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MONZUN-HP

MONZUN AIR HEATER-HP WITH HEAT PUMP

INSTALLATION, COMMISSIONING,
OPERATION, MAINTENANCE
AND SERVICE MANUAL

MANDÍK®

CONTENTS

GENERAL

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

a) MONZUN-HP air heaters may only be used by a person trained 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 in accordance with point a).

c) Children must not use or play with the MONZUN-HP heater.

Description of the MONZUN-HP heater

MONZUN-HP is an air-to-air heat pump. It is intended for ecological heating of rooms and halls with heated air, or for cooling. It is rated for outputs ranging from 20 kW and 33 kW with a heated air flow rate of 4300 and 6500 m^3/h.

It consists of an outdoor unit with a compressor and an indoor unit. The outdoor unit is used to exchange heat with outdoor air, the indoor unit transfers the heating or cooling obtained by the outdoor unit to the air in the room or hall. The outdoor and indoor units are connected by an insulated refrigerant pipe and a communication cable.

The indoor units of the MONZUN-HP heater are intended for installation in environments protected against weather influences with a temperature range of 0 ° to +35 °C. The air passing through the unit must not contain solid, fibrous, sticky or aggressive particles. They cannot be installed in rooms with a risk of fire or explosion.

Power regulation of MONZUN-HP heaters is continuous from minimum to nominal/maximum power. The flow of heated air is forced by an axial fan.

Description of operation

The operation of the heater is controlled automatically by the built-in electronics.

After the heater is turned on by a request for heating or cooling, the outdoor unit is turned on, and then, after reaching the required refrigerant parameters, the fan of the indoor unit is turned on.

When the control electronics detects freezing of the outdoor unit's heat exchanger, the defrost mode starts, where both indoor and outdoor unit fans are stopped and hot refrigerant is transferred to the outdoor unit's heat exchanger, where it melts the ice. After the ice melts, the heat pump switches back to heating mode.

Heat pump control uses heating and cooling signals at the 24 V level, the heating and cooling output is controlled by the 0–10 V signals.

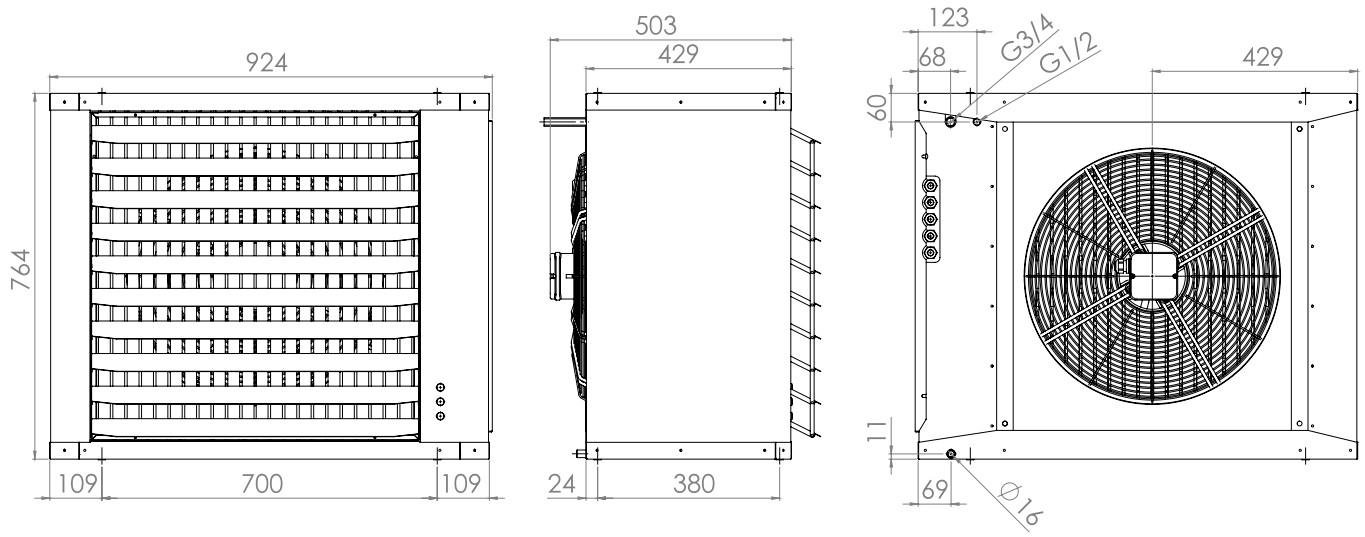
A Power indicator (green)
– heater connected to power

