protection
- **P1** jumper – room thermostat
- **P2** jumper – antifreeze thermostat
- **PR P1** jumper – room thermostat
- **P2** jumper – antifreeze thermostat
- **K** contactor
- **SA** heater casing
- **SV** terminal board of the fan
- **VA** axial fan

Fig. 16: Wiring diagram supporting thermostat control of multiple units with three-phase fan using single thermostat and including motor thermal protection (BTM3)

III. CONTROL

Room thermostat

It is designed to control the fan depending on the temperature of the heated space. The required temperatures can be programmed for a week. Multiple units can be controlled by single thermostat, number of units is dependent on the current capacity of the thermostat (every heater needs 200 mA to be switched)

The room thermostat enables the control of the air fan of the unit, or several units, according to the required temperature and time. After removing jumper P1 (connects terminals L, 1) in the wiring box, the 230 V / 50 Hz signal is fed to terminal 1. See wiring diagrams that follow.

Anti-freeze thermostat

It is designed to stop the fan, when output water temperature falls below 6 °C. It also sends a signal to close the regulating damper, which is controlled by the actuator (version .57). The anti-freeze thermostat is placed on outlet water pipe and it is connected to terminal box after removing the jumper P2 (connects terminals 1, 2) to terminals 1, 2. See wiring diagrams that follow.

Speed regulators

Thyristor speed regulator P-E-1, P-E-2.5 and P-E-4 (only for one-phase fan)

Speed adjustment is performed continuously by using the rotary which also has a shutdown function. Starting fan is always on full speed. Then the speed drops to the set value. The controller can be supplied as separate control box with IP54 protection class.

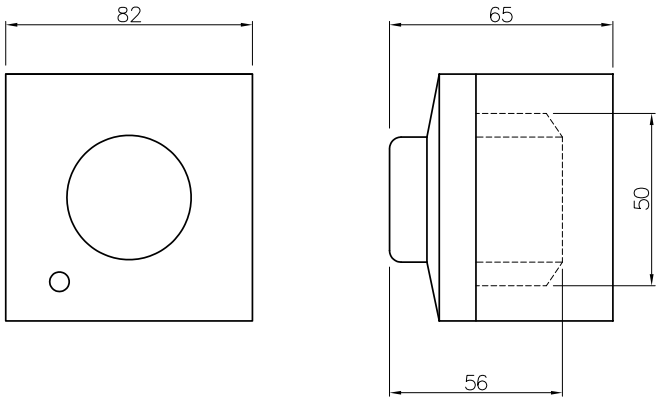


Fig. 17: Speed regulator P-E-1 to P-E-4

Type	P-E-1	P-E-2.5	P-E-4
Nominal current	1 A	2,5 A	4 A
Min. motor current	0,1 A	0,2 A	0,4 A
Internal fuse	F 1,258A-H	F 3,15A-H	F 5A-H
Weight	240 g	300 g	360 g

Tab. 3: Technical data

Thyristor speed regulator P-E-6 and P-E-10 and (only for one-phase fan)

Speed adjustment is performed continuously by using the rotary switch. Separate illuminated ON/OFF switch. Starting fan is always on full speed. Then the speed drops to the set value. The controller can be supplied as separate control box with IP54 protection class.

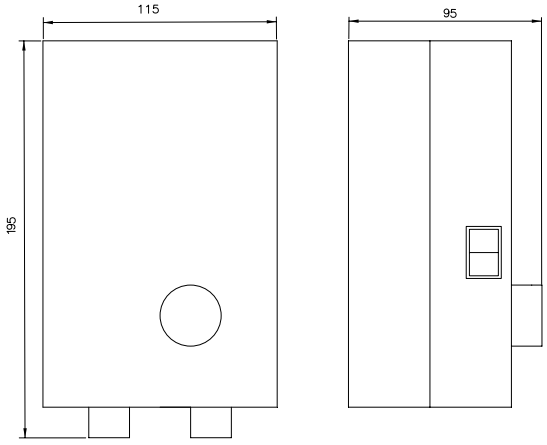


Fig. 18: Speed regulator P-E-6 and P-E-10

Typ	P-E6	P-E10
Nominal current	6 A	10 A
Min. motor current	0,5 A	1 A
Internal fuse	F 8A-H	F 16A-H
Weight	680 g	740 g

Tab. 4: Technical data

Transformer speed regulator TR (only for one-phase fan)

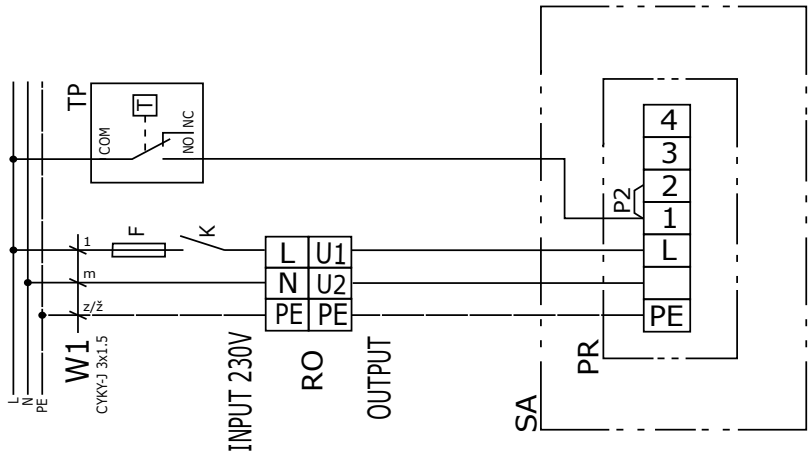
The speed is changed in stages using a 5-stage switch. They contain a built-in switch.

The output voltage in individual stages is 116 V, 136 V, 156 V, 181 V, 230 V.

The advantage is the silent operation of the engine in all modes.

Type	TR40	TR41	TR42
Nominal current	0,9 A	2,12 A	6,5 A
IP rate	IP 30	IP 30	IP 30
Weight	1,7 kg	2,52 kg	6,1 kg
Dimensions l × w × d	125 × 80 × 70 mm	170 × 100 × 90 mm	124 × 240 × 130 mm

Tab. 5: Transformer speed regulators



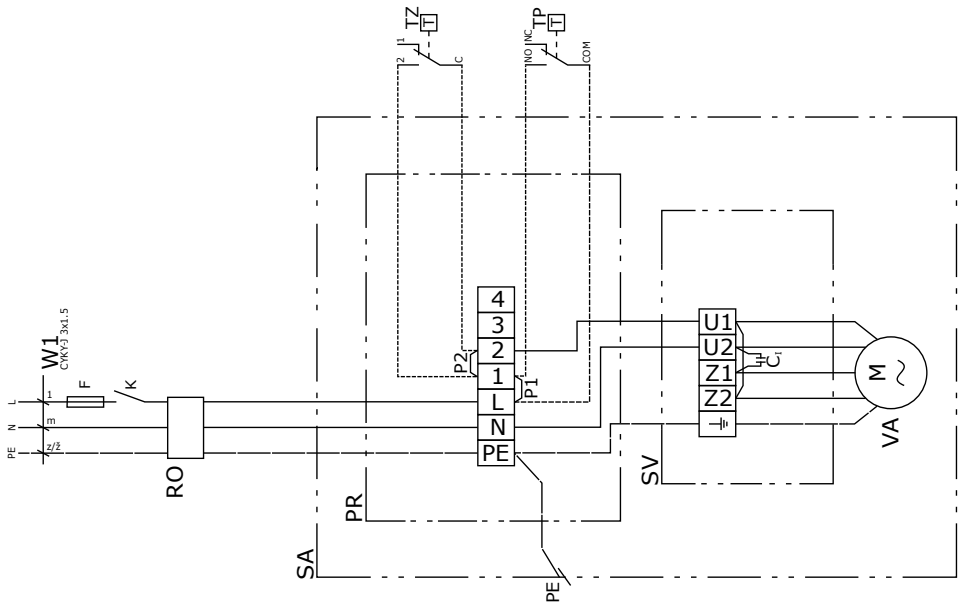
Legend:
- **K** switch
- **F** fuse
- **TP** room thermostat
- **P2** jumper – antifreeze thermostat
- **PR** connection box
- **RO** speed regulator
- **SA** heater casing

