

GAS HOT-AIR HEATER MONZUN



INSTALLATION,
OPERATION INSTRUCTIONS
AND MAINTENANCE MANUAL

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For actual product information see www.mandik.com

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

- a) Gas hot-air heaters MONZUN 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.

MONZUN air heaters meet the ecodesign requirements of ErP 2016/2281 according to Commission Regulation (EU) 2016/2281.

Description of heaters MONZUN

Hot air gas heaters MONZUN are designed for ventilation and ecological heating of rooms and halls by heated air. Available versions are in a power range from 15 kW to 60 kW with an airflow from 2,500 to 8,000 m³/h in size: 15, 20, 30, 40, 50 and 60. In terms of gas extraction equipment, it is an open or closed appliance with forced exhaust flue gas.

A common operating fuel for MONZUN units is:

- natural gas – ZP (G20/G25)
- propane-butane – PB (G30/G31)
- propane – P (G31)

The MONZUN heaters are in the standard version intended for installation in weather-protected environments of class 3K3 according to EN 60721-3-3 with temperature range from 0 ° to +35 °C, for spaces without explosion hazard according to EN 1127-1. The air passing through the unit and the combustion air must not contain solid, fibrous, sticky or aggressive particles. They cannot be installed in rooms where there is a risk of fire or explosion.

Description of function

The heater operation is controlled by the control automatics.

After the heater is switched on, the burner fan starts to ventilate and the exchanger is ventilated with fresh air for 30 s.

After the venting time, starting speed of the burner fan is set by the control automatics, the burner electrical ignition is triggered and the electromagnetic gas valve is opened. After the burner is ignited, the speed of the burner fan is adjusted to the operating speed according to the required power.

When the heater exchanger is heated to the set temperature, the fan operating thermostat triggers the axial air fan and the heater starts to blow heated air.

The temperature of the exchanger is monitored by thermostats:

- Operating thermostat of ventilator (switches the axial fan ON and OFF according to set temperature)
- Burner operating thermostat (checks the correct temperature of the heat exchanger, if the set temperature is exceeded, it shuts down the burner operation)
- Emergency thermostat (checks the maximum allowable temperature of the heat exchanger and when this limit temperature is reached, shuts down the gas burner and activates the warning light. Operator intervention is required to unblock the emergency thermostat. Operator should check the heater and unblock the emergency thermostat.)

Appliance categories - II2E3B/P, II2ELL3B/P, design B23, C13, C33, C63
Degree of electrical protection is IP40

Emission value NO_x to 70 mg/kWh acc. to commission regulation (EU) 2016/2281 (Ecodesign 2021)

Emission class – NO_x 5

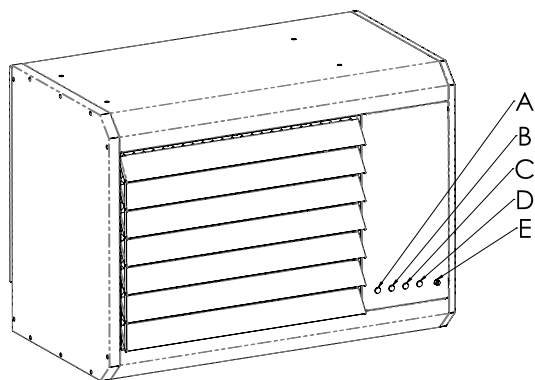
The control of the power output of the MONZUN heaters is continuous from minimum power to rated/maximum power. The heated air flow is forced by an axial fan.

Due to the high efficiency it is necessary to install a condensate drain from the chimney, unless it is otherwise addressed in special cases.

When the heater is switched off, the control unit automatically closes the electromagnetic gas valve, the speed of the burner fan is adjusted to the ventilating speed and the exchanger is ventilated with fresh air. The axial air fan keeps running and ensures that the exchanger cools down below the set temperature.

The function of the burner fan is monitored by the control automatics with the help of the fan motor speed sensor.

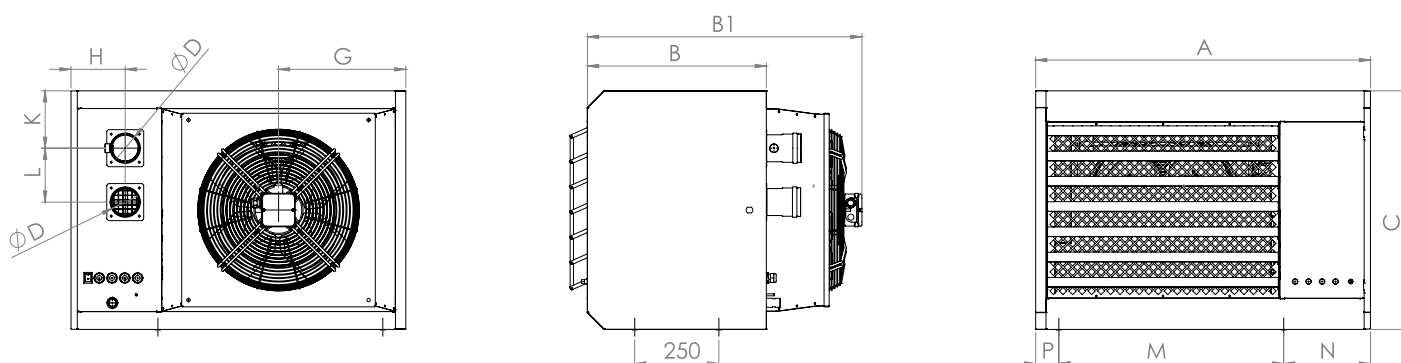
The control of the output power of the hot-air heater is carried out by the control signal 0–10 V (DC ±) or by Modbus. If the control signal is not connected, after the heater is switched on by the service switch, the heater switches to minimum power output.



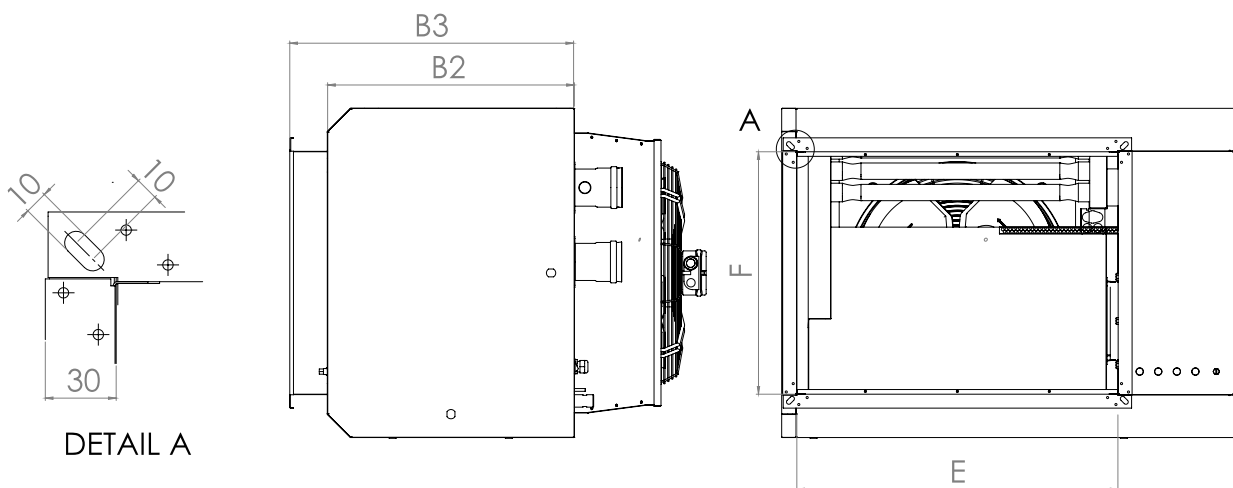
- A** Power light (green)
– connecting the heater to the network
- B** Malfunction indicator light (red)
– burner ignition failure or flame extinguishing
- C** Running light (orange)
– presence of flame
- D** Over temperature light (red)
– exchanger overheating (failure)
- E** Emergency thermostat deblocking button
– hidden button under the cap

Pic. 1: Signalization of functions

Dimensions and weights



Pic. 2: Dimensions of MONZUN Z(V) heaters



Pic. 3: Dimensions of MONZUN P heaters

Performance series [kW]	15, 20	30, 40	50, 60
Dimension A [mm]	785	995	1,200
Dimension B [mm]	533	533	533
Dimension B1 [mm]	735	815	815
Dimension B2 [mm]	665	666	666
Dimension B3 [mm]	807	948	948
Dimension E [mm]	480	690	890
Dimension F [mm]	465	520	540
Dimension C [mm]	655	710	733
Dimension D [mm]	80	80	100
Dimension H [mm]	161	161	133
Dimension K [mm]	117	170	182
Dimension L [mm]	160	160	180
Dimension G [mm]	223	375	483
Dimension M [mm]	458	668	668
Dimension N [mm]	258	258	258
Dimension P [mm]	68	68	270
Design Z, V, P – heater weight [kg]	65	90	117
Design Z, V, P – the weight of heater with the transport package [kg]	81	106	136
Design K – heater weight [kg]	53	72	93

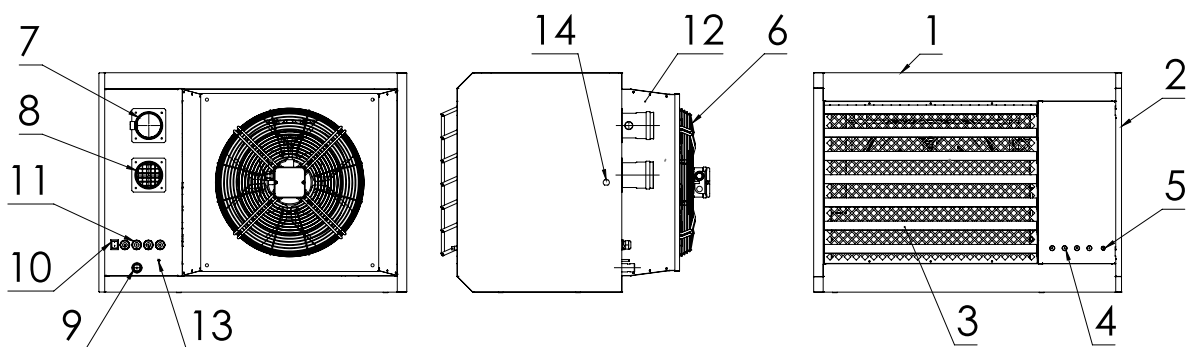
Tab. 1: Dimensions and weights of MONZUN heaters

Versions

MONZUN heaters are available in these designs:

- For horizontal mounting – design Z
- For vertical mounting (under the ceiling) – design V
- Discharge flange – design P
- For installation in air handling units – design K

MONZUN heaters in design K do not have blinds, diffusers, fan or fan carrier and may only be used as part of air handling units.