B Defrost indicator (orange)
– outdoor unit defrost cycle active

C Malfunction indicator (red)
– device fault

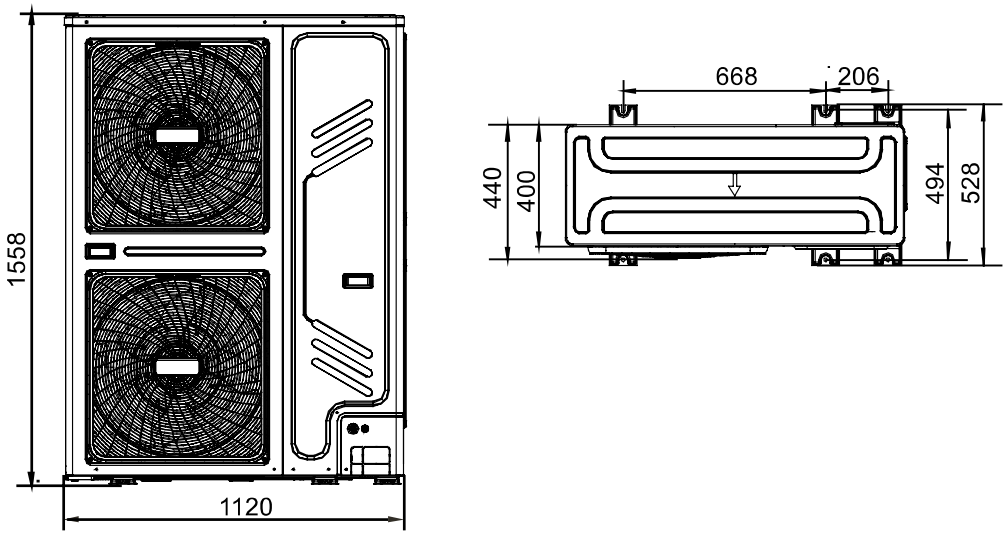
Fig. 1: Function indicators

Weight and dimensions of the indoor unit



Weight and dimensions of the indoor unit
MONZUN-HP 33: 70 kg

Fig. 2: Dimensions of the MONZUN-HP indoor unit

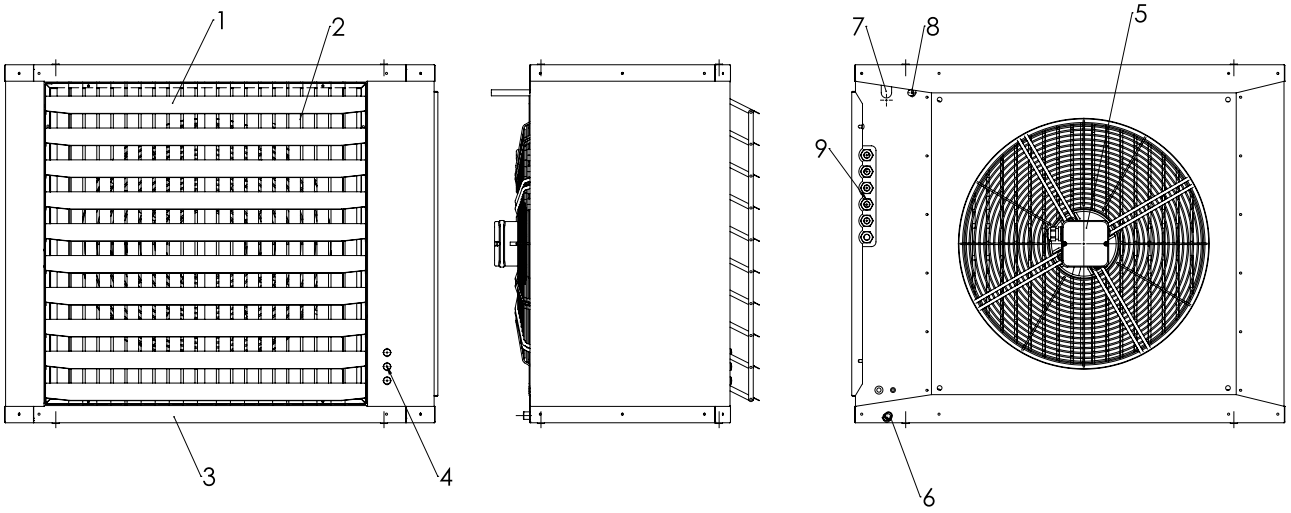


Weight and dimensions of the indoor unit
MONZUN-HP 33: 157 kg

Fig. 3: Dimensions of the MONZUN-HP outdoor unit

Design

MONZUN-HP heaters are designed with a wall-mounted indoor unit.



1 diffuser with blinds
2 drip eliminator
3 housing
4 indicators (power, defrost, fault)
5 axial fan
6 condensate drain
7 gas refrigerant ports, 19.1 mm for MONZUN-HP 20 and 25.4 mm for MONZUN-HP 33
8 liquid refrigerant ports, 12.7 mm
9 bushings: PG 13.5 (5)

Fig. 4: Main components of the MONZUN-HP indoor unit

Technical parameters

Rated output/input – heating	20/5.26	33/10.31	kW
Rated output/input – cooling	20/4.44	33/11.38	kW
COP[1]	4.51	3.63	–
EER[2]	3.88	2.23	–
SCOP	4.04	4.06	–
Power supply	380–415/3/50		V/Ph/Hz
Max. current (protection device)	25	32	A
Outdoor operating temperatures – heating	-20 to +24		°C
Outdoor operating temperatures – cooling	-5 to +48		°C
Refrigerant	R410a		
Refrigerant charge	6.5	8	kg
Port diameters – liquid	12.7	12.7	mm
Port diameters – gas	19.1	25.4	mm

Outdoor unit			
W × L × D	1120 × 1558 × 528		mm
Requirements for flat load-bearing surface (W × L)	1200 × 830		mm
Net weight	143	157	kg
Sound pressure level[3]	58	61	dB(A)
Sound pressure level[3]	78	81	dB(A)

Indoor unit			
W × L × D	924 × 764 × 503		mm
Net weight	62	70	kg
Air flow rate	4100	6100	m^3/h
Airflow range (0.5 m/s)	12	16	m
Indoor air heating	16	16	K
Sound pressure level[3]	61	69	dB(A)
Connection length max.	30		m
Connection length opt.	7.5		m
Indoor unit power input	550	900	W
Circuit protection	4	6	A

[1] Indoor temperature 20 °C; Outdoor temperature 2 °C, 87 % RH; equivalent refrigerant pipe length 7.5 m with zero height difference, full output.

[2] Indoor temperature 27 °C, 48 % RH; outdoor temperature 29 °C; equivalent refrigerant pipe length 7.5 m with zero height difference, full output.

[3] Average sound pressure level at a distance of 1m from the unit, in a free field

Material, surface finish

The housings of the indoor and outdoor units of the heater are made of galvanized steel sheet metal with heat-cured lacquer, the assembly of individual sheet metal parts is done with screws and rivets. The heater exchangers are made of copper tubes with aluminium fins. The console and base are made of sheet steel with a powder coating.

INSTALLATION

Minimum space requirements for installation of the indoor unit

The minimum spacing must be maintained to ensure sufficient air flow through the heat exchanger and proper operation of the outdoor unit. Failure to maintain spacing may result in reduced heat pump performance, in particular at lower temperatures.