Fig. 19: Wiring diagram with TR speed regulator

Electrical connecting of the units MONZUN-TE in version B1

The electrical power supply is connected to the terminals of the fan, see *Fig.14.*

Electrical connecting of the units MONZUN-TE in version BT1



Legend:
- **K** switch
- **F** fuse
- **P1** jumper – room thermostat
- **P2** jumper – antifreeze thermostat
- **PR** BT1 connection box
- **RO** speed regulator
- **SA** heater casing
- **SV** terminal board of the fan
- **VA** axial fan
- **TZ** anti-freeze thermostat
- **TP** room thermostat

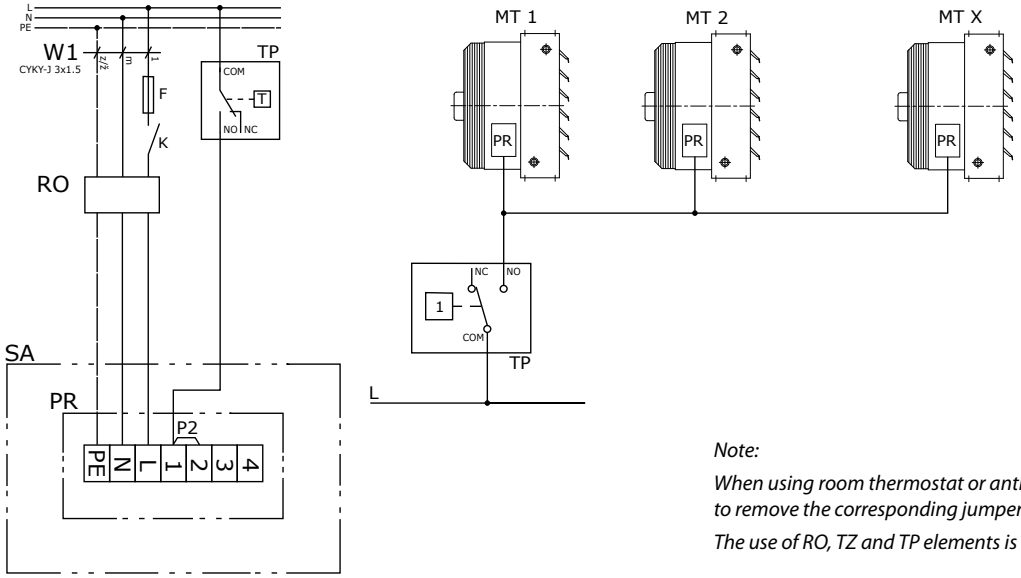
Note:

When using room thermostat or antifreeze thermostat it is necessary to remove the corresponding jumper.

The use of RO, TZ and TP elements is optional.

Fig. 20: Electrical connecting of the units MONZUN-TE in version BT1

Electrical connecting of the room thermostat to the unit MONZUN-TE in version BTM1



Legend:

K switch
MT MONZUN-TE
F fuse
P2 jumper – antifreeze thermostat
PR BTM1 connection box
RO speed regulator
SA heater casing
SV terminal board of the fan
VA axial fan
TP room thermostat
W1 connecting cable

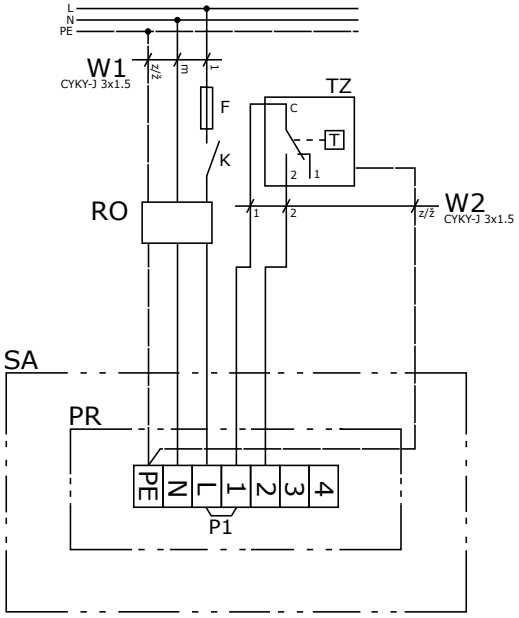
Note:

When using room thermostat or antifreeze thermostat it is necessary to remove the corresponding jumper.

The use of RO, TZ and TP elements is optional.

Fig. 21: Electrical connecting of the room thermostat to the unit MONZUN-TE in version BTM1

Electrical connecting of the anti-freeze thermostat to the unit MONZUN-TE in version BT1 and BTM1



Legend:

K switch
F fuse
P1 jumper – room thermostat
PR connection box
RO speed regulator
SA heater casing
SV terminal board of the fan
VA axial fan
TP prostorový termostat
TZ anti-freeze thermostat
W1, W2 connecting cable

Note:

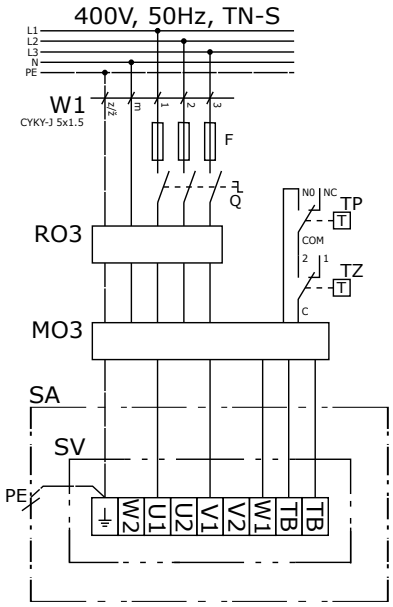
When using room thermostat or Anti-freeze thermostat it is necessary to remove the corresponding jumper.

The use of RO, TZ and TP elements is optional.

Fig. 22: Electrical connecting of the anti-freeze thermostat to the unit MONZUN-TE in version BT1 and BTM1

Electrical connecting of the units MONZUN-TE in version B3

The electrical power supply is connected to the terminals of the fan, see *Fig. 9*.