- 1 Cabinet of the heater
- 2 Burner chamber side door
- 3 Tilting blinds (In design V, the direction of the blinds is different)
- 4 Indicators (power supply, error, running, overheating)
- 5 Emergency thermostat
- 6 Axial air fan
- 7 Flue gas outlet
- 8 Combustion air inlet
- 9 Gas connection
- 10 Service switch
- 11 Grommet: PG 13,5 (4 pcs)
- 12 Fan carrier
- 13 Grounding screw
- 14 Door lock

Pic. 4: Main part of MONZUN Z(V) heater

Technical parameters

Performance series [kW]	15	20	30	40	50	60
Rated power input Hi [kW]						
Fuel G20 – ZP	17.3	22.2	32.4	37.4	49.9	60
Fuel G25 – ZP	17.3	22.1	32.4	37.4	49.9	60.1
Fuel G31 – propane	16.5	22	32.4	38.3	49.9	60.4
Fuel G30 – butane	16.5	21.9	32.4	38.3	49.9	60.4
Rated heating output [kW]						
Fuel G20 – ZP	16	20.3	29.8	34.3	46.2	54.7
Fuel G25 – ZP	16	20.2	29.8	34.3	46.2	54.8
Fuel G31 – propane	15.1	20.1	29.8	35.1	46.1	55.1
Fuel G30 – butane	15.1	20.1	29.8	35	46.1	55.1
Minimal heating power output [kW]						
Fuel G20 – ZP	12	12	22.4	22.4	35	35
Fuel G25 – ZP	12	12	22.4	22.4	35	35
Fuel G31 – propane	11.8	11.8	22.1	22.1	35	35
Fuel G30 – butane	11.3	11.3	22.1	22.1	35	35
Gas consumption at nominal power						
G20 – ZP [m ³ /h]	1.8	2.3	3.35	3.86	5.16	6.2
G25 – ZP [m ³ /h]	2.17	2.76	4.04	4.69	6.14	7.49
G31 – propane [kg/h]	1.35	1.8	2.66	3.14	4.09	4.95
G30 – butane [kg/h]	1.3	1.73	2.55	3.02	3.91	4.76
Gas consumption at minimal power						
G20 – ZP [m ³ /h]	1.3	1.3	2.42	2.42	3.78	3.78
G25 – ZP [m ³ /h]	1.64	1.64	2.88	2.88	4.51	4.51
G31 – propane [kg/h]	0.97	0.97	1.82	1.82	3.02	3.02
G30 – butane [kg/h]	0.93	0.93	1.75	1.75	2.89	2.89
Connecting overpressure						
G20 – ZP [mbar]	17–26					
G25 – ZP [mbar]	25–30					
G31 P [mbar]	30–50					
G30/31 PB [mbar]	30–50					
Electrical connection [V/Hz]	230/50					
IP protection	IP40					
Electrical input power [kW]	0.28	0.28	0.48	0.48	0.92	0.92
Fuse [A]	4					
Air flow [m ³ /h]	3200	3200	4950	4950	8050	8050
Air flow range in free space, residual speed 0,25 m/s [m]	13	13	19	19	27	27
Increase air temperature at rated power [°C]	19.4	19.4	23.5	23.5	22.3	22.3
Average sound level at 1 m from the device in free acoustic field [dB(A)]	63.5	63.5	68.6	68.6	73.6	73.6

Tab. 2: Technical parameters of MONZUN heaters

Material, surface treatment

The heater housing is made of galvanized steel sheet, powder coated, the assembly of individual sheet metal parts is made with screws and blind rivets. The heater exchanger is made of stainless steel.

The minimum distance between the surface of the heater and other surfaces is indicated on the picture below. The minimum distance between the non-insulated flue duct and flammable materials is 500 mm. From face side is minimum distance 3,000 mm.

It is not permitted to discharge flue gas through the wall/ceiling from combustible materials.

The heater must be installed in accordance with applicable standards and regulations.

BEFORE INSTALLING, CHECK:

- Local conditions of fuel distribution, fuel characteristics, overpressure, existing status heater settings in the production plate are compatible.
- Main conditions of electrical power supply are compatible with electrical data on the label.
- **The temperature of the flue gas at the outlet of the heater does not exceed 200 °C!**

The use of heaters in a corrosive environment is prohibited!

THE MANUFACTURER IS NOT RESPONSIBLE FOR DAMAGES CAUSED BY INCORRECT INSTALLATION.

Installation principles

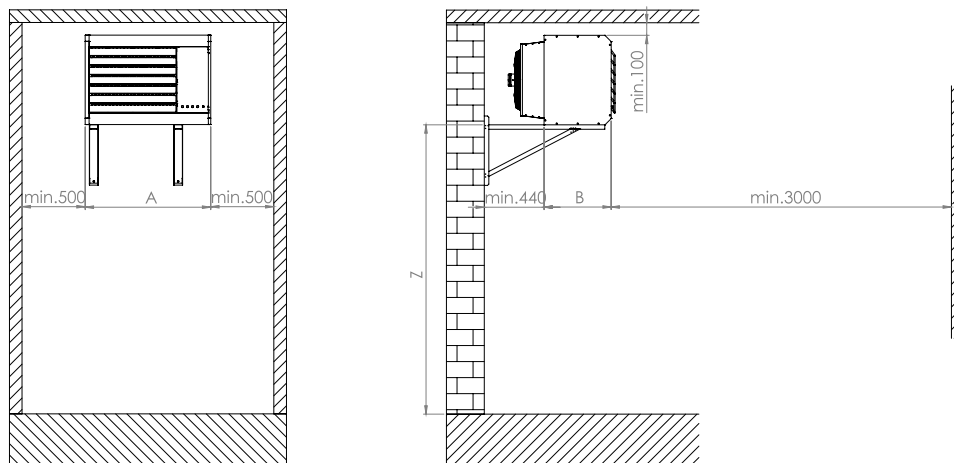
The conditions for connecting gas heaters to the for gas distribution and to the electricity network are given in chapters Examples of typical design of flue gas exhaust and combustion air supply.

The amount of combustion air for heaters must comply with relevant standards and regulations.

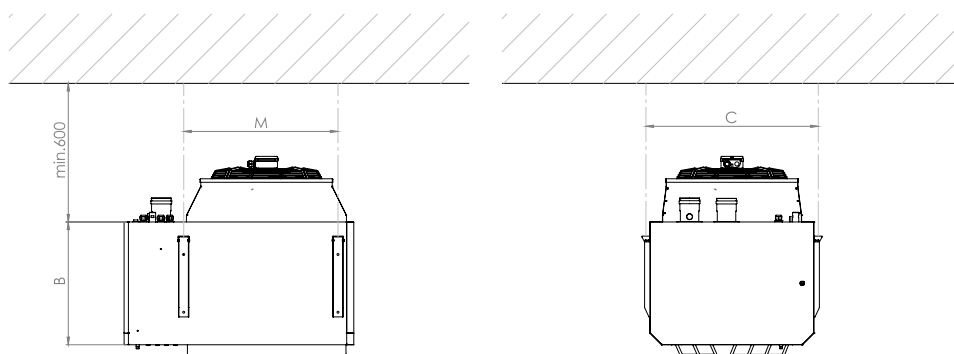
Recommended installation height Z (mm) of heaters MONZUN (with outlet with tilting louvers on discharge) is listed in *Tab. 3*.

Minimum space for heater installation:

Free access (min. 500 mm) to the burner chamber and to the exchanger must be provided from the sides. Determination of the safety distance of heaters and exhaust pipes from the surface of building materials must comply with the relevant standards. See *Pic. 5* and *Pic. 6*.