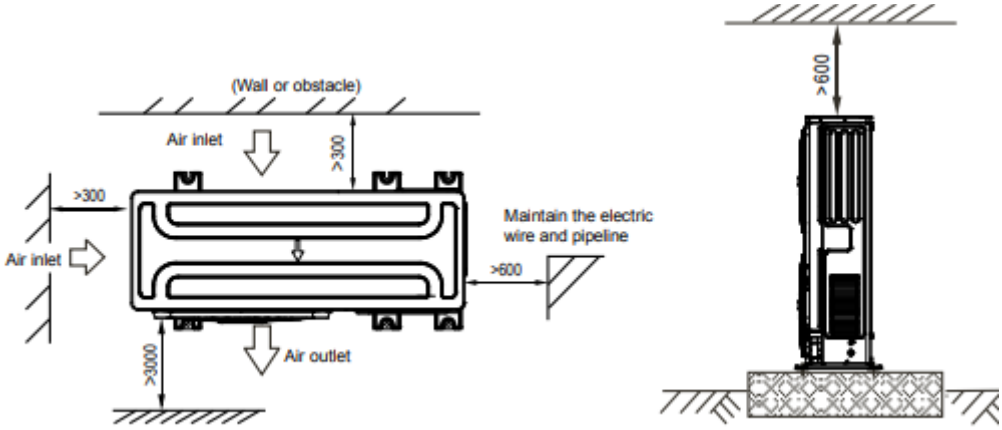


Fig. 5: Minimum space for installing the MONZUN-HP outdoor unit

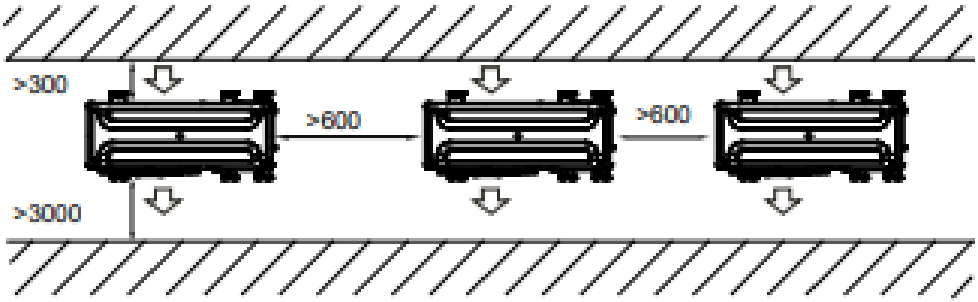


Fig. 6: Minimum space for installing MONZUN-HP outdoor units in a single row

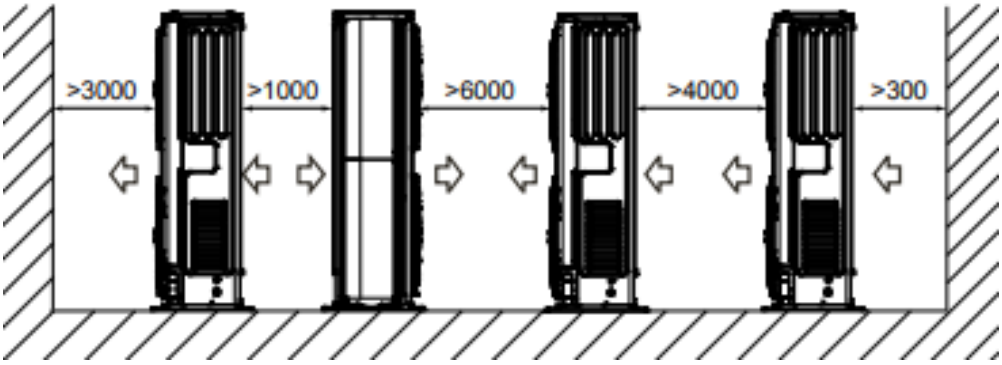


Fig. 7: Minimum space for installing MONZUN-HP outdoor units back to back, front to front and front to back

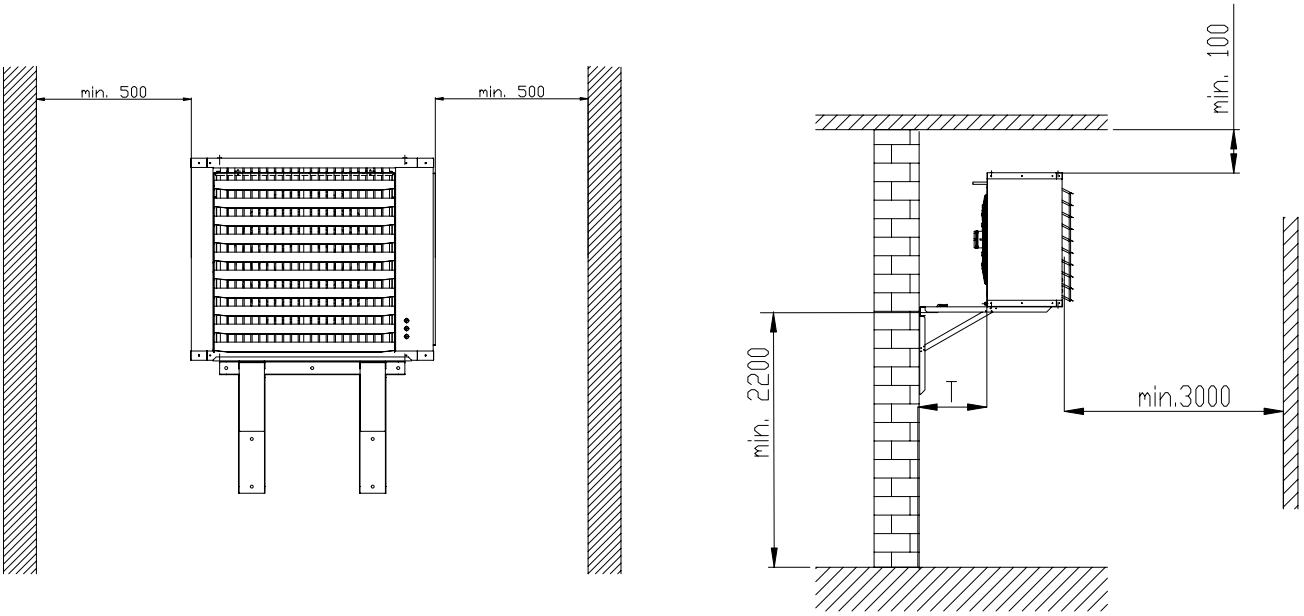


Fig. 8: Minimum space for installing the MONZUN-HP indoor unit

The indoor unit of the MONZUN-HP heater is equipped with 4 suspension points with M8 thread on the bottom and on the top, which are used to attach it to the supporting structure.

A wall mounting bracket is supplied as an accessory for the indoor unit of the MONZUN-HP heater. The bracket allows the unit to be rotated by 15 ° to both sides. Choose the location of the indoor units so that the entire space is ventilated.

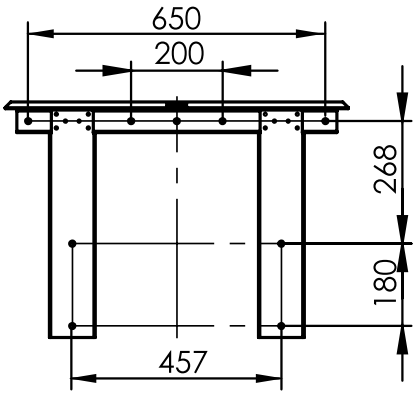


Fig. 9: Indoor unit bracket connection dimensions

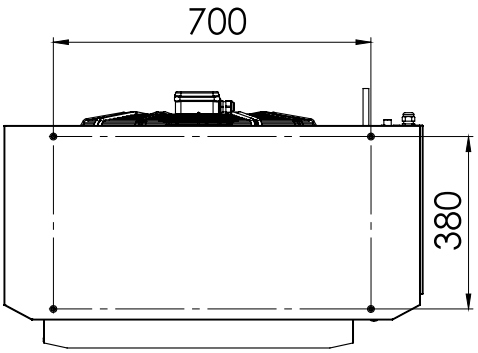


Fig. 10: Indoor unit mounting points

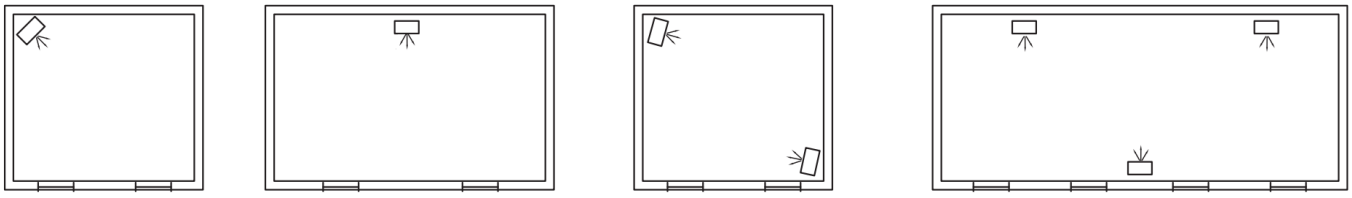


Fig. 11: Indoor unit placement examples

As an accessory to the outdoor unit, a stand with rubber vibration dampers is supplied, which is anchored to a solid surface or to a building structure of sufficient load-bearing capacity.