Legend:

- **Q** switch
- **F** fuse
- **RO3** three-phase speed regulator
- **MO3** three-phase motor thermal protection
- **SA** heater casing
- **SV** terminal board of the fan
- **VA** axial fan
- **TZ** anti-freeze thermostat
- **TP** room thermostat

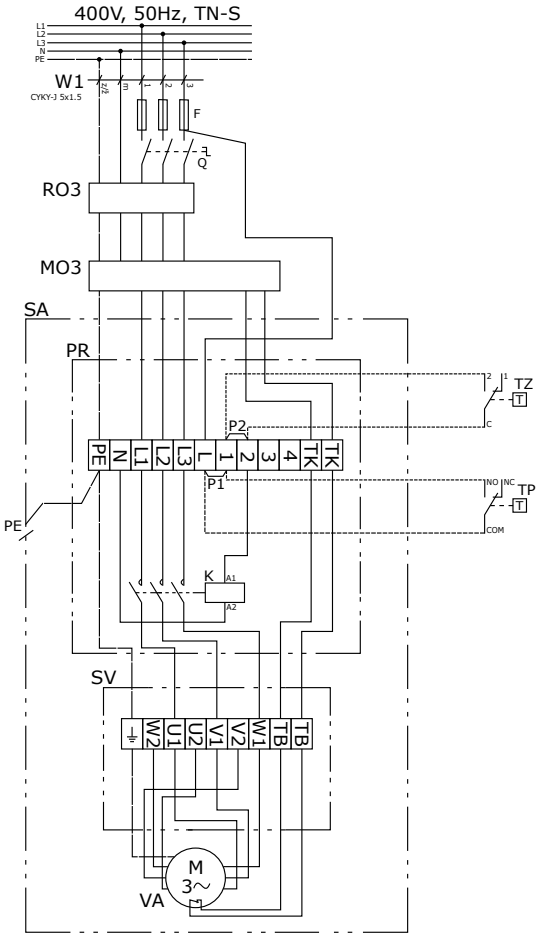
Note:

Motor protection MO3 must ensure that the fan does not start spontaneously after the reaction of the thermal contact.

The use of RO, TZ and TP elements is optional.

Fig. 23: Electrical connecting of the units MONZUN-TE in version B3

Electrical connecting of the units MONZUN-TE in version BTM3



Legend:

- **Q** switch
- **F** fuse
- **RO3** three-phase speed regulator
- **MO3** three-phase motor thermal protection
- **SA** heater casing
- **PR** PTM3 connection box
- **SV** terminal board of the fan
- **P1** jumper – room thermostat
- **P2** jumper – anti-freeze thermostat
- **TP** room thermostat
- **TZ** anti-freeze thermostat
- **K** contactor
- **W1** power supply cable

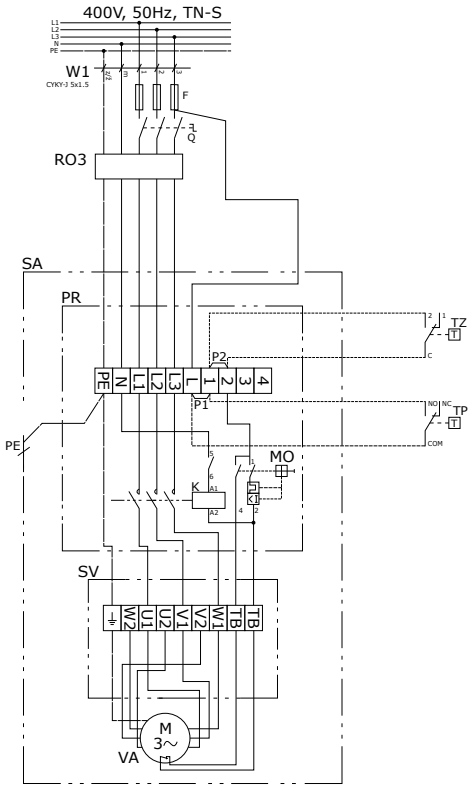
Note

Motor protection MO3 must ensure that the fan does not start spontaneously after the reaction of the thermal contact.

The use of RO, TZ and TP elements is optional.

Fig. 24: Electrical connecting of the units MONZUN-TE in version BTM3

Electrical connecting of the units MONZUN-TE in version BTPM3



Legend:

- **Q** switch
- **F** fuse
- **RO3** three-phase speed regulator
- **MO** motor thermal protection
- **SA** heater casing
- **PR** PTM3 connection box
- **SV** terminal board of the fan
- **P1** jumper – room thermostat
- **P2** jumper – anti-freeze thermostat
- **TP** room thermostat
- **TZ** anti-freeze thermostat
- **K** contactor

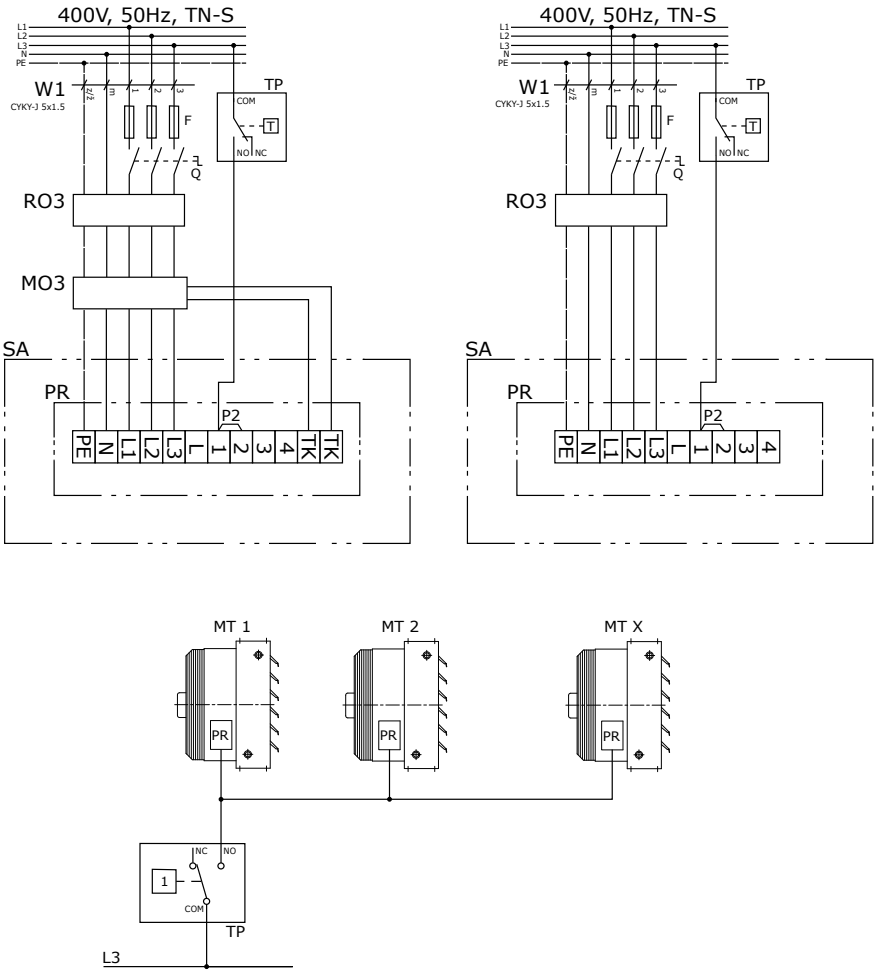
Note:

Motor protection MO3 must ensure that the fan does not start spontaneously after the reaction of the thermal contact.

The use of RO, TZ and TP elements is optional.