Pic. 5: Minimum space for installation on the wall



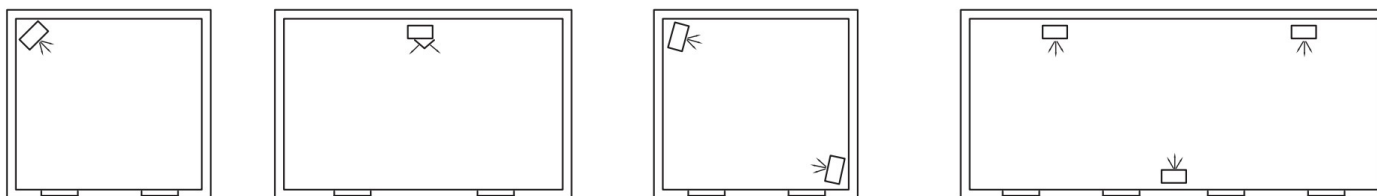
Pic. 6: Minimum space for installation under the ceiling

MONZUN [kW]	Dimensions [mm]				
	A	B	C	M	T
15, 20	785	533	700	458	2,200
30, 40	995	533	755	668	2,500
50, 60	1,200	533	776	668	3,000

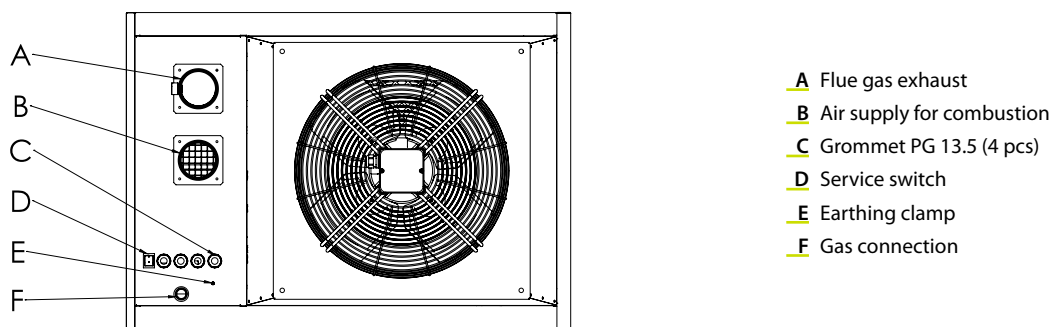
Tab. 3: Mounting dimensions – MONZUN Z(V)

The MONZUN heater has four suspension points on the upper panel and four suspension points on the lower panel, which are fitted with M8 bolts, for which it is attached to a supporting structure, e.g. on

a bracket. Select the location of the MONZUN heaters so that the entire space is ventilated.



Pic. 7: Example of installation of MONZUN heaters in heated space

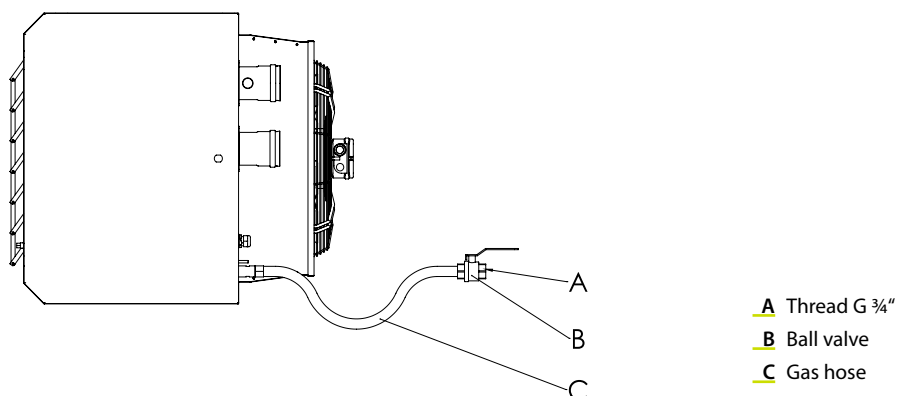


Pic. 8: Connection points of the MONZUN heater

Gas connection installation

Connection of heaters with output power up to 50 kW is solved according to EN1775 Gas supply – gas pipelines in buildings – operational requirements; connection of heaters over 50 kW is solved according to EN 15001-1 Gas supply – Gas pipelines with operating pressure higher than 0.5 bar for industrial use and gas pipelines with operating pressure higher than 5 bar for industrial and non-industrial use. In the piping, a stable non-fluctuating gas pressure must be guaranteed during operation of the heater. See Tab. 2.

The gas line must be terminated with a gas ball valve near the heater connection (Pic. 9). The actual connection of the heater to the gas through a flexible gas hose or through a screw connection. The gas inlet pipe is terminated with an external thread G3/4", the minimum gas hose diameter is 15 mm. The ball valve and gas hose are not part of the heater.



Pic. 9: Connection MONZUN heater to the gas distribution

The heater must only be connected by an authorized organization. Before connecting, check that the type and pressure of the gas correspond to the data on the data label (on the rear panel of the heater). The gas hose is subject to regular inspections and inspections as gas

distribution (TPG 704 01). Hoses must be protected against mechanical stress and aggressive substances. The hose must not be subjected to tension.

Electrical installation

The MONZUN heaters are connected to the terminal block by a power supply with a stop switch/circuit breaker. The power input is decisive for supply sizing. The MONZUN heaters must be connected to the TN-S system in accordance with the applicable standards. The power supply must have the required protection according to the

relevant standard. According to EN 61140, MONZUN heaters are class I electrical appliances and are equipped with a protective conductor connection terminal. This terminal must be connected acc. to the above standard

Notice: After removal of the side door at the burner chamber, according to EN 60 947-1, the protection of the device is IP 00 (there is a risk of electric shock).

FLUE EXHAUST AND COMBUSTION AIR SUPPLY

Flue gas discharge is forced, through a flue outside the building.

The appliance is classified in categories B23, C13, C33 and C63 according to the method of exhaust gas – see EN 1020.

The design and installation of the flue pipe must comply with the relevant standard.

The fan of the premix burner of MONZUN heaters, together with the gas fitting and the venturi tube, ensures a constant mixing ratio of fuel and air in the entire performance range.

Flue gas discharge can be realized by:

- flue gas duct terminated by end cap

Combustion air supply can be realized by:

- from the area where the heater is located
- from outside using piping for suction

If the pressure losses in the flue gas exhaust system and the combustion air supply are too high, the transported amount of the mixture will decrease and the burner performance will decrease. In case of blockage, the heater will be shut down.

The maximum temperature of the flue gas at the outlet of the heater does not exceed 200 °C.

The hot air heater is equipped with two sockets (female) – one for connecting the flue pipe and the other for air intake.

- coaxial chimney, which simultaneously removes flue gas and air intake for combustion

- coaxial chimney, which simultaneously removes flue gas and air intake for combustion

The sum of the pressure loss values of the air intake and flue gas exhaust systems must not exceed 100 Pa – see *Tab. 4* and *Tab. 5*. Discharge of flue gas through the wall/ceiling from combustible materials is not permitted.

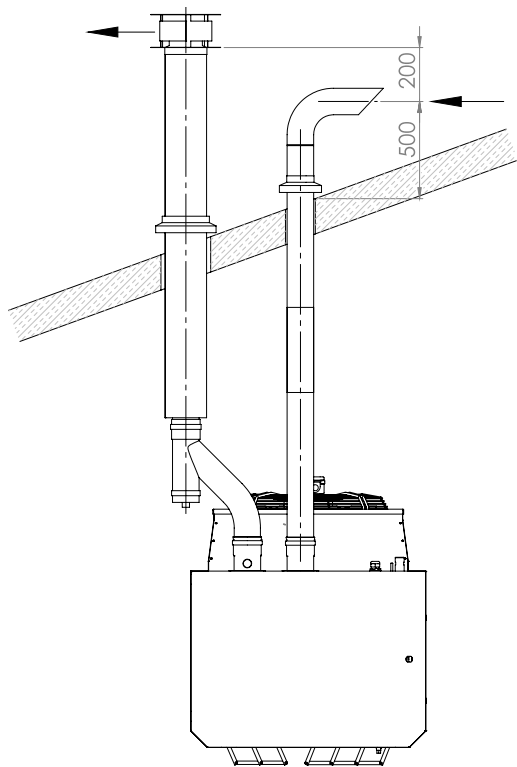
MONZUN [kW]	Nominal size [mm]	Pressure loss [Pa]								
		Tube 1 bm	Bend 45°	Bend 90°	RKN 90°	Coaxial chimney horizontal	Coaxial chimney vertical	Exhaust head horizontal	Exhaust head vertical	Flex-tube Al Air intake 1 bm
15	DN 80	2.5	4	8	13	30	35	7	8	5
	DN 100	1.5	2	4	7	18	20	4	5	3
20	DN 80	3.5	6	10	16	40	50	9	12	7
	DN 100	2	2.5	5	9	23	26	5	7	4.5
30	DN 80	6	9	12	26	60	75	20	26	12
	DN 100	3.5	5	7	14	33	36	12	14	7
40	DN 80	9	11	15	30	70	90	25	30	14
	DN 100	4	6	8	16	37	40	14	16	8
50	DN 100	6	9	14	27	57	62	19	21	10
60	DN 100	9	11	17	32	70	80	25	28	13
	DN 125	5	6	9	16	36	42	13	15	8

Tab. 4: Pressure losses of flue gas exhaust and combustion air supply components – aluminium system

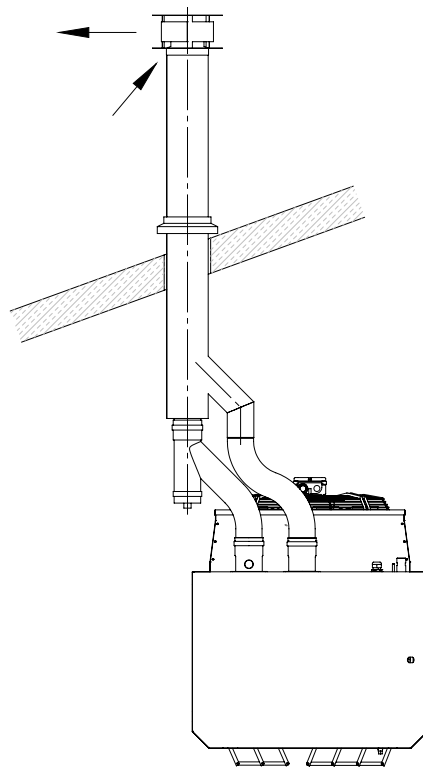
MONZUN [kW]	Nominal size [mm]	Pressure loss [Pa]										
		Tube 1 bm	Bend 45°	Bend 90°	RKN 90°	Coaxial chimney horizontal	Coaxial chimney vertical	Exhaust head horizontal	Exhaust head vertical	Flex-tube Al 1 bm	Flex-tube INOX 1 bm	Flex-tube Al Air intake 1 bm
15	DN 80	2	2.5	4	8	28	37	6	7	8	4	5
	DN 100	1.5	1.5	2	4	16	23	3	4	5	2	3
20	DN 80	3.5	4	6	11	40	51	10	12	14	6	7
	DN 100	2	2	2	6	21	28	5	6	7.5	3	4.5
30	DN 80	5	6	9	16	55	75	18	24	26	9	12
	DN 100	3	3	5	10	27	33	7	9	11	5	7
40	DN 80	8	9	13	20	66	90	25	29	30	10	14
	DN 100	3.5	4.5	7	14	35	44	11	14	16	7	8
50	DN 100	5.5	6.5	11	22	53	66	15	18	21	11	10
60	DN 100	8	9	15	30	65	75	22	26	26	12	13
	DN 130	5	7	8	15	34	38	12	14	14	6	8