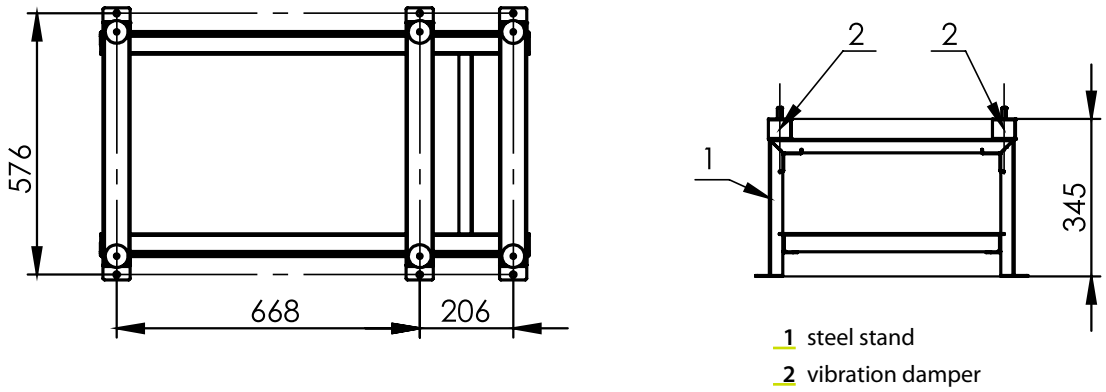


Fig. 12: Outdoor unit stand

If the base of the outdoor unit is not used, it is possible to place the outdoor unit, for example, on a concrete block with a min. dimensions 1200 × 830 mm and min. 200 mm high for access during installation and piping. The outdoor unit is fixed to the concrete block with M10 anchors via rubber pads designed to absorb vibration. The anchor points are depicted in *Fig. 13*.

Under the base (block) we strongly recommend a channel for draining condensate or a suction point. Condensate should not flow onto surfaces such as pavements or roadways, as there is a risk of a thick layer of ice forming at outside temperatures below 0 °C.

When placing the outdoor unit on the roof, it is necessary to prepare a structure that will be used to fix the outdoor unit. The bearing capacity of the structure must take into account the weight of the outdoor unit and the effect of wind. The height of the structure is at least 200 mm above the roof surface, the upper surface with the anchor points is horizontal. The location of the anchor points for attaching the outdoor unit is shown in *Figure 13*, vibration dampers can be ordered as accessories for the outdoor unit.

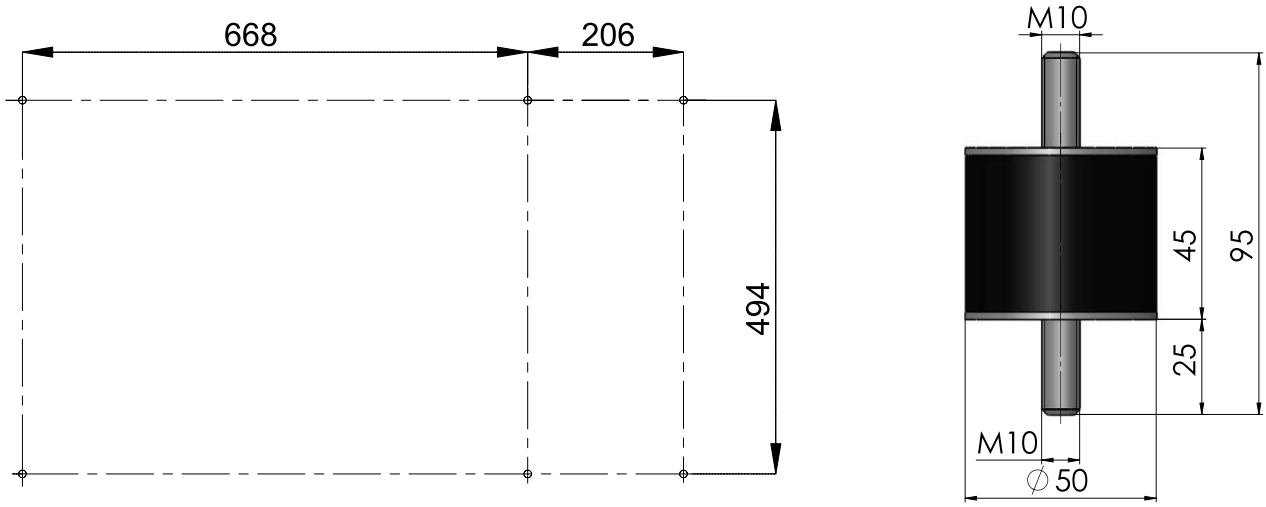


Fig. 13: Anchor points for the outdoor unit and vibration damper dimensions

For flat roofs, if the load-bearing capacity and slope of the roof allow, it is possible to anchor the outdoor unit to a concrete block laid over rubber anti-vibration pads on the flat roof. In this case, the minimum dimensions of the block are 1200 × 1200 × 150 mm to prevent the outdoor unit from tipping over in the wind. The outdoor unit is the attached to the block with M10 chemical anchors and any inclination is compensated using nuts and counter nuts.

Central condensate drain

If a central condensate drain is required, the supplied waterproof plugs and sealing washer and condensate outlet must be installed in the holes in the outdoor unit chassis.

The condensate drain pipe is connected to the outlet. The use of insulated and heated piping is recommended.

REFRIGERANT CIRCUIT

Refrigerant circuit design principles

- The total number of refrigerant piping connections should be minimised.
- The total length of the refrigeration piping must not exceed 30 m.
- The height difference between the outdoor and indoor units must not exceed:
  25 m if the outdoor unit is higher than the indoor unit
  20 m if the outdoor unit is lower than the indoor unit
- The number of bends must not exceed 10.
- If the outdoor unit is more than 20 m higher than the indoor unit, it is recommended to include a bend in the refrigerant gas branch as shown in *Fig. 13* to improve oil flow to the compressor.