Fig. 25: Electrical connecting of the units MONZUN-TE in version BTPM3

Electrical connecting of the room thermostat to the unit MONZUN-TE in version BTM3 and BTPM3



Legend:

- **Q** switch
- **F** fuse
- **RO3** three-phase speed regulator
- **MO3** three-phase motor thermal protection
- **SA** heater casing
- **PR** connection box
- **SV** terminal board of the fan
- **VA** axial fan
- **P1** jumper – room thermostat
- **P2** jumper – anti-freeze thermostat
- **TP** room thermostat
- **K** contactor

Note:

Motor protection MO3 must ensure that the fan does not start spontaneously after the reaction of the thermal contact.

When using room thermostat or Anti-freeze thermostat it is necessary to remove the corresponding jumper.

For MONZUN-TE BTM3 and BTPM3 versions, voltage speed regulators are unsiutable.

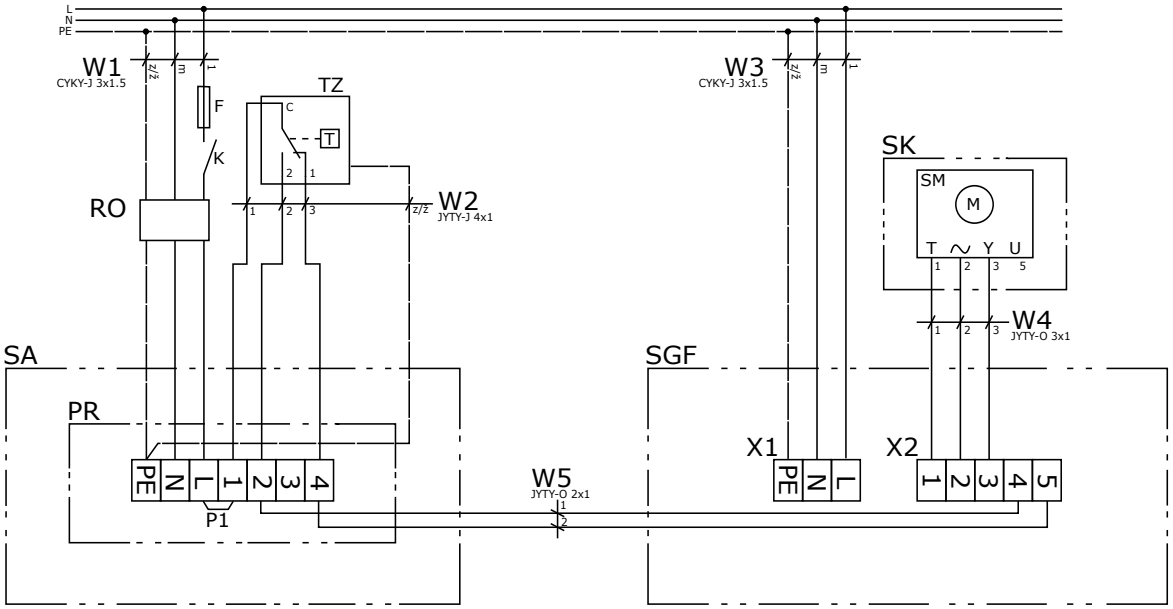
Fig. 26: Electrical connecting of the room thermostat to the unit MONZUN-TE in version BTM3 and BTPM3

SGF 24 VM Control box

It used to control the mixing chamber SK with actuator Belimo SM 24A-SR. Control box provides power supply control of the actuator. With anti-freeze thermostat it ensures protection against water freezing in the heating coil. (When output water temperature drops below 6 °C external air regulating damper shall close. This breaks the air supply from outside. Frost protection indicator will light.).

The control box SGF 24 VM is connected to the 230 V / 50 Hz power supply.

Control box protection class is IP 54. Protection class of the thermostat depends on the thermostat used.



Legend:

- **W1** power supply cable
- **W3** power supply cable
- **F** fuse
- **K** switch
- **RO** speed regulator
- **TZ** anti-freeze thermostat
- **W2** connecting cable
- **W4** connecting cable
- **W5** connecting cable
- **SA** heater casing
- **PR** connection box
- **P1** jumper – room thermostat
- **SGF** control box for mixing chamber SGF 24 VM
- **SK** nixing chamber
- **SM** actuator

Note:

When using room thermostat or Anti-freeze thermostat it is necessary to remove the corresponding jumper.

The use of RO, TZ and TP elements is optional.

For MONZUN-TE BTM and BTPM versions, voltage speed regulators are unsiutable.

Fig. 27: Electrical connecting of SGF 24 VM control box

EN

IV. USERS MANUAL

a) MONZUN-TE air heaters may only be used by trained persons who are aware of possible risks. Persons with reduced mental or physical abilities may only use them under the supervision of a trained person.

b) Persons with reduced physical, sensory or mental abilities or a lack of experience and knowledge may only use the heater under the supervision of a person trained in accordance with point a).

c) Children must not use or play with MONZUN-TE heaters.

Before turning on the heater, check:

- Whether the heating medium is leaking.
- Whether there is anything mechanically preventing the rotation of the fan.
- Whether all electrical connection and control boxes are properly closed.
- Whether the heater is excessively contaminated with dust.

If you find one of the above defects, remove it first before turning on the heater.

MONZUN-TE heaters are switched on either with a switch or a room thermostat. They do not require maintenance during operation.

V. DESIGN DOCUMENTS

Technical parameters

Electrical and technical parameters of MONZUN-TE, size1

Double-row	Single-row			Double-row			Three-row		Four-row	
Heater type	**1.1.150**	**1.1.180**	**1.1.220**	**1.2.150**	**1.2.200**	**1.2.250**	**1.3.180**	**1.3.220**	**1.4.150**	**1.4.180**
Heating power* [kW]	9.6	10.0	11.0	17.1	19.5	21.5	22.0	24.2	26.0	27.7
Air flow [$m^3.h^{-1}$]	1,500	1,650	1,950	1,450	1,750	2,050	1,650	1,900	1,600	1,750
Electrical connection [V/Hz]	230/50									
Electric input [W]	90	85	120	85	120	150	120	150	120	150
Protection [A]	6									
Air throw in open space,residual speed 0.25 $m.s^{-1}$ [m]	9	11	14	10	12	15	10.8	13	10	12
Recommended installation height Z [m]	3.5	3.6	4.5	2.9	3.9	4.9	3.3	4.3	2.9	3.6
Average sound pressure level at 1 m distance from the heater in free field [db(A)]	66	61	62	58	61	61	62	62	61	61

Tab. 6: Electrical and technical parameters of MONZUN-TE, with single-phase fan, size1

** The data above correspond to the temperature gradient of heating water 90/70 °C and intake air temperature t_{v1}=15 °C*

Double-row	Single-row			Double-row			Three-row		Four-row	
Heater type	–	**1.1.180**	**1.1.220**	**1.2.150**	**1.2.200**	**1.2.250**	**1.3.180**	**1.3.220**	**1.4.150**	**1.4.180**
Heating power* [kW]	–	10.5	11.7	17.5	20.6	23.7	22.4	25.8	24.8	28.3
Air flow [$m^3.h^{-1}$]	–	1,850	2,200	1,500	1,900	2,400	1,700	2,100	1,500	1,800
Electrical connection [V/Hz]	3× 400/50									
Electric input [W]	–	180	180	180	180	190	180	190	180	190
Protection [A]	6									
Air throw in open space,residual speed 0.25 $m.s^{-1}$ [m]	–	11.4	16.0	10.0	13.0	16.0	10.8	13.8	10.0	12.1
Recommended installation height Z [m]	–	3.6	4.5	2.9	3.9	4.9	3.3	4.3	2.9	3.6
Average sound pressure level at 1 m distance from the heater in free field [db(A)]	–	60	62	60	62	67	62	67	62	67