Tab. 5: Pressure losses of flue gas exhaust and combustion air supply components – stainless steel system

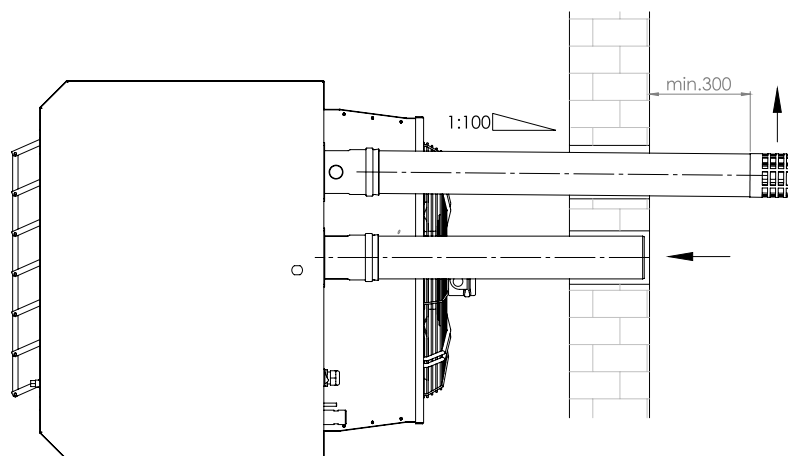
Examples of typical design of flue gas exhaust and combustion air supply



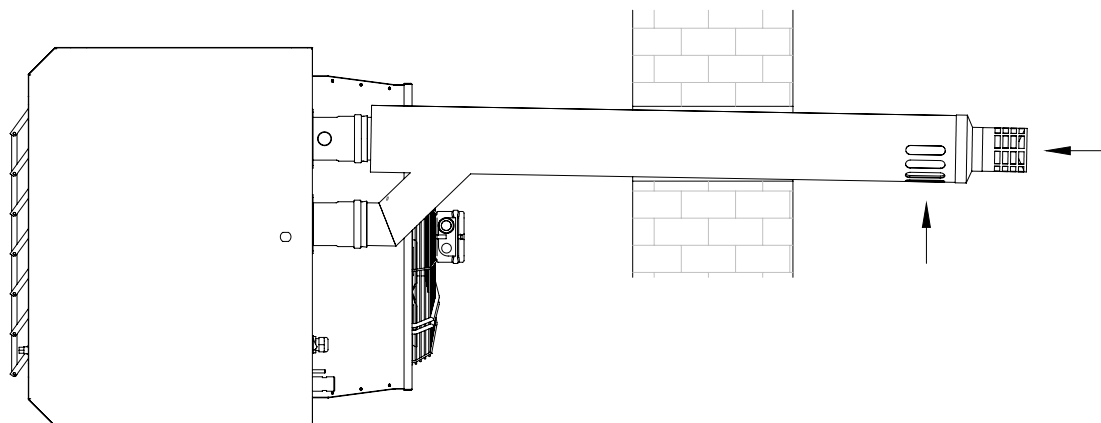
Pic. 10: Vertical installation – Flue exhaust through the roof with separate air intake



Pic. 11: Vertical installation – Flue exhaust through the roof by coaxial chimney



Pic. 12: Horizontal installation – Flue exhaust through the roof with separate air intake



Pic. 13: Horizontal installation – Flue exhaust through the roof by coaxial chimney

Performance series [kW]	15	20	30	40	50	60
Fan speed – nominal output power [min ⁻¹]	3,800	4,600	4,500	5,500	4,500	5,250
Fan speed – start [min ⁻¹]	3,500	3,500	4,150	4,150	4,100	4,100
Fan speed – minimal output power [min ⁻¹]	2,750	2,750	3,500	3,500	3,800	3,800
Oxygen content in flue gas at rated power output [%]	5.8	5.8	5.5	5.5	5.4	5.4

Tab. 6: Adjustment data for natural gas G20

Performance series [kW]	15	20	30	40	50	60
Fan speed – nominal output power [min ⁻¹]	3,900	4,700	4,600	5,600	4,600	5,250
Fan speed – start [min ⁻¹]	3,500	3,500	4,150	4,150	4,100	4,100
Fan speed – minimal output power [min ⁻¹]	2,750	2,750	3,500	3,500	3,800	3,800
Oxygen content in flue gas at rated power output [%]	5.5	5.5	5.5	5.5	5.4	5.4



Tab. 7: Adjustment data for natural gas G25

Performance series [kW]	15	20	30	40	50	60
Fan speed – nominal output power [min ⁻¹]	3,700	4,700	4,900	5,400	4,700	5,500
Fan speed – start [min ⁻¹]	3,500	3,500	4,100	4,100	4,100	4,100
Fan speed – minimal output power [min ⁻¹]	2,750	2,750	3,400	3,400	3,300	3,300
Oxygen content in flue gas at rated power output [%]	6	6	6	6	5.5	5.5

Tab. 8: Adjustment data for propane G30, propane-butane G30/G31



Commissioning

Manual switch-on of heating

With repeated pushing of left button select the heating mode  and the comfort mode . If the room temperature is lower than the set comfort one, the heater switches on. In case the set comfort temperature is below the current room one, increase it by turning the wheel

clock-wise, the required temperature blinks and has no thermometer symbol. The heater burner output is modulated depending on the difference between the requested and current room temperature.



Manual switch-on of ventilation (summer operation)

With the left button set the cooling mode  and comfort . If the room temperature is below than the set comfort one, the heater fan switches on. Provided the current room temperature is below the set

comfort one, you shall lower the requested comfort temperature below the current one in order to switch on the ventilation.

Decommissioning

Manual switch-off of heating

Using the left button set the mode with a requested temperature below the current room temperature (attenuation , antifreeze ) or turn the wheel anti-clockwise to reduce the requested comfort

temperature. The heater burner switches off and stops to heat the exchanger. Following the exchanger cooling-down the heater fan gets switched off.

Manual switch-off of ventilation (summer operation)

Use the left button to set another mode, for ex. cooling + anti-freezing or cooling + attenuation. The heater fan switches off immediately.

Notice:

- Shutting down in heating mode with the main switch or closing the gas supply is prohibited. The only permitted shut-down is electrical, see "Decommissioning" chapter.
- Only the electrical protection of the device, the main switch or pulling the power cord from the socket can disconnect the heater from the electrical supply. In this way, the device may only be switched off if it is not in the heating function and the air fan is not cooling the exchanger.

It is important to ensure that the air fan is not obstructed or that the shutters are closed, as this will change the operating conditions of the

device (too high temperature of the exhaust air due to insufficient cooling of the exchanger) – risk of overheating of the device!!!

Maintenance

Regular annual inspections shall be carried out according to the relevant standard (is not part of warranty service). The manufacturer recommends to perform a professional service inspection once per year as described by the manufacturer, in particular:

- Security elements of the appliance.
- Leakage of the heat exchanger, exhaust system and their integrity.
- Leakage of the gas installation of the appliance.

When operating in a polluted environment, it is necessary to regularly remove dust that may accumulate on the louvres, the air fan grill and around the heat exchanger.

All professional work may only be performed by a service technician with the relevant certificate and authorization from the company MANDÍK, a. s.

Failures and their elimination

Before solving a MONZUN heater fault, we recommend:

Make sure the gas caps are open. Check the power cables and control presents. Most commissioning failures result from poor cable installation, which can lead to damage to the controller.

- 230 V between phase L1 and neutral conductor N
- 230 V between phase L1 and a protective conductor PE
- 0 V neutral conductor N and a protective conductor PE

Make sure that the room thermostat is set to heating.

After each repair or conversion, the heater must be put back into operation by a service technician trained and authorized by the company MANDÍK, a. s.

Heater failure	Cause	Removal
The power light (green light) is off	faulty light	replace the light
	fuses (circuit breakers) dropped	replace fuses (switch circuit breaker)
	grid failure	remove the fault of the grid
The burner fan does not work	faulty burner fan	replace the burner fan
	defective automatic control	replace the control automatic
	faulty burner thermostat	replace the burner thermostat
	defective emergency thermostat	replace the emergency thermostat
	faulty thermal protection of the air fan	replace the air fan
Can't start – burner fan works	defect in wiring	check the electrical connection
	defective gas valve	replace the gas valve
	defective control automatic	replace control automatic
	electrodes or electrode cables not assembled or defective	replace or set correctly
	wrong electrode grounding	ground properly
	poorly set starting power	properly set start power
The burner starts, but then goes off	low gas pressure in the distribution	increase the pressure in the distribution
	defective ionisation electrode	replace ionisation electrode
	defective ionisation electrode cable	replace cable
The burner goes off and then red light indicator (overheating) lights up	overheated exchanger	unlock thermostat
	defective emergency thermostat	replace the emergency thermostat
Air axial fan does not start	defective air fan	replace the air fan
	faulty capacitor of the fan	replace the capacitor
	defective fan thermostat	replace the fan thermostat

Tab. 9: Failure and fixing

Notice:

When the burner is running, it is necessary to avoid shutting down the electric power supply! This can lead to overheating of the exchanger through thermal inertia – it does not cool down. In case of overheating of the heater (failure of the air blower, thermostat of the burner, closed blinds, failure of the electric current during the operation of the burner...) and subsequent blocking of the emergency

thermostat let the heater cool down, remove the fault and unlock the thermostat (unscrew the cover of the emergency thermostat and use a tool (rod, screwdriver, ...) Press the unlock button), in case of failure or repetition of the fault, contact the service organization or the manufacturer.