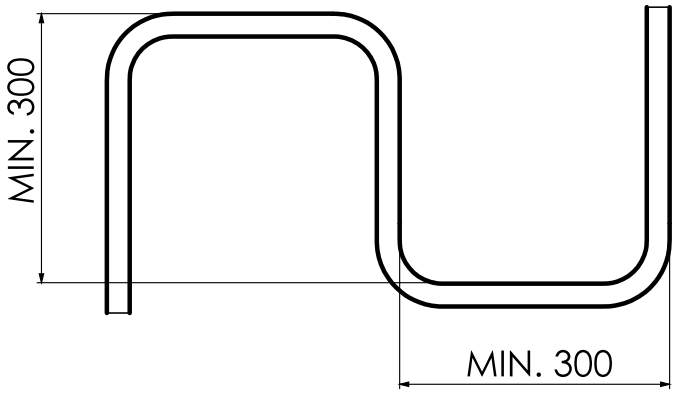


Fig. 14: Bend for oil return (oil siphon)

Materials

As an accessory, the MONZUN-HP heat pump comes with a pre-insulated copper pipe for the refrigerant. If not used, seamless copper pipes of the following dimensions must be used:

Table 1: Refrigerant piping dimensions for MONZUM-HP

MONZUN-HP	Refrigerant piping – liquid	Refrigerant piping – gas
20	Φ12.7 x 0.8 (1/2")	Φ19.1x 1 (3/4")
33	Φ12.7x 0.8 (1/2")	Φ25.4 x 1.2 (1")

Precautions against refrigerant leakage

R410A refrigerant is not flammable at temperatures below 100 °C under atmospheric air pressure and is generally considered a safe substance for use in air handling systems. Nevertheless, it is necessary to take into account the unlikely accident associated with the leakage of all the refrigerant. Such measures must comply with all relevant legislation. If there is no such legislation, it is possible to proceed using the following principles:

- The room with the indoor unit must be large enough so that even if all the refrigerant from the system escapes into it, the concentration of the refrigerant in the air does not reach a value dangerous to health.
- The critical concentration for assessment (when R410A refrigerant becomes dangerous to human health) is 0.3 kg/m^3.
- The potential concentration of the refrigerant in the room after the leak can be calculated as follows:
  - Calculate the total amount of refrigerant ("A") in the system as the sum of the refrigerant charge indicated on the outdoor unit label and the refrigerant charge according to the pipe length according to the Refrigerant charge calculation chapter.
  - Calculate the total volume ("B") of the smallest room where the refrigerant could potentially escape.
  - Calculate the potential refrigerant concentration as the ratio of A/B.
  - If A/B is greater than 0.3 kg/m^3, then countermeasures such as the installation of forced ventilation either permanently operating or triggered by a refrigerant leak detector are required.
  - Given R410A is heavier than air, special attention must be paid to the possibility of refrigerant leakage into basement rooms.

Refrigerant piping installation

Refrigerant piping installation proceeds in the following order:

1. Bending, insulation and installation of piping
2. Pipe flushing
3. Brazing pipes in a protective nitrogen atmosphere
4. Gas leak test
5. Insulation
6. Vacuuming (vacuum drying)

Note: Pipe flushing is performed on the piping with all connections complete, but before the indoor unit is connected.

Three principles for refrigerant piping

Principle	Reason and cause	Solution
PURITY	Solid particles such as oxides formed during brazing and/or construction dust can lead to compressor failure.	• Seal the piping during storage[1] • Brazing under nitrogen flow[2] • Pipe flushing[3]
DRYING	Moisture can corrode internal circuit components or form ice and cause compressor malfunction or damage.	• Pipe flushing[3] • Vacuum circuit[4]
TIGHTNESS	Leaks will cause refrigerant leakage.	• Pipe handling[5] and brazing technique[2] • Gas leak test[6]

[1] see the *"Delivery, storage and sealing of piping"* section
[2] see the *"Brazing"* section
[3] see the *"Pipe flushing"* section
[4] see the *"Evacuation"* section
[5] see the *"Pipe handling"* section
[6] see the *"Gas leak test"* section

Delivery, storage and sealing of piping

- Ensure that the pipe is not bent or deformed during transport and storage.
- Store them in a designated area on site.
- Pipes must remain sealed against the ingress of dust or moisture during storage and assembly until they are joined. Plugs or self-adhesive tape can be used for short-term sealing. For longer storage, the ends of the connections are brazed, and the pipes are pressurized with nitrogen to 0.2–0.5 MPa (2–5 bar).
- There is a risk of water or dust ingress when storing pipes directly on the ground. Support the pipes during storage with wooden supports.
- During installation, make sure that the pipe that passes through the hole in the wall is sealed and secured against the ingress of dust and wall debris.
- Make sure that rainwater does not enter the pipe installed outside through the seal.

Pipe treatment – degreasing

- Lubricating oil used during some copper pipe manufacturing processes can form deposits in R410A systems that can cause malfunctions. Therefore, oil-free pipes must be used. If ordinary (greased) pipes are used, they must be cleaned with gauze soaked in tetrachlorethylene solution before assembly.
- Caution: never use tetrachloromethane (CCl4) for cleaning or flushing as it can seriously damage the system.

Cutting copper pipes and removing burrs

- Use a pipe cutter, avoid using chip forming tools such as a saw or angle grinder. Copper swarf is difficult to remove from inside the pipes and poses a serious risk to the system if it gets into the compressor or valves.
- Be careful not to damage, puncture or deform the pipes while cutting.
- After cutting the tubes with the cutter, use a reamer to remove the burrs. When deburring, the pipe opening must point down so that the chips fall out of the pipe.
- Remove the burrs carefully, but avoid scratching the pipes, which can cause a leaky connection and refrigerant leakage.

Swaging copper piping

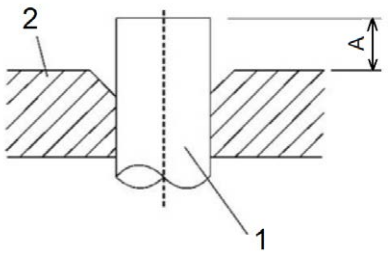
- The ends of the copper pipes are swaged when it is necessary to connect the pipes with a brazed joint.
- Insert the swaging head into the pipe, swage the pipe and rotate a few degrees to align the imprints of the swaged head segments
- **Caution:** ensure the swaged end of the pipe is smooth and even. Remove all burrs after cutting.

Fig. 15: Swaging pipes for brazing

Flared connections

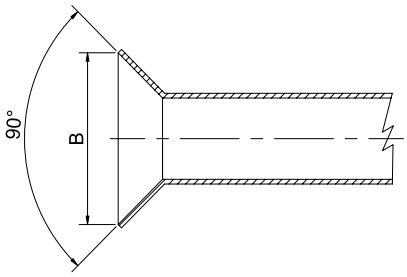
- Before flaring line sets, anneal (heat and allow to cool) the end of the pipe to be flared.
- Thread the flare nut onto the end of the pipe before placing the crimper on the pipe.
- Attach the flaring form to the end of the pipe. The end of the pipe must protrude from the flaring form according to *Fig. 16* and the dimensions shown in the table below.