Tab. 7: Electrical and technical parameters of MONZUN-TE, with three-phase fan, size1

** The data above correspond to the temperature gradient of heating water 90/70 °C and intake air temperature t_{v1}=15 °C*

Electrical and technical parameters of MONZUN-TE, size 2

Double-row	Single-row			Double-row			Three-row			Four-row		
Heater type	**2.1.200**	**2.1.250**	**2.1.400**	**2.2.250**	**2.2.320**	**2.2.420**	**2.3.220**	**2.3.280**	**2.3.400**	**2.4.200**	**2.4.250**	**2.4.350**
Heating power* [kW]	13.1	14.8	17.2	25.5	30.4	35.0	31.8	36.5	44.3	36.4	42.2	48.1
Air flow [$m^3.h^{-1}$]	2,100	2,600	3,500	2,300	3,100	3,900	2,250	2,800	3,700	2,150	2,650	3,200
Electrical connection [V/Hz]	230/50											
Electric input [W]	120	150	260	150	260	480	150	260	480	150	260	480
Protection [A]	6											
Air throw in open space, residual speed 0.25 $m.s^{-1}$ [m]	12	16	21	14	20	23	13	18	22	12	15	20
Recommended installation height Z [m]	3.6	4.4	5.2	4.2	4.7	5.3	3.9	4.5	5.0	3.4	4.3	4.8
Average sound pressure level at 1 m distance from the heater in free field [db(A)]	60.5	61	65	62	64	70	62	65	70	62	64	70

Tab. 8: Electrical and technical parameters of MONZUN-TE, with single-phase fan, size 2

** The data above correspond to the temperature gradient of heating water 90/70 °C and intake air temperature t_{v1}=15 °C*

Double-row	Single-row			Double-row			Three-row			Four-row		
Heater type	**2.1.200**	**2.1.250**	**2.1.400**	**2.2.250**	**2.2.320**	**2.2.420**	**2.3.220**	**2.3.280**	**2.3.400**	**2.4.200**	**2.4.250**	**2.4.350**
Heating power* [kW]	12.4	13.9	18.5	26.0	29.3	35.5	31.3	35.0	44.8	35.1	39.4	49.1
Air flow [$m^3.h^{-1}$]	1,900	2,350	4,000	2,400	2,900	4,000	2,200	2,600	3,750	2,050	2,400	3,300
Electrical connection [V/Hz]	3×											
Electric input [W]	180	180	430	140	190	450	140	190	450	140	190	450
Protection [A]	6											
Air throw in open space, residual speed 0.25 $m.s^{-1}$ [m]	11	14	22	15	19	24	13	17	22	12	14	21
Recommended installation height Z [m]	3.6	4.4	5.2	4.2	4.7	5.3	3.9	4.5	5.0	3.4	4.3	4.8
Average sound pressure level at 1 m distance from the heater in free field [db(A)]	60	62	68	63	65	72	63	68	72	63	67	71

Tab. 9: Electrical and technical parameters of MONZUN-TE, with three-phase fan, size 2

** The data above correspond to the temperature gradient of heating water 90/70 °C and intake air temperature t_{v1}=15 °C*

Electrical and technical parameters of MONZUN-TE, size 3

Double-row	Single-row			Double-row			Three-row			Four-row		
Heater type	**3.1.450**	**3.1.600**	**3.1.800**	**3.2.420**	**3.2.500**	**3.2.700**	**3.3.400**	**3.3.500**	**3.3.600**	**3.4.350**	**3.4.450**	**3.4.520**
Heating power* [kW]	25.8	29.7	32.2	45.0	54.5	60.0	51.5	61.5	68.0	61.1	73.5	80.3
Air flow [$m^3.h^{-1}$]	3,900	5,100	6,000	3,600	4,800	5,600	3,550	4,600	5,400	3,500	4,500	5,100
Electrical connection [V/Hz]	230/50											
Electric input [W]	260	480	570	260	480	570	260	480	570	260	480	570
Protection [A]	6											
Air throw in open space, residual speed 0.25 $m.s^{-1}$ [m]	16	20	23	15	19	22	15	18	21	14	17	20
Recommended installation height Z [m]	4.2	4.4	5.2	4.0	4.6	5.2	3.9	4.5	5.0	3.4	4.1	4.7
Average sound pressure level at 1 m distance from the heater in free field [db(A)]	70	71	73	70	71	73	69	70	72	69	70	72

Tab. 10: Electrical and technical parameters of MONZUN-TE, with single-phase fan, size 3

** The data above correspond to the temperature gradient of heating water 90/70 °C and intake air temperature t_{v1}=15 °C*

Double-row	Single-row			Double-row			Three-row			Four-row		
Heater type	**3.1.450**	**3.1.600**	**3.1.800**	**3.2.420**	**3.2.500**	**3.2.700**	**3.3.400**	**3.3.500**	**3.3.600**	**3.4.350**	**3.4.450**	**3.4.520**
Heating power* [kW]	28.8	29.5	36.0	50.5	56.0	66.0	57.0	64.5	74.5	68.8	74.7	88.7
Air flow [$m^3.h^{-1}$]	4,800	5,000	7,500	4,300	5,000	6,600	4,100	4,900	6,200	4,050	4,600	5,900
Electrical connection [V/Hz]	3 × 400/50											
Electric input [W]	430	450	840	430	450	840	430	450	840	430	450	840
Protection [A]	6											
Air throw in open space, residual speed 0.25 $m.s^{-1}$ [m]	16	20	23	15	19	22	15	18	21	14	17	20
Recommended installation height Z [m]	4.3	4.4	5.2	4.2	4.6	5.2	4.0	4.5	5.0	4.0	4.1	4.7
Average sound pressure level at 1 m distance from the heater in free field [db(A)]	71	74	74	71	73	74	70	73	73	70	73	73

Tab. 11: Electrical and technical parameters of MONZUN-TE, with three-phase fan, size 3

** The data above correspond to the temperature gradient of heating water 90/70 °C and intake air temperature t_{v1}=15 °C*

Calculation and determining quantities for MONZUN-TE

For the design of the working point and the selection of suitable MONZUN-TE units for the given purpose, it is possible to use the HastrMAN design program on the website www.mandik.cz.