Under no circumstances must the flue pipe be blocked or blocked or combustion air drawn in.

INSTALLATION AND DISASSEMBLY OF COMPONENTS

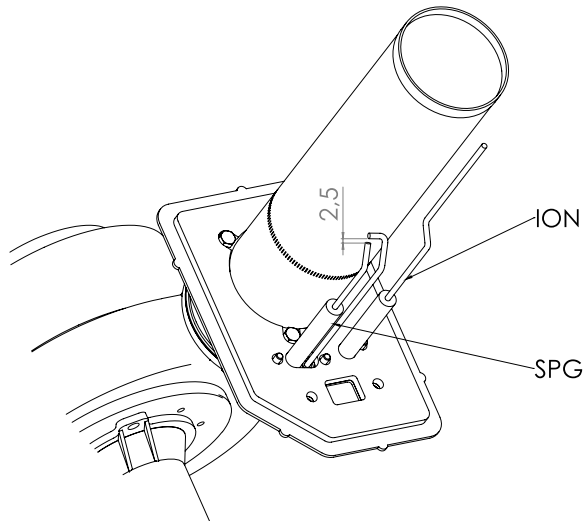
ALL PROFESSIONAL WORK MAY ONLY BE PERFORMED BY A SERVICE TECHNICIAN WITH THE RELEVANT CERTIFICATE AND AUTHORIZATION FROM THE COMPANY MANDÍK, A. S.

Burner assembly removal:

1. Disconnect the MONZUN heater from the electrical network and close the gas supply.
2. Remove the door of the burner box.
3. Disconnect the internal gas hose.
4. Disconnect the cable connectors from the burner fan.
5. Disassemble the burner assembly.
6. Install in reverse order and perform a leak test.

Electrodes removal and adjustment:

1. Disconnect the MONZUN heater from the electrical network and close the gas supply.
2. Remove the door of the burner box.
3. Disassemble the electrodes with cable located on the torch holder.
4. Install in reverse order and check that the electrodes are set correctly, adjust the distance between the electrodes. Check the function of the device.



ION – Ionisation electrode

SPG – Ignition electrode

Pic. 14: Electrodes adjustment

Burner fan removal:

1. Disconnect the MONZUN heater from the electrical network and close the gas supply.
2. Remove the door of the burner box.
3. Disconnect the cable connectors from the exhaust fan.
4. Disassemble the burner assembly.
5. Disassemble the burner fan.
6. Install in reverse order, replace fan seal.

Control automatic removal:

1. Disconnect the MONZUN heater from the electrical network and close the gas supply.
2. Remove the door of the burner box.
3. Disconnect the cable connectors of the control automatic.
4. Disassemble the control unit.
5. Install in reverse order and check the function of the device.

Gas valve and venturi tube removal:

1. Disconnect the MONZUN heater from the electrical network and close the gas supply.
2. Remove the door of the burner box.
3. Disconnect the internal gas hose.
4. Remove the control automatic from the gas valve.
5. Disassemble the Venturi with the gas valve (2 M6 screws with 4 mm hex).
6. Remove the gas valve from the Venturi tube (3 M6 screws with 4 mm hex).
7. Install in the reverse order and perform a leak test and check the function of the device.

Venturi tube adjustment after replacement:

This is a pre-setting of a mixture that is easy to ignite.

1. Install the Venturi tube to the gas valve and then together to the burner fan.
2. Completely close the richness adjusting screw = tighten as far as it will go, then loosen the number of turns according to the *Tab. 10*.

ADJUSTMENT ACCORDING TO THE FLUE ANALYZER IS ABSOLUTELY NECESSARY!

Monzun [kW]	Fuel	Venturi tube	Number of revolutions of adjusting screw from fully closed = enable
15, 20	G20 (natural gas)	203	6.5
	G25 (natural gas)		7.5
	G30/G31 (propane-butane)		3
30, 40	G20 (natural gas)	202	5.5
	G25 (natural gas)		6.5
	G30/G31 (propane-butane)		2
50, 60	G20 (natural gas)	201	5
	G25 (natural gas)		6
	G30/G31 (propane-butane)		1.5

Tab. 10: Pre-setting the richness of the mixture after replacing the venturi tube

Air fan removal:

1. Disconnect the MONZUN heater from the electrical network and close the gas supply.
2. Remove the door of the burner box.
3. Disconnect the air fan cable from the terminal box.
4. Remove the air fan from the fan carrier.
5. Install in reverse order and check the function of the device.

Conversion to another type of fuel

Conversion of MONZUN heaters to other fuels may only be carried out by a service technician authorized by MANDÍK, a. s., who will then put the heater back into operation.

Necessary equipment:

- Flue gas analyser
- Computer with Honeywell ESYS software and cable for connection to the control automatics
- Screwdriver to adjust the richness of the mixture

When converting to a different fuel, no parts are replaced, the re-building consists in setting the appliance to a new fuel.

Necessary equipment:

1. Setting the burner fan speed to the respective fuel, see *Tab. 6 – Tab. 8*. The speed setting is performed from the computer using Honeywell ESYS software. The computer is connected with control automatics by Honeywell DI100001U cable. The heater must be connected to the power supply to set the speed.
2. The fuel/air richness is adjusted by the adjusting screw on the bottom of the Venturi tube. By loosening the screw, the fuel is added to the mixture, and the fuel goes away by tightening. The adjusting screw has a right-hand thread.

When adjusting the richness of the mixture, first perform a pre-adjustment on the heater switched off, and after switching on the heater and igniting the burner, adjust the richness of the mixture using the flue gas analyser to the values in *Tab. 6 – Tab. 8*.

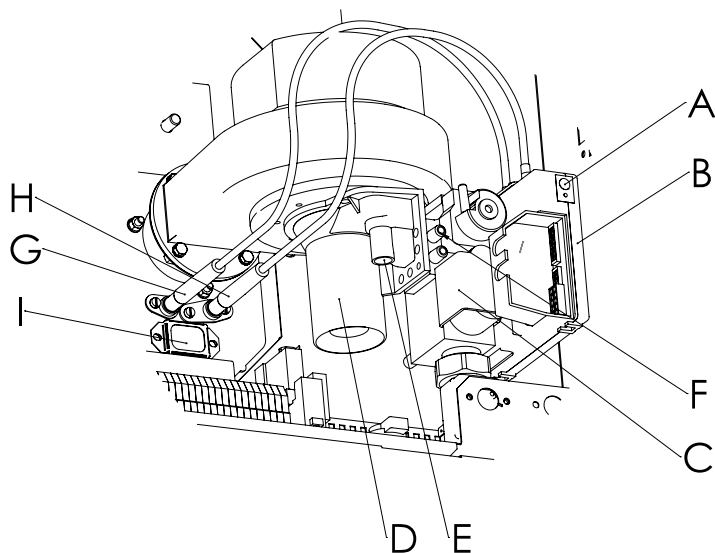
Original fuel	New fuel	Direction of rotation by adjusting screw	Number of revolutions of adjusting screw
G20	G25	+ loosen	1
G25	G20	- tighten	0
G20	G30/G31	- tighten	3.5
G30/G31	G20	+ loosen	5

– The pre-setting is only to prepare a new fuel blend that can easily be ignited.

Tab. 11: Pre-setting the richness of the mixture for individual rebuilds

ADJUSTMENT ACCORDING TO THE FLUE ANALYZER IS ABSOLUTELY NECESSARY!

After setting the richness of the mixture, check the heater function, especially the cold starts.



- A** Control automatic reset button
- B** Control automatic
- C** Gas valve
- D** Venturi tube
- E** Mixture adjustment screw
- F** Place for checking the connected overpressure (loosen the screw, put on the manometer hose)
- G** Ionisation electrode
- H** Ignition electrode
- I** Small window of the combustion chamber

Pic. 15: Burner assembly

Components used in heaters MONZUN

Gas valve:

- Honeywell VK4115V2012B
- EBM Papst G20E01 BC1CS

Control automatic:

- Honeywell S4965V3166B
- Honeywell S4965V3250
- EBM Papst 900MN

Burner fan:

- EBM Papst

Thermostats:

- TG (REGULUS)
- IMIT (COMTHERM)

Axial air fan:

- EBM Papst
- ZIEHL-ABEGG
- AFL

Venturi tube:

- Honeywell
- EBM Papst

Recycling and disassembly at the end of life

After the end of its life, the old device can be disposed of in the following ways:

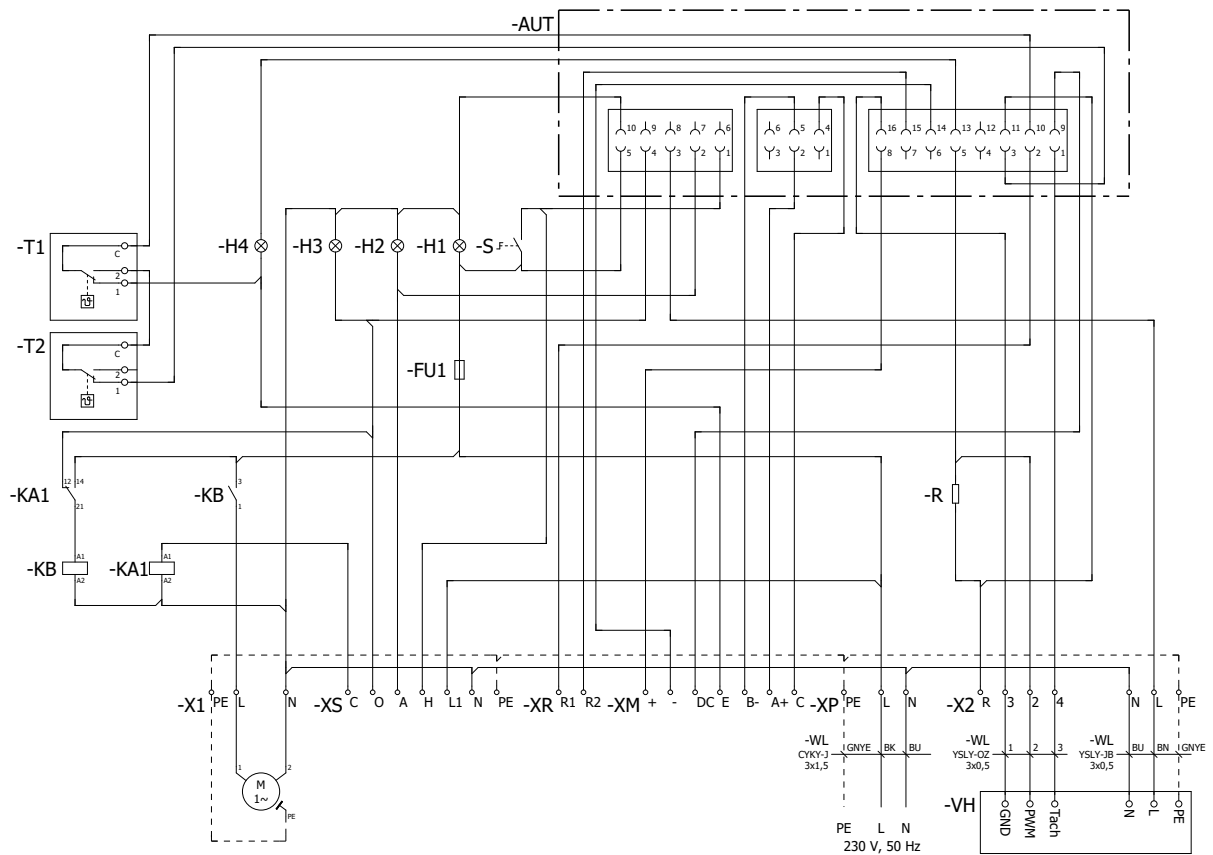
1. When purchasing a new device, the supplier will take back the old heater and ensure its disposal.
2. Hand over the old heater to the manufacturer for disposal.
3. Disassemble the heater and give it away as scrap.

It is necessary to disassembly to these parts:

- Fans, Venturi tubes, gas valve and heater wiring are electrical waste
- The heater shell is a lightweight 27 grade steel waste
- The exchanger, burner and burner extension are alloyed steel waste, class 025

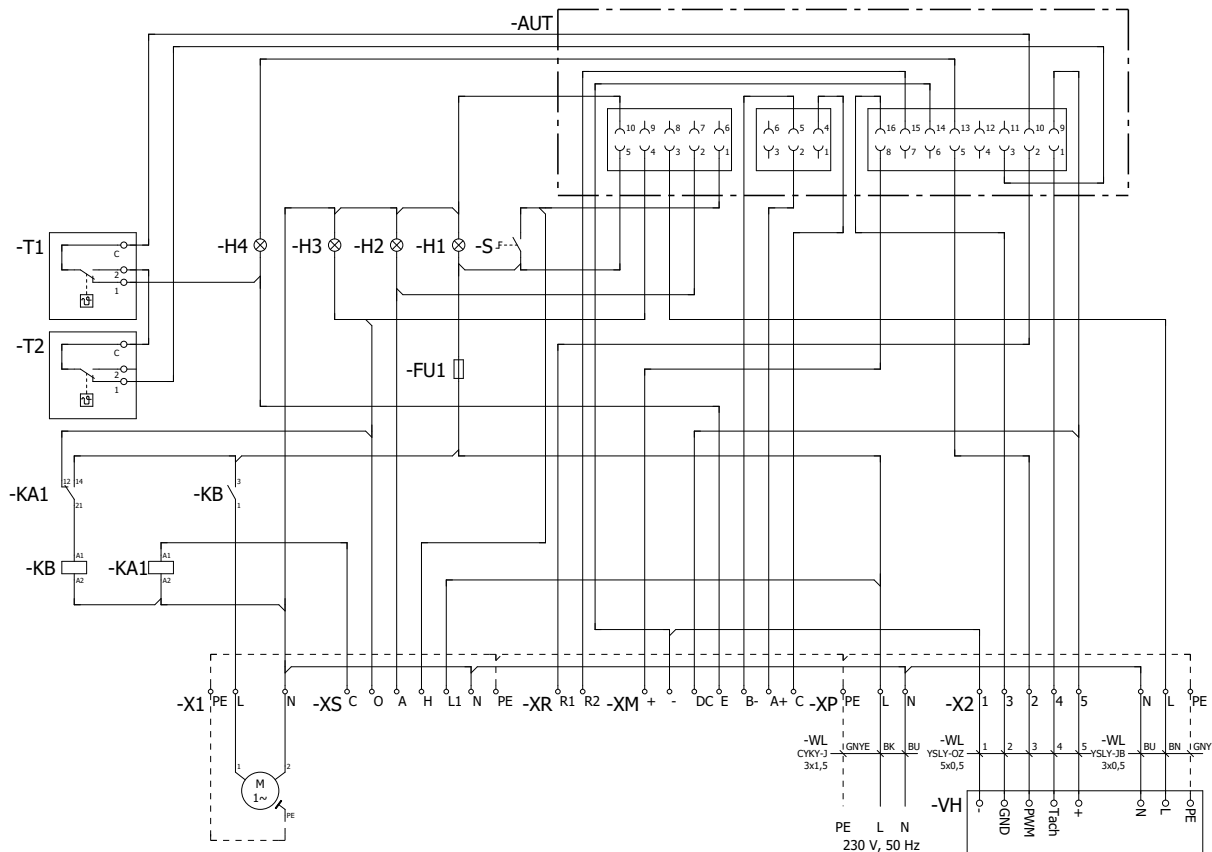
CONTROL

Wiring diagram MONZUN



- | | | |
|---|---|--|
| T1 Emergency thermostat | H3 Burn indicator light (orange) 230 V | VH Burner fan |
| T2 Thermostat for burner | H4 Overheat indicator light (red) 24 V | M Axial air fan |
| KB Bimetal time switch for axial air fan | S Service switch | XP Power supply terminals |
| KA1 Relay for venting | FU1 Fuse 3.15 A | XS, XR, XM Terminals for control connection |
| H1 Power indicator light (green) 230 V | R Resistance of fan power circuit | |
| H2 Malfunction indicator light (red) 230 V | AUT Control automatic | |

Pic. 16: Wiring diagram of MONZUN 15–40kW heaters



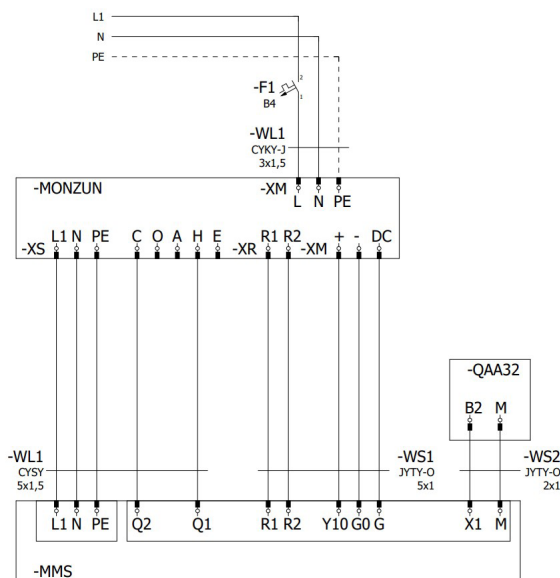
- T1** Emergency thermostat
- T2** Thermostat for burner
- KB** Bimetal time switch for axial air fan
- KA1** Relay for venting
- H1** Power indicator light (green) 230 V
- H2** Malfunction indicator light (red) 230 V
- H3** Burn indicator light (orange) 230 V
- H4** Overheat indicator light (red) 24 V
- S** Service switch
- FU1** Fuse 3.15 A
- AUT** Control automatic
- VH** Burner fan
- M** Axial air fan
- XP** Power supply terminals
- XS, XR, XM** Terminals for control connection

Pic. 17: Wiring diagram of MONZUN 50–60kW heaters

Control box

MMS control box is used to control gas air heaters MONZUN. It includes a room thermostat Siemens RDG160T that is used to control and modulate the heater, reset button and terminal board. The heater control can be manual or based on a week program. Heater perform-

ance modulation is automatic in both cases, depending on the requested and measured room temperature. The control box belongs to optional accessories and if not connected, the heater starts with minimum output following switching-on by service switch.