Pipe diameter [mm]	Dimension A [mm]	
	min.	max.
6.35	0.7	1.3
9.53	1.0	1.6
12.7	1.0	1.8
15.9	2.0	2.2
19.1	2.0	2.4
22.3	2.2	2.6
25.4	2.2	2.8



Legend:
1 piping
2 flaring form
A protruding end

Obr. 16: End of the pipe protruding from the flaring form



Obr. 17: Flare diameters for flared connections

Pipe diameter [mm]	Flare diameter B [mm]
6.35	8.7–9.1
9.53	12.8–13.2
12.7	16.2–16.6
15.9	19.3–19.7
19.1	23.6–24
22.3	25.9–26.3
25.4	28.9–29.3

- After flaring, make sure the flared surface is not cracked, deformed or scratched. If so, repeat the flaring procedure as any of these defects could cause the joint to leak.
- The flare diameter should be within the range specified in *Fig. 17*.
- For easier assembly of the flared connection, the pipe can be annealed again. When assembling the flared connection, lubricate the flared surface inside and out with compressor oil to facilitate proper seating of the sealing surfaces and tightening of the nut without distorting the pipe.

- Procedure for tightening a flared connection:
  1. Align the centre of the mating surface with the centre of the flared end.
  2. Tighten the flare nut by hand as much as possible.
  3. Hold the hex nut on the seating surface with a wrench and, while doing so, tighten the flare nut with a torque wrench with the tightening torque per *Table 2* below. Then loosen the flare nut slightly and re-tighten with the tightening torque according to the table below.

Table 2: Tightening torque for flared connections

Pipe diameter [mm]	Tightening torque [Nm]	Final torque [Nm]
6.35	15	20
9.53	30	38
12.7	35	44
15.9	45	55
19.1	65	75
22.3	85	100
25.4	110	125

ATTENTION!

Excessive torque may damage the nut and piping, the tightening and final torque values specified in the table must not be exceeded.

Bending piping

- Due to the prescribed diameters of the refrigerant pipes, it is necessary to use a bender to bend the pipes, manual bending may flatten or break them.
- Make sure that the functional surfaces of the bender are clean and undamaged before inserting the tube into the bender.
- The bending angle of the pipe must not be greater than 90 °, otherwise the pipe will be deformed or burst.
- After bending the pipe, make sure that the pipe is not deformed by wrinkles, flattening or cracks on any side.
- Do not use a pipe that has flattened during bending, the smallest allowable net cross-section of the bend is 2/3 of the original circular cross-section.

Refrigerant piping support

When the heat pump is running, the refrigerant pipe is stressed by refrigerant pressure and temperature changes. Therefore, the pipe must be supported or suspended with support spacing according to *Table 3* below.

Table 3: Refrigerant piping support

Pipe diameter [mm]	Support distance [m]	
	Horizontal piping	Vertical piping
<Φ20	1	1.5
Φ20–Φ40	1.5	2
> Φ40	2	2.5

In general, refrigerant pipes are run parallel and both branches are supported at the same time, while the distance of the supports is chosen according to the diameter of the gas branch.

Changes in refrigerant temperature, pressure and flow direction cause pipe expansion, and therefore the supports must allow the pipe to move. With a tight fit, there would be a stress concentration in the pipes that could lead to their bursting.

Brazing

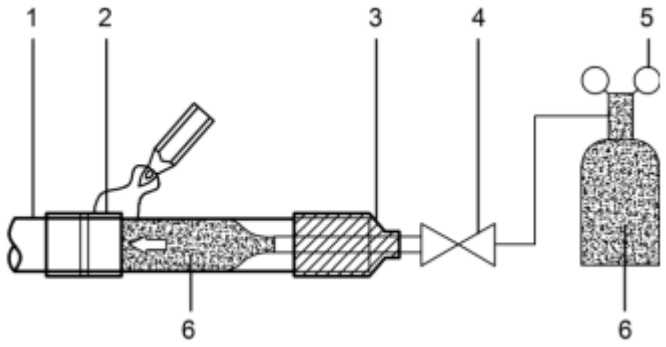
When brazing, it is necessary to prevent the formation of oxides inside the copper pipes. Copper oxides in the refrigerant disrupt the function of the valves and the compressor, resulting in low efficiency or the destruction of the compressor. Nitrogen flushing of the tubes during brazing is used to prevent oxidation.

WARNING

- **Never put oxygen in the pipes, it promotes oxidation and can lead to an explosion, it is extremely dangerous.**
- **Take fire precautions when brazing and have a fire extinguisher handy.**

Brazing in a nitrogen atmosphere

- Using a pressure reducing valve, feed nitrogen into the piping so that there is an overpressure of 0.2 to 0.3 bar during brazing.
- Bleed the nitrogen before beginning to braze and keep the nitrogen flowing through the piping throughout the brazing process until it is done, and the copper has cooled.
- When brazing a longer piece of pipe to a shorter piece, fill with nitrogen from the shorter side to better displace the air with the nitrogen.
- If the pipe length from the nitrogen connection to the brazed joint is long, the nitrogen must be flow long enough before brazing to force air out of the brazing area before brazing begins.



Legend:

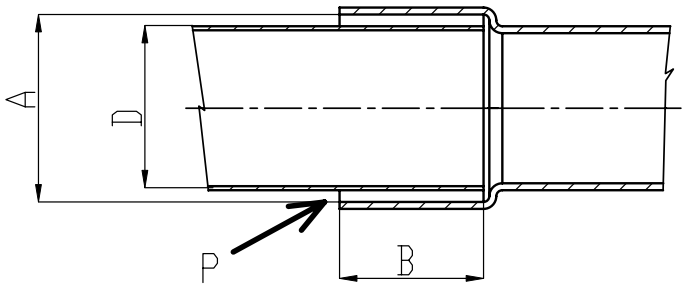
1 copper piping
2 brazed section
3 nitrogen connection
4 hand valve
5 reducer valve
6 nitrogen

Fig. 18: Brazing in nitrogen

Position of the joint during brazing

Brazing must be done downwards or horizontally to ensure that the joint is filled with the filler metal.
Brazing upwards is not allowed.

Brazed joint dimensions



Legend:

A inner diameter of the larger or flared pipe
D outer diameter of the inserted pipe
B insertion depth
P brazing direction

Fig. 19: Brazed joint dimensions

Table 4: Permissible dimensions of brazed joints according to Fig. 19

D [mm]	Minimum permissible insertion B [mm]	Permissible range A–D [mm]
5 < D < 8	6	0.05–0.21
8 < D < 12	7	
12 < D < 16	8	0.05–0.27
16 < D < 25	10	
25 < D < 35	12	0.05–0.35
35 < D < 45	14	

Filler metal

- Only copper-phosphorus (designation CuP according to EN ISO 1762) brazing alloy, which do not require a flux.
- Do not use flux. Flux can corrode the pipes and degrade the properties of the compressor oil.
- Do not use antioxidants when brazing. Their residues can clog pipes and damage circuit components.
- Only a professionally qualified person may install the refrigerant circuit.