QR code for link to the program HastrMAN:

Quantity of water flow

$$V_w = \frac{Q_T}{4{,}186 \cdot (t_{w1} - t_{w2})}$$

Pressure loss on the water side

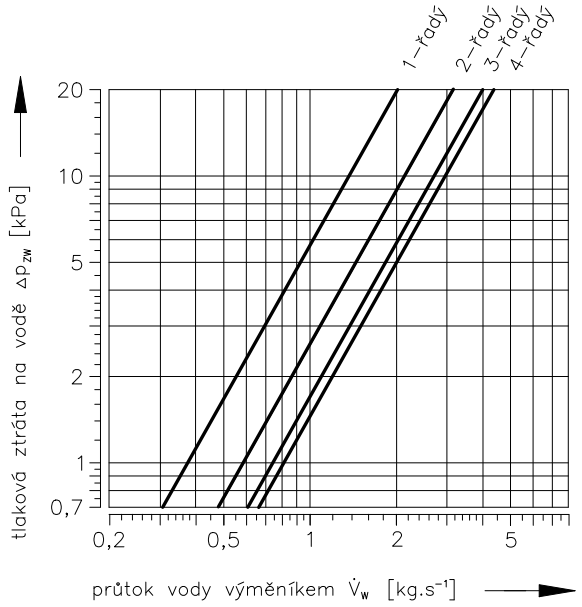


Chart 1: Pressure loss on the water side, size 1

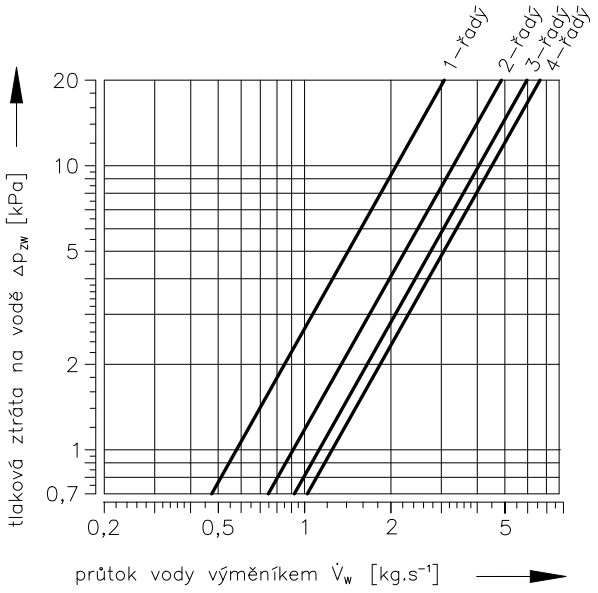


Chart 2: Pressure loss on the water side, size 2

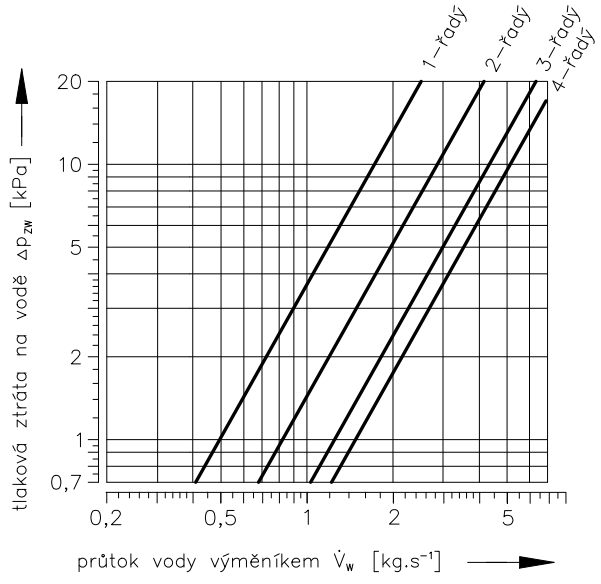


Chart 3: Pressure loss on the water side, size 3

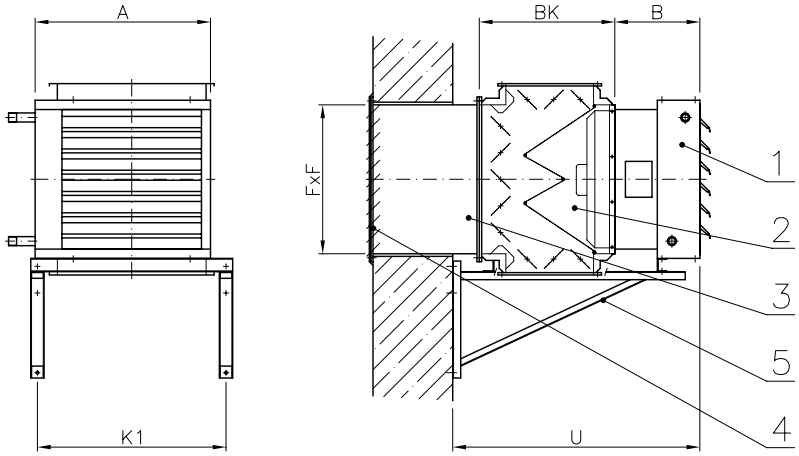
Legend:

- V_v [$m^3.h^{-1}$] air flow through the heater
- V_w [$kg.s^{-1}$] water flow
- Q_T [kW] heating power
- p_{zw} [Pa] pressure loss on the water side
- t_{v2} [°C] outlet air temperature
- t_{v1} [°C] inlet air temperature
- t_{w2} [°C] outlet water temperature
- t_{w1} [°C] inlet water temperature

VENTILATION SETS WITH MONZUN-TE HEATERS

Ventilation set with MONZUN-TE for horizontal installation

The set is designed for heating and ventilation with heated air. It is installed on the wall.



Legend:

1 MONZUN-TE air heater
2 mixing chamber with filter
3 horizontal duct (with loose flange)
4 rain protection louver (with screen)
5 wall bracket for set (see accessories)

Fig. 28: The ventilation set with MONZUN-TE for horizontal installation

MONZUN-TE	Air flow for heater with fan	
	Single-phase	Three-phase
1.1.150	500	–
1.1.180	800	900
1.1.220	1,000	1,200
1.2.150	750	850
1.2.200	950	1,000
1.2.250	1,000	1,200
1.3.180	850	900
1.3.220	950	1,100
–	–	–
1.4.150	900	900
1.4.180	1,050	1,100
–	–	–

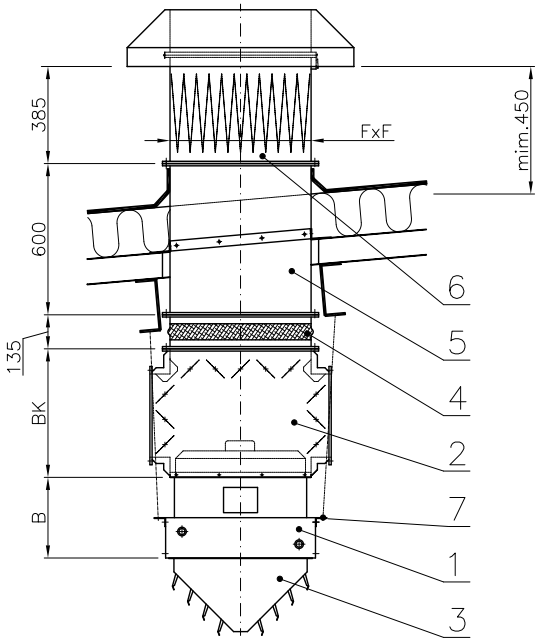
MONZUN-TE	Air flow for heater with fan	
	Single-phase	Three-phase
2.1.200	800	700
2.1.250	900	800
2.1.400	1,300	1,500
2.2.250	1,100	1,200
2.2.320	1,600	1,600
2.2.420	2,100	2,000
2.3.220	1,300	1,250
2.3.280	1,600	1,500
2.3.400	2,100	2,200
2.4.200	1,200	1,200
2.4.250	1,600	1,400
2.4.350	1,900	2,100

MONZUN-TE	Air flow for heater with fan	
	Single-phase	Three-phase
3.1.450	800	700
3.1.600	900	800
3.1.800	1,300	1,500
3.2.420	1,100	1,200
3.2.500	1,600	1,600
3.2.700	2,100	2,000
3.3.400	1,300	1,250
3.3.500	1,600	1,500
3.3.600	2,100	2,200
3.4.350	1,200	1,200
3.4.450	1,600	1,400
3.4.520	1,900	2,100

Tab. 12: Air flow for horizontal sets with MONZUN-TE

Ventilation set with MONZUN-TE for vertical installation

The set is designed for heating and ventilation with heated air. It is installed bellow the ceiling.