Pic. 18: Wiring diagram of connection between MONZUN and control box MMS

Terminal block	Terminal	Signal	Level
XP	L	phase	230 V /50 Hz
	N	neutral	230 V /50 Hz
	PE	grounding	230 V /50 Hz
XS	C	ventilation	230 V /50 Hz
	O	flame	230 V /50 Hz
	A	alarm	230 V /50 Hz
	H	heating	230 V /50 Hz
	E	overtemperature	230 V /50 Hz
	L1	connection of axial fan	230 V /50 Hz
	N		
	PE		
XR	R1	reset	potential-free contact
	R2	reset	
XM	+	load modulation	0–10 V
	-		
	DC	+24 V out	24 V DC

Tab. 12: Description of terminals

MODBUS CONTROL

MONZUN air heaters can be controlled via Modbus communication. This solution saves significant quantity of cabling because up to 32 heaters can be connected to single communication cable. The heaters are controlled and monitored individually, their assignment to zones I done no the controller level.

Standard communication format is 19200,8, E,1. Other communication format allowed are 19200,8,N,2; 19200,8,N,1; 19200,8,O,1.

Each heater has to have its own Modbus address. The address and communication format are factory-set , the settings can be changed by authorised serviceman.

The Modbus address is indicated by white number sticked on the heater.

For Modbus control, ZEUS control box is designed.

Register	R/W	CMD	Name	Type	Range	Remarks
0	R/-	0x04	HB:Esys flags	U8	0–255	Bit position description 0: heating mode 2: Test mode 3: Flame
			LB: Esys flags	U8	0–255	Bit position description 0: Fault/Error 3: APS 4: Fan
256	-/W	0x06	Reset staus command	U16	0–65535	Write 0xAA55 to reset Lockout error
512	R/W	0x03 0x06 0x10	HB reserved			
			LB: Heat demand*	U8	0–255	0x00 no heat demand 0xCC Heat demand 0xFF TEST demand
			HB: reserved			
513	R/W	0x03	LB: Power control *	U8	0–100	Fan speed in %

* Heat demand and power control commands must be repeated at least every 30 seconds to signify none break the burning process. Others way the Modbus HD is stopped.

Tab. 13: Modbus commands for MONZUN

CHECKING AND TESTING

The device is pre-set by the manufacturer, its operation depends on correct installation and adjustment. All equipment is tested for safety and serviceability when finished.

LOGISTIC DATA

MONZUN heaters are packed in cardboard boxes on special pallets. The package allows you to store up to three heaters on top of each other.

They are transported with covered vehicles. During transport, heaters must be protected against mechanical damage and weathering. There must be no vibration and the ambient temperature must not exceed +50 °C.

The heaters must be stored in covered buildings, in an environment free from aggressive vapours, gases and dust. Temperatures in the range -5 to +40 °C and relative humidity max. 80 % must be maintained in the buildings. During handling and storage, the heaters must be protected against mechanical damage.

PRODUCT DATA

Data label

MANDÍK ® MANDÍK, a.s. Dobříšská 550, 267 24 Hostomice,			
PRODUCT IDENTIFICATION NUMBER: CE-1015CS0588			
GAS-FIRED HOT-AIR UNIT			
TYPE:		CE 1015	
INPUT POWER MAX:		FUEL:	
INPUT POWER MIN:		VOLTAGE:	
GAS CONSUMPTION MAX:		INPUT POWER:	
GAS CONSUMPTION MIN:		PROTECTION:	
FUEL GAUGE PRESSURE:		WEIGHT:	
COUNTRY OF DESTINATION:		CATEGORY:	
SER. NUMBER:			
CLAS NOx 5		DESIGN B23, C13, C33, C63	

Pic. 19: Data label MONZUN

Ordering key

MONZUN 20 Z - G20

Fuel:

- G20 Natural gas
- G25 Natural gas
- G31 Propane

Unit design:

- Z Horizontal (wall mounted)
- V Vertikal (under the ceiling)
- P Pressure flange
- K For air handling units

Performance series:

- 15 – 15 kW
- 20 – 20 kW
- 30 – 30 kW
- 40 – 40 kW
- 50 – 50 kW
- 60 – 60 kW

Ordering example:

MONZUN 20 Z – G20

– Hot air gas heater MONZUN, power series 20, wall mounted design, fuel natural gas

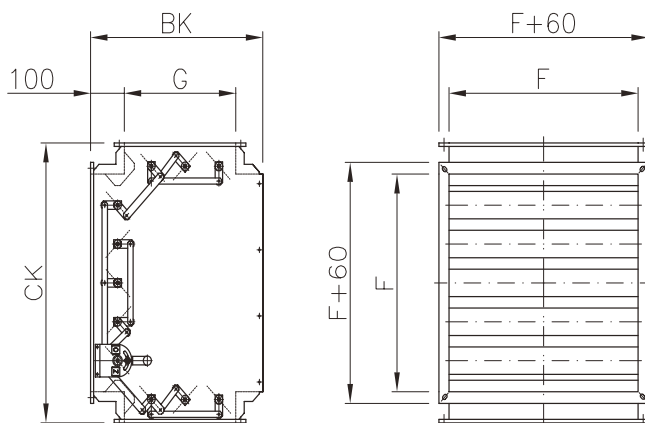
OPTIONAL ACCESSORIES

Mixing chamber

Mixing chamber is intended for mixing of outdoor and circulating air. It consists of a body made of galvanized sheet metal and three louvers flaps designed to adjust the selected air ratio in the range of 0 to 100 %.

For outdoor air, the damper is tight, for circulation air two leaking dampers. The control dampers are mechanically coupled with manual (design .01) or continuous control actuator (design .57).

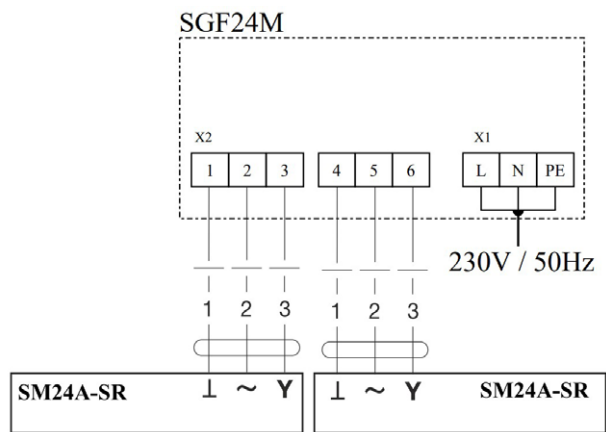
The mixing chamber is available with or without G2 filtration fabric.



Pic. 20: Mixing chamber

MONZUN [kW]	Dimensions [mm]				Weight [kg]
	F	BK	CK	G	
15, 20	560	510	720	330	28
30, 40, 50, 60	710	585	870	405	40

Tab. 14: Dimensions and weights of mixing chamber



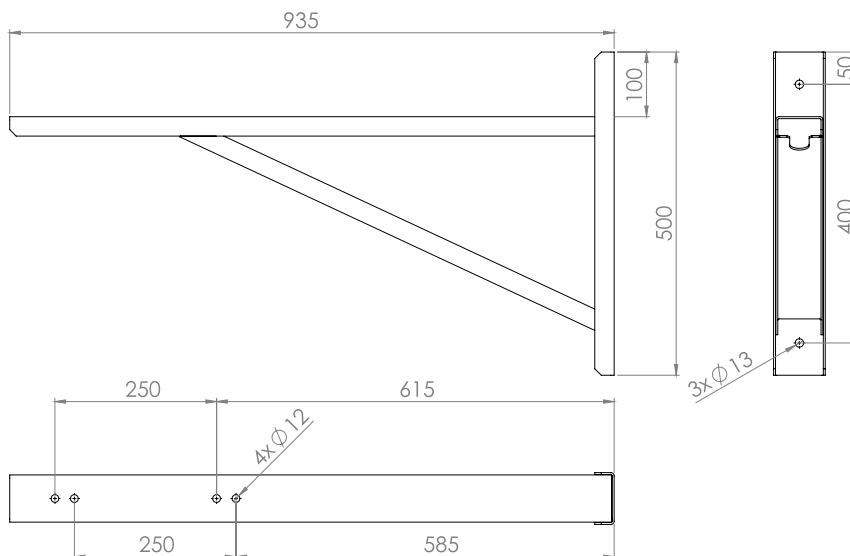
Pic. 21: Connection diagram of the SGF24M control box with up to two servo drives Belimo SM24A-SR

Servo-drive BELIMO	SM 24A-SR
Power voltage	AC 24 V / 50 Hz
Power input (in operation/in stand-by)	2.5 / 1.5 W
Dimensioning	5 VA (I _{max} 8.3 A @ 5 ms)
Control signal	DC 0-10 V @ Ri 100 kΩ
Adjustment time	150 s
Operating temperature (min/max)	-30 / +50 °C
Weight	1050 g

Tab. 15: Servo drives Belimo SM 24A-SR

Fixed console

Fixed console is used to install MONZUN heaters on a supporting vertical structure. One pair of fixed consoles is used for one heater.

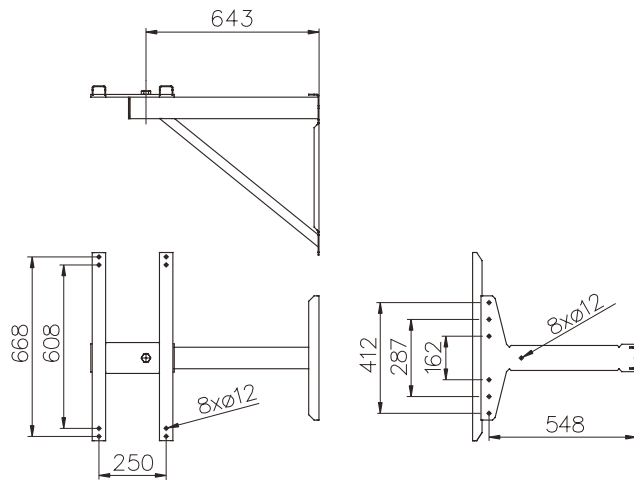


Pic. 22: Fixed console

Swivel console

Swivel console for installation of MONZUN heaters on a supporting vertical structure allowing the device to rotate on both sides. After installation, the swivel console must be firmly fixed. In this way, the heater is attached only to the hinge points located on the bottom panel.