Pipe flushing

The purpose of the flushing is to remove dust, mechanical debris and water that can damage the compressor from the piping. Therefore, the pipe is flushed with nitrogen. As described in the "Refrigerant piping installation" section, flushing is done when all the piping connections are done but before the indoor unit is connected. The outdoor unit is connected during flushing, but the indoor unit is not.

WARNING

Only use nitrogen for flushing. Using CO_2 could result in condensation inside the piping. Oxygen, air, refrigerant and flammable or toxic gases must not be used for flushing Use of these gases may cause fire or explosion.

Flushing procedure

Both legs of the refrigerant piping can be flushed at once or sequentially and then steps 1 to 6 are repeated for the other leg.

1. Cover the refrigerant inlet and outlet of the indoor unit against the ingress of dirt from the flushed piping.
2. Connect the pressure reducing valve to the nitrogen cylinder.
3. Connect the output of the reducing valve to the input on the liquid (or gas) side of the outdoor unit.
4. Start opening the valve on the nitrogen cylinder and gradually increase the pressure to 0.5 MPa (5 bar).
5. Wait a while for the nitrogen to reach the indoor unit.
6. Perform the flush:
   a. Using a suitable material such as a cloth or a bag, to plug the end of the pipe at the indoor unit.
   b. Once the pressure inside is so great that you cannot hold it with your hand, quickly release the opening so that the nitrogen and any impurities can escape.
   c. Repeat plugging and unclogging until dirt stops coming out of the pipes. The best way to check the purity of the discharged nitrogen is to pass it through a clean cloth.
7. Once the flushing is complete, close the openings to prevent dust and dirt from entering.

Gas leak test

WARNING

Use only dry nitrogen for leak testing. Oxygen, air and flammable or toxic gases must not be used. Use of these gases may cause fire or explosion.

Procedure – Step 1

When the refrigerant circuit piping is completed, flushed, and the indoor and outdoor units are connected, apply vacuum to the piping to a level of -0.1 MPa (-1 bar).

Step 2

Fill the piping with nitrogen to 0.3 MPa (3 bar) through the service valves on the liquid and gas side shut-off valves of the outdoor unit. Observe the pressure gauge for large leaks. A rapid drop in pressure indicates a large leak.

If the pressure does not drop, fill the piping with nitrogen to 1.5 MPa (15 bar) and leave for at least 3 minutes. Observe the pressure gauge, which will drop noticeably even with a small leak.

If the pressure does not drop, fill the piping with nitrogen to 4.2 MPa (42 bar) and allow at least 24 hours to detect micro leaks. These are difficult to detect. It is necessary to calculate the pressure change depending on the temperature of 0.01 MPa per 1 °C temperature change at the beginning and at the end of the test. Recalculated reference pressure = pressure at filling + (temperature at the end of the test − temperature at pressurization) × 1.01 Mpa. Compare the calculated reference pressure with the measured pressure at the end of the test. If they are the same, the pipe has passed the leak test. If the measured pressure is lower, the pipe has micro leaks.

If a leak is detected (see the leak detection paragraph), the leak test must be repeated after its repair.

Step 3

If you do not proceed directly to vacuum the system, reduce the nitrogen pressure to 0.5–0.8 MPa (5–8 bar) before vacuuming.

Leak detection

General methods of detecting leaks are as follows:

1. Hearing – relatively large leaks can be heard.
2. Touch – leaking gas at joints is palpable.
3. Detection using a foaming solution: small leaks form bubbles after applying foaming solution to the joint.
4. Refrigerant leak detection: for hard-to-detect leaks, refrigerant detection can be used as follows:

a) Pressurize the pipe with nitrogen to 0.3 MPa

b) Add refrigerant to the pipe until the pressure reaches 0.5 MPa

c) Use a halogenated refrigerant detector to locate the leak

d) If the source of the leak cannot be found, continue to fill the pipe with refrigerant until the pressure is 4 MPa, and then search again with the detector.

Vacuum purge

The purpose of vacuuming is to remove moisture and non-condensable gases from the system. By removing the moisture, ice formation and corrosion of the copper pipes and other parts of the system will be prevented. The presence of ice particles in the system would cause malfunction, while corrosion fumes can damage the compressor. The presence of non-condensable gases in the system would lead to pressure surges and poor heat transfer.

The vacuum also provides another option for leak detection in addition to the gas leak test.

Procedure

During a vacuum purge, a vacuum is used to reduce the pressure so that any moisture present evaporates. At a pressure of 5 mmHg (755 mmHg below normal atmospheric pressure), the boiling point of water is 0 °C. Therefore, a vacuum capable of achieving a negative pressure of -756 mmHg or greater must be used. The use of a pump with an output of more than 4L/S and an accuracy level of 0.02 mmHg is recommended.

ATTENTION

- Before starting the vacuum purge, make sure that all shut-off valves of the outdoor unit are tightly closed.
- Once the vacuum is finished and the pump is stopped, the vacuum in the piping can draw the lubricant from the pump into the heat pump system. The same can happen if the vacuum stops unexpectedly during the vacuum purge. Mixing pump oil with compressor oil can damage the compressor, so a check valve must be used in the pump suction to prevent pump oil from being drawn into the vacuum piping.

Vacuum purge procedure:

Step 1

- Connect the blue (low pressure side) hose from the manifold gauge set to the gas-side outdoor unit shut-off valve, the red (high-pressure side) hose to the outdoor unit liquid-side shut-off valve, and the yellow hose to the vacuum pump.

Step 2

- Start the vacuum pump and then open the valves on the manifold gauge set to begin evacuating the system.
- After 30 minutes, close the valves on the manifold gauge set.
- After another 5 to 10 minutes, check the pressure gauge. If the pressure gauge returns to zero, look for a leak in the refrigerant piping.

Step 3

- Reopen the valves on the manifold gauge set and continue to evacuate for at least 2 hours until a vacuum of at least 0.953 bar is achieved. Once a vacuum of 0.953 bar is reached, continue to evacuate for another 2 hours.

Step 4

- Close the valves on the manifold gauge set and then turn off the vacuum pump.
- After 1 hour, measure the vacuum. If the negative pressure has not decreased, the evacuation is complete. If the vacuum has dropped, look for leaks.
- After evacuation, **leave the blue and red hoses connected to** manifold gauge set at **to the shut-off valves of the outdoor unit** as a preparation for charging with refrigerant.