Legend:

1 MONZUN-TE air heater
2 mixing chamber without filter
3 vertical angle diffuser
4 damping pad
5 vertical duct
6 roof air intake head
7 set of hangers (see accessories)

Fig. 29: Ventilation set with MONZUN-TE for vertical installation

MONZUN-TE	Air flow for heater with fan	
	Single-phase	Three-phase
1.1.150	600	–
1.1.180	900	1,000
1.1.220	1,100	1,400
1.2.150	600	900
1.2.200	1,000	1,000
1.2.250	1,200	1,300
1.3.180	1,000	950
1.3.220	1,300	1,200
–	–	–
1.4.150	950	1,000
1.4.180	1,100	1,200
–	–	–

MONZUN-TE	Air flow for heater with fan	
	Single-phase	Three-phase
2.1.200	900	900
2.1.250	1,000	1,100
2.1.400	1,300	1,800
2.2.250	1,200	1,300
2.2.320	1,700	1,700
2.2.420	2,200	2,200
2.3.220	1,150	1,250
2.3.280	1,700	1,650
2.3.400	2,200	2,100
2.4.200	1,200	1,200
2.4.250	1,700	1,500
2.4.350	2,000	2,050

MONZUN-TE	Air flow for heater with fan	
	Single-phase	Three-phase
3.1.450	2,000	2,400
3.1.600	2,600	2,600
3.1.800	3,100	3,700
3.2.420	1,900	2,300
3.2.500	2,450	2,550
3.2.700	2,900	3,600
3.3.400	1,750	2,250
3.3.500	2,400	2,500
3.3.600	2,800	3,550
3.4.350	1,700	2,200
3.4.450	2,350	2,400
3.4.520	2,700	3,500

Tab. 13: Air flow for ventilation set with MONZUN-TE

Ventilation set with unit MONZUN-TE, dimensions for installation

Size	Dimension [mm]					
	A	B	BK	K1	U	F
1	595	315	480	650	827	500
2	720	325	510	710	837	560
3	900	334	565	850	846	710

Tab. 14: Ventilation set with unit MONZUN-TE, dimensions for installation

Heating power for set

$$Q_{TS} = 1{,}1 \cdot Q_T \cdot \frac{\dot{V}_{VS}}{\dot{V}_V}$$

$\dot{V}_V$	[m³.h⁻¹]	air flow through the unit
V_{VS}	[m³.h⁻¹]	air flow through the set
Q_T	[kW]	heating power for unit
Q_TS	[kW]	heating power for set

Parts of ventilation set with MONZUN-TE

Mixing chamber KS

It is intended to mix the outdoor air and circulation air. The mixing chamber is made of galvanized steel with louver dampers at both the fresh and the circulating air intake.

The dampers are coupled to set the fresh air/circulating air rate from 0 to 100 %. The fresh air damper is tight, the circulating air damper is not tight.

The dampers can be adjusted manually (version .01) or with electric actuator (version .57). The mixing chamber can be supplied with or without integrated filter.

Dimensions and weight

Size	Dimension [mm]				Weight [kg]
	F	BK	CK	G	
1	500	480	655	300	24
2	560	510	755	330	28
3	710	585	930	405	40

Tab. 15: Dimensions and weight of mixing chamber

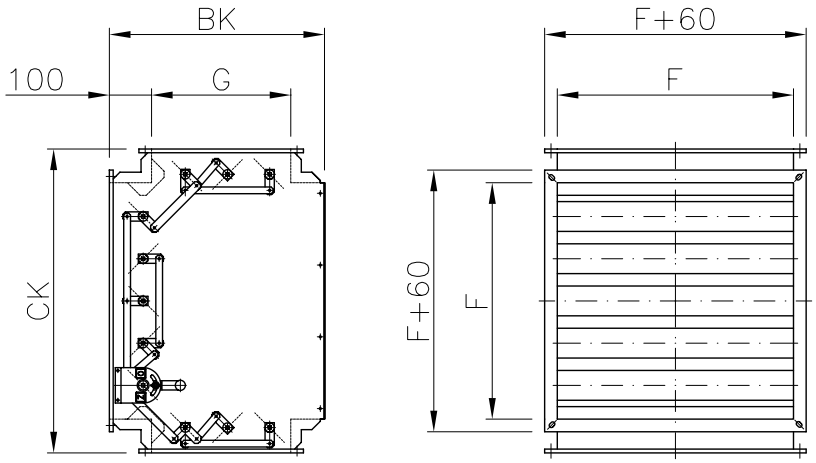


Fig. 30: Mixing chamber, version without filter fabric with manual control

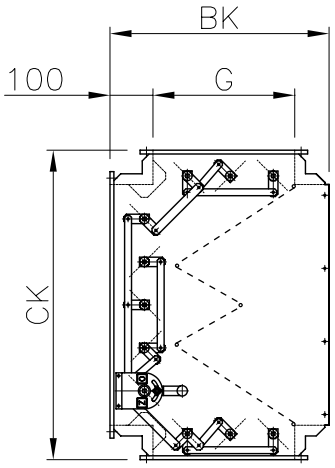
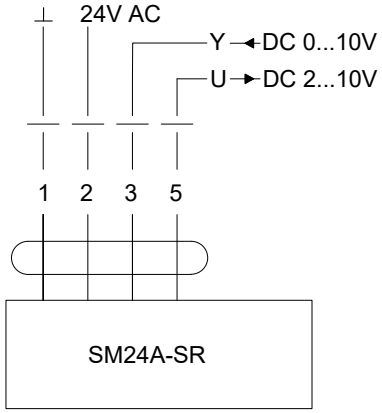


Fig. 31: Mixing chamber, version with filter fabric with manual control

Electric actuator Belimo



Caution:

- Connection via safety isolating transformer.
- Parallel connection of several motors is possible.
- You must meet the performance data.

Fig. 32: Wiring diagram of actuator Belimo SM24A-SR

Actuator Belimo type	SM 24A-SR
Power supply	AC 24 V / 50 Hz
Power input – in operation – sandby mode	 2.5 W 1.5 W
Dimensioning	5 VA (I_{max} 8,3 A @ 5 ms)
Control signal	DC 0 … 10 V @ Ri 100 k
Positioning time	150 s
Operating temperature	-30 °C … +50 °C
Weight	1,050 g

Tab. 16: Actuator Belimo SM24A-SR

With actuator Belimo SM 24A-SR is supplied control box SGF 24VM (optional accessory), which provides power supply for actuator and allows damper position adjustment. The box is connected to 230 V / 50 Hz power supply.

Vertical Duct DS

Is installed into the roof opening. It is a rectangular fresh air intake duct, 600 mm long with 4 moulding bars which are fixed to the duct and roof by the installer according to roof slope. The whole is made of galvanized steel.

Usually, the roof air intake head is installed on the top of vertical duct.