Note: The heater must not be in collision with the flue gas outlet and the gas supply.

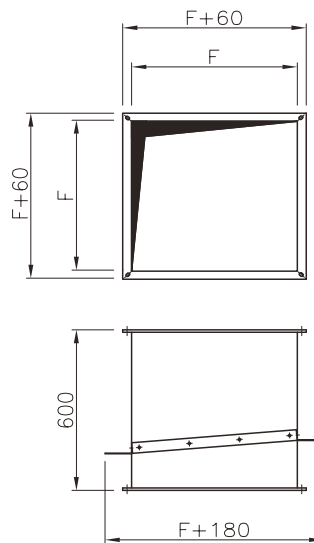


Pic. 23: Swivel console

Roof section

The roof section is designed to be installed in the roof opening, serves to fasten the roof head. It consists of an oven with dimensions $F \times F$ and a length of 600 mm and four free rails, which are mounted

according to the roof pitch on the pipe. Everything is made of galvanized sheet metal.



Pic. 24: Roof section

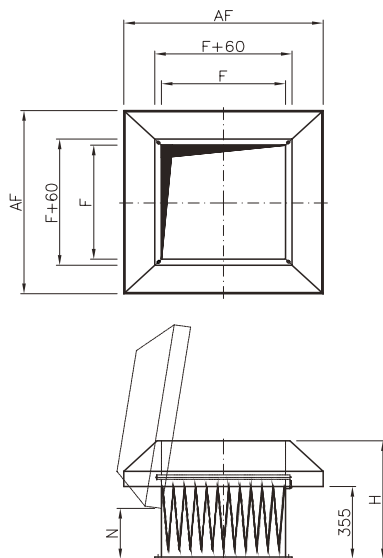
MONZUN [kW]	Dimensions [mm]	Weight [kg]
	F	
15, 20	560	16
30, 40, 50, 60	710	21

Tab. 16: Dimensions of roof section

Roof warhead

The roof warhead is designed to be installed in the roof opening, serves to fasten the roof head. It consists of an oven with dimensions $F \times F$ and a length of 600 mm and four free rails, which are mounted

according to the roof pitch on the pipe. Everything is made of galvanized sheet metal.



Pic. 25: Roof warhead

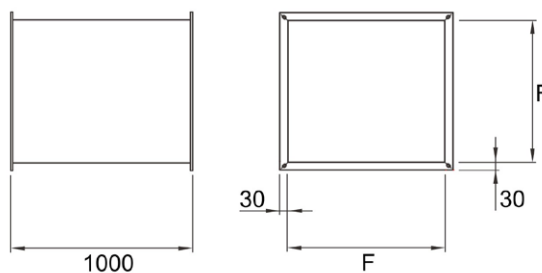
MONZUN [kW]	Dimensions [mm]				Weight [kg]
	F	AF	H	N	
15, 20	560	900	590	252	27
30, 40, 50, 60	710	1,100	650	227	37

Tab. 17: Dimensions of roof warhead

Passage part

The passage part is designed to be built into the hole in the vertical structure for the outdoor air intake. It is an oven with a free flange with dimension $F \times F$ and length 1,000 mm (the length of the part is

adjusted during assembly as needed). It is made of galvanized sheet metal.



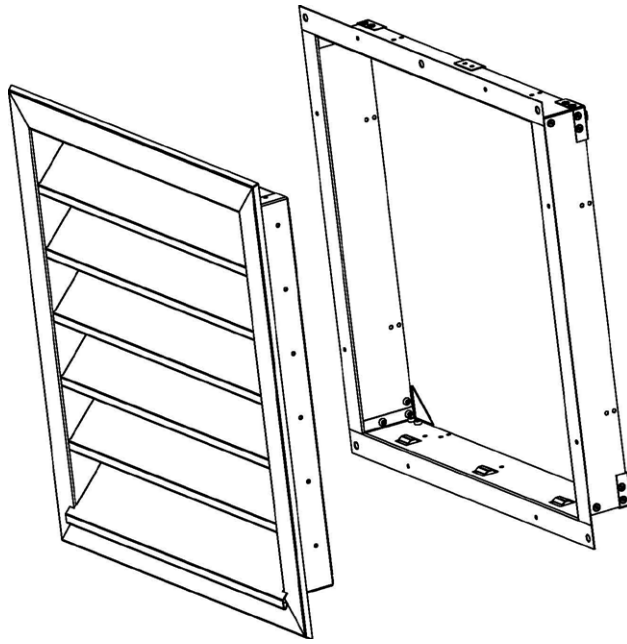
Pic. 26: Passage part

MONZUN [kW]	Dimensions [mm]	Weight [kg]
	F	
15, 20	560	14.5
30, 40, 50, 60	710	23

Tab. 18: Dimensions of passage part

Rain protection louver PDZM

Rain protection louver PDZM blind is designed to terminate the passage part on the outside wall. Characteristic dimension F × F. Made of galvanized sheet metal.



Pic. 27: Rain protection louver PDZM

MONZUN [kW]	Dimensions [mm]	Weight [kg]
	F	–
15, 20	560	5.4
30, 40, 50, 60	710	7.8

Tab. 19: Dimensions of rain protection louver PDZM

PRODUCT DATA ACCORDING TO COMMISSION REGULATION (EU) 2016/1188

Performance series [kW]	15	20	30	40	50	60
Nominal/maximal heating power output [kW]	16	20.2	29.8	34.3	46.2	54.8
Minimal heating power output [kW]	12	12	22.4	22.4	35	35
Electrical input power						
At nominal heating power output [kW]	0.28	0.28	0.455	0.46	0.79	0.8
At minimal heating power output [kW]	0.26	0.26	0.41	0.41	0.72	0.72
In standby mode [kW]	0.005	0.005	0.005	0.005	0.005	0.005
Useful efficiency at nominal heating power output (GCV) [%]	82.8	82.6	83.1	82.9	83.5	82.4
Useful efficiency at minimal heating power output (GCV) [%]	86.2	86.2	86.5	86.5	86.4	86.4
Nitrogen oxides emissions NO _x (GCV) [mg/kWh]	50	50	52	52	52	52
Emission efficiency [%]	95.8	95.6	95	94.9	95.2	94.8
Heating season energetic efficiency [%]	78.2	79.2	78.2	78.9	78.4	78.8

Tab. 20: Fuel G20 nature gas

Performance series [kW]	15	20	30	40	50	60
Nominal/maximal heating power output [kW]	16	20.2	29.84	34.4	46.16	54.8
Minimal heating power output [kW]	12	12	22.4	22.4	35	35
Electrical input power						
At nominal heating power output [kW]	0.28	0.28	0.455	0.46	0.79	0.8
At minimal heating power output [kW]	0.26	0.26	0.41	0.41	0.72	0.72
In standby mode [kW]	0.005	0.005	0.005	0.005	0.005	0.005
Useful efficiency at nominal heating power output (GCV) [%]	82.8	82.6	83.1	82.9	83.5	82.4
Useful efficiency at minimal heating power output (GCV) [%]	86.2	86.2	86.5	86.5	86.4	86.4
Nitrogen oxides emissions NO _x (GCV) [mg/kWh]	50	50	52	52	52	52
Emission efficiency [%]	95.8	95.6	95	94.9	95.2	94.8
Heating season energetic efficiency [%]	78.2	79.2	78.2	78.9	78.4	78.7

Tab. 21: Fuel G25 nature gas

Performance series [kW]	15	20	30	40	50	60
Nominal/maximal heating power output [kW]	15.1	20.1	29.8	35.1	46.1	55.1
Minimal heating power output [kW]	11.3	11.3	21.1	21.1	35	35
Electrical input power						
At nominal heating power output [kW]	0.28	0.28	0.455	0.46	0.79	0.8
At minimal heating power output [kW]	0.26	0.26	0.41	0.41	0.72	0.72
In standby mode [kW]	0.005	0.005	0.005	0.005	0.005	0.005
Useful efficiency at nominal heating power output (GCV) [%]	84.4	84.4	84.6	84.3	84.6	83.9
Useful efficiency at minimal heating power output (GCV) [%]	87.9	87.9	87.4	87.4	87.4	87.4
Nitrogen oxides emissions NO _x (GCV) [mg/kWh]	50	51	52	54	52	53
Emission efficiency [%]	96	95.8	95.2	95.1	95.3	94.8
Heating season energetic efficiency [%]	79.9	81.2	79.5	80.2	79.3	79.9

Tab. 22: Fuel G30 butane

Performance series [kW]	15	20	30	40	50	60
Nominal/maximal heating power output [kW]	15.1	20.1	29.8	35.1	46.1	55.1
Minimal heating power output [kW]	11.8	11.8	21.1	21.1	35	35
Electrical input power						
At nominal heating power output [kW]	0.28	0.28	0.455	0.46	0.79	0.8
At minimal heating power output [kW]	0.26	0.26	0.41	0.41	0.72	0.72
In standby mode [kW]	0.005	0.005	0.005	0.005	0.005	0.005
Useful efficiency at nominal heating power output (GCV) [%]	84.4	84.4	84.6	84.3	84.6	83.9
Useful efficiency at minimal heating power output (GCV) [%]	87.9	87.9	87.4	87.4	87.4	87.4
Nitrogen oxides emissions NO _x (GCV) [mg/kWh]	50	51	52	54	52	53
Emission efficiency [%]	96	95.8	95.2	95.1	95.3	94.8
Heating season energetic efficiency [%]	79.9	81.2	79.5	80.2	79.3	79.9

Tab. 23: Fuel G31 propane

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