Condensate drain

Principles of condensate drainage design

The condensate drain from the indoor unit must have sufficient clearance and slope to drain all condensate. The condensate drain should be as short as possible.

The slope of the condensate drain must be at least 1:100 away from the indoor unit even if you go around obstacles such as beams or pipes.

The clearance of the condensate drain pipe must not be less than 16 mm (the diameter of the nozzle for draining the condensate from the indoor unit).

The horizontal condensate pipe must be supported every 0.8–1 m, the vertical pipe must be fixed every 1.5–2 m, in two places at least.

The installed condensate drainage pipe must be tested.

The leak test is done by closing the pipe outlet with a stopper and pouring water into the condensate pan of the indoor unit so that the pipe is full and half the capacity of the condensate pan. The pipe or its connection to the condensate pan must not leak.

The discharge test follows the end of the leak test. Water from the condensate pan of the indoor unit must drain through this pipe after releasing the drain from the condensate drain.

Refrigerant piping insulation

During operation, the temperature of the refrigerant piping changes. Insulation improves unit performance and compressor life. During cooling, the temperature of the gas refrigerant pipe can be very low. The insulation prevents condensation on the pipes. During heating, the temperature of the refrigerant gas piping may be high, in which case the insulation protects against burns when touching the piping.

Refrigerant pipe insulation should be closed-cell foam, fire rated B1, resistant to continuous temperatures up to 120 °C and complying with local regulations.

The insulation thickness is shown in *Table 5* below. In hot and humid climates, the thickness of the insulation must be increased above the values in the table.

Table 5: Minimum insulation thickness of the refrigerant piping

Pipe outer diameter [mm]	Minimum insulation thickness [mm] Relative humidity < 80 %	Minimum insulation thickness [mm] Relative humidity > 80 %
6.3	15	20
9.53		
12.7		
15.9		
19.1		
22.2		
25.4		
28.6		
31.8		
38.1		
41.3	20	25
44.5		
54.0		

Outside of pipe connections, pipe insulation must be installed before piping is installed. Pipe connections are only insulated after a successful gas leak test.

Insulate the gas and liquid refrigerant pipes separately to prevent heat exchange between these pipes.

Do not tie the two branches together too tightly, as this may compromise the connections between the insulation sections.

Insulation of connections

Insulation of connections

1. Cut a piece of insulation 50–100 mm longer than the gap to be filled. Make sure that the cross and longitudinal sections of the insulation are straight.
2. Insert the insulation into the gap so that the ends of the insulation are snug against each other.
3. Glue the longitudinal joint of the insulation and the cross joints on both sides.
4. Seal the insulation joints with aluminium tape.

Adding refrigerant

Calculation of the amount of refrigerant to be added

The amount of refrigerant to add depends on the diameter and length of the liquid refrigerant piping. The table of the amount of refrigerant to be added per meter of liquid refrigerant piping follows. The outdoor unit is pre-charged with refrigerant with a reserve of 7 m of connecting pipe.

Table 6: Quantity of R410A refrigerant to the added

Diameter of the liquid refrigerant piping [mm]	Refrigerant added for 1 m of equivalent length of piping [kg]
6.35	0.022
9.53	0.057
12.7	0.110
15.9	0.170
19.1	0.260
22.2	0.360

Adding refrigerant

ATTENTION

- **Add refrigerant only after completing the gas leak test and vacuum test.**
- **Never add more refrigerant than needed (calculate the need according to the table above), as this can cause surges in the circuit.**
- **Only add R410A refrigerant – adding another substance can cause an accident or explosion.**
- **Use tools and equipment designed for use with R410A refrigerant to ensure pressure resistance and prevent foreign matter from entering the system.**
- **Refrigerant handling is subject to local regulations.**
- **Always use protective gloves and eye protection when adding refrigerant.**
- **Open refrigerant tanks slowly.**

Procedure:

Step 1

- Calculate the refrigerant charge R (kg) per the table above

Step 2

- Place the R410A refrigerant tank on the scale. When using a bottle with a single valve, turn the container upside down to ensure that the refrigerant is added in liquid form. (R410A is a mixture of two different chemical compounds. Charging with gas may mean that the incorrect composition of the refrigerant is added). When using a tank with two valves, add refrigerant through the liquid service outlet.
- After the vacuum purge (see the vacuum purge section above), the blue and red hoses from the manifold gauge set should still be connected to the shut-off valves of the outdoor unit.
- Connect the yellow hose from the manifold gauge set to the refrigerant tank.

Step 3

- Open the valve where the yellow hose meets the manifold gauge set and carefully open the refrigerant tank. There should be a vacuum in the hose as in the entire manifold. ATTENTION – open the refrigerat tank slowly.
- Zero out the weight on the scale

Step 4

- Open the valves on the manifold gauge set to feed refrigerant into the system.
- When the amount of added refrigerant reaches the R(kg) value calculated in Step 1, close the valve on the pressure cylinder. If quantity R has not yet been reached, but no refrigerant is added, close the manifold gauge set valves, run the outdoor unit in cooling mode, and then open the valves to slowly charge the refrigerant into the unit's suction piping. After checking the correct refilled amount, we recommend suctioning the remaining refrigerant in the cabinet into the unit.
- Note: all the pre-commissioning checks listed in the pre-commissioning checks section must be carried out before starting the system and make sure all shut-off valves are open, as running the system with the shut-off valves closed can damage the compressor.

Electrical installation

General

WARNING

- **An authorised and qualified party must perform all electrical installation work as defined in local regulations.**
- **Earthing of the electrical system must be done according to local regulations.**
- **The wiring diagrams in this manual are general and not intended for each specific installation.**
- **Refrigerant piping, electrical supply power and communication cables typically have identical routes. However, interference from power cables can penetrate communication cables. If the supply current is less than 10 A, a minimum distance of 300 mm should be maintained between the power cable and the communication cables. If the supply current is between 10 and 50 A, this minimum distance is 500 mm.**

Power connection

The power connection is subject to the following requirements:
The indoor and outdoor units must be powered separately.
See the following *Table 7* for the sizing of the feeder cable and circuit protection devices for the outdoor unit:

Table 7: Current and circuit protection devices for the MONZUN-HP outdoor unit

MONZUN-HP	Power supply	Current	Circuit protection device
20	3 × 400 V / 50 Hz	19 A	25 A
33	3 × 400 V / 50 Hz	26.4 A	32 A

Power to the outdoor unit must have a circuit breaker, an overcurrent protection device and a manual disconnect switch.

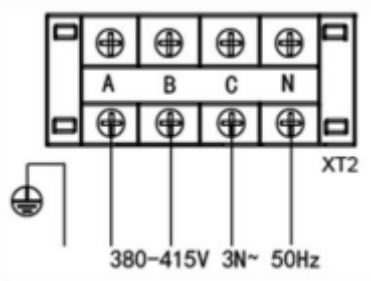