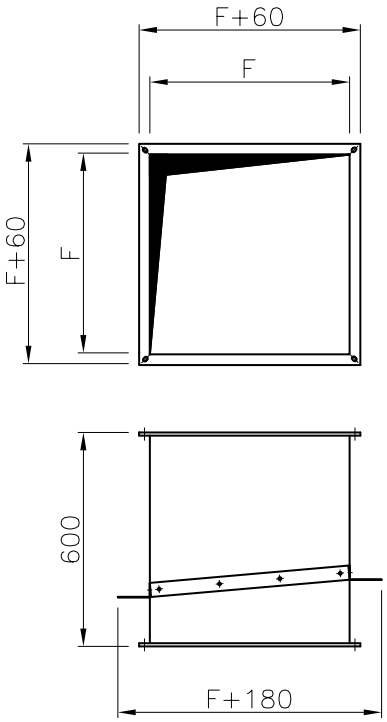


Fig. 33: Vertival duct

Size	Dimension F [mm]	Weight [kg]
1	500	14
2	560	16
3	710	21

Tab. 17: Dimensions and weight of vertical duct

Roof air intake head HS

Is designed for fresh air intake above the roof. It consists of head body and hinged roof. The entire is made of galvanized steel. In the head body a bag filter is installed. Filter pollution is signalised by differential pressure switch. Filter change is recommended when the pressure los increases by 75 to 100 % against initial. The filter change is carried out after opening the canopy rotatably attached to the body of the head.

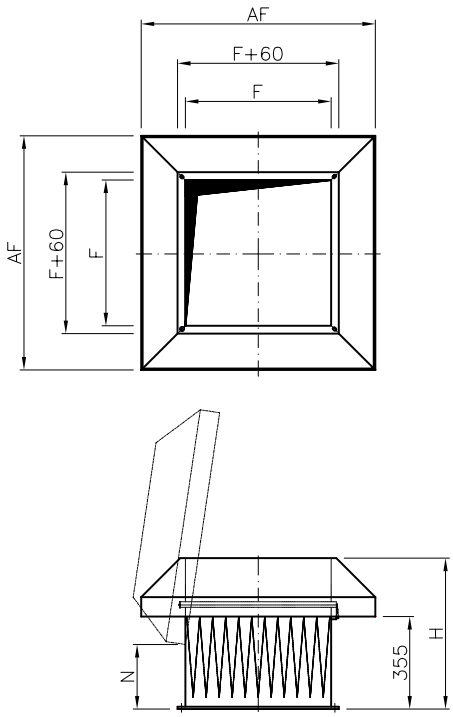


Fig. 34: Roof intake head

Size	Dimension [mm]				Weight [kg]
	F	AF	H	N	
1	500	840	590	252	24
2	560	900	590	252	27
3	710	1,100	650	227	37

Tab. 18: Dimensions and weight of roof air intake head

Horizontal duct DP

Is designed for installation into the wall opening for horizontal installation of MONZUN-TE ventilation set. The duct is rectangular, dimensions as fresh air flange of the mixing chamber, with one free flange, the supplied length is 1 m, made of galvanized steel. The precise length is adjusted on site by the installer.

Size	Dimension F [mm]	Weight [kg]
1	500	13
2	560	14,5
3	710	23

Tab. 19: Dimensions and weight of horizontal duct

Rain protection louver PDZM

Is installed at the end of horizontal duct into the wall. Standard version is made of galvanized steel, for other possible variants refer to technical brochure TPM 079/01.

Size	Dimension F [mm]	Weight [kg]
1	500	4.5
2	560	5.4
3	710	7.8

Tab. 20: Dimensions and weight of rain protection louver

Optional mechanical accessories

Wall brackets

Wall brackets are used to install hot water air heaters MONZUN-TE on the wall. It consists of a two cantilevers riveted from galvanized U profile.

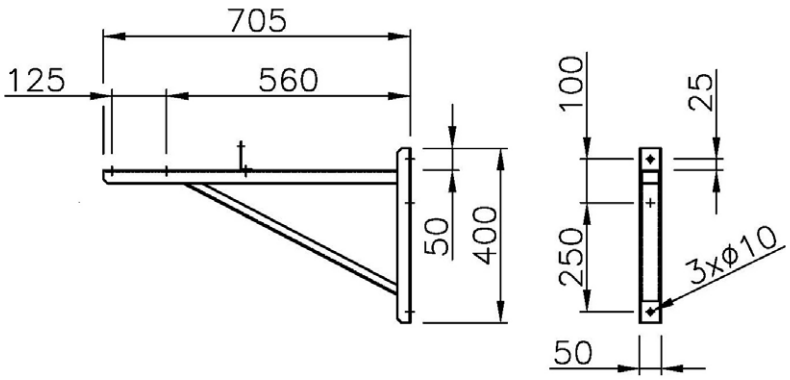


Fig. 35: Wall bracket

Example for ordering:

Wall brackets for unit	**KJ**

Unit suspender for heater vertical installation under ceiling ZJ

Is designed to install MONZUN-TE heater under horizontal structure.
It consists of four hangers made of galvanized steel profile.

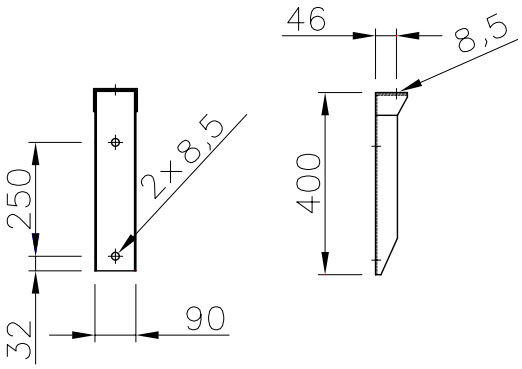


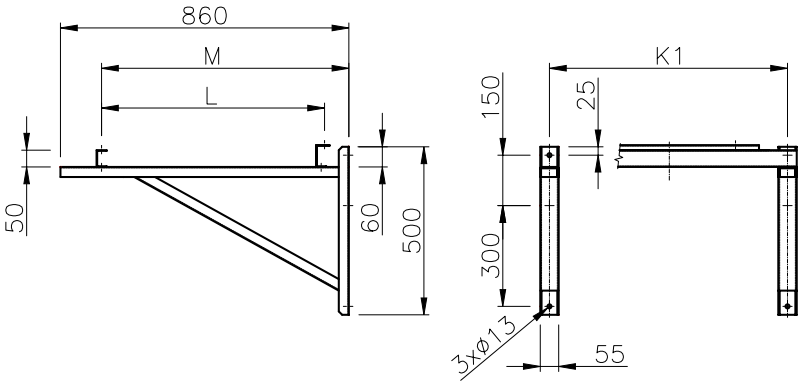
Fig. 36: Unit suspender

Example for ordering:

Unit suspender	**ZJ**

Set wall brackets for ventilation set KS

Wall brackets for ventilation set are used to install ventilation set with hot water air heaters MONZUN-TE on the wall. It consists of a pair of cantilevers welded from steel U-profile and two transverse beams which are joined by screws. The cantilevers are powder-coated RAL 9005 (black).. The bracket is supplied dismantled.



Size	Dimension [mm]			Weight [kg]
	K1	L	M	
1	650	613	728	12.5
2	710	653	728	13
3	850	755	828	17.5

Tab. 21: Dimensions and weight of set wall bracket

Fig. 37: Set wall bracket

Example for ordering:

Set wall bracket **KS** **1**

Size 1 to 3

Set suspender for ventilation set vertical installation under ceiling ZS

Is designed to install ventilation set with MONZUN-TE heater under horizontal structure.

It consists of two hangers made of galvanized steel profile.

Example for ordering:

Set suspender **ZS** **1**

Size 1 to 3

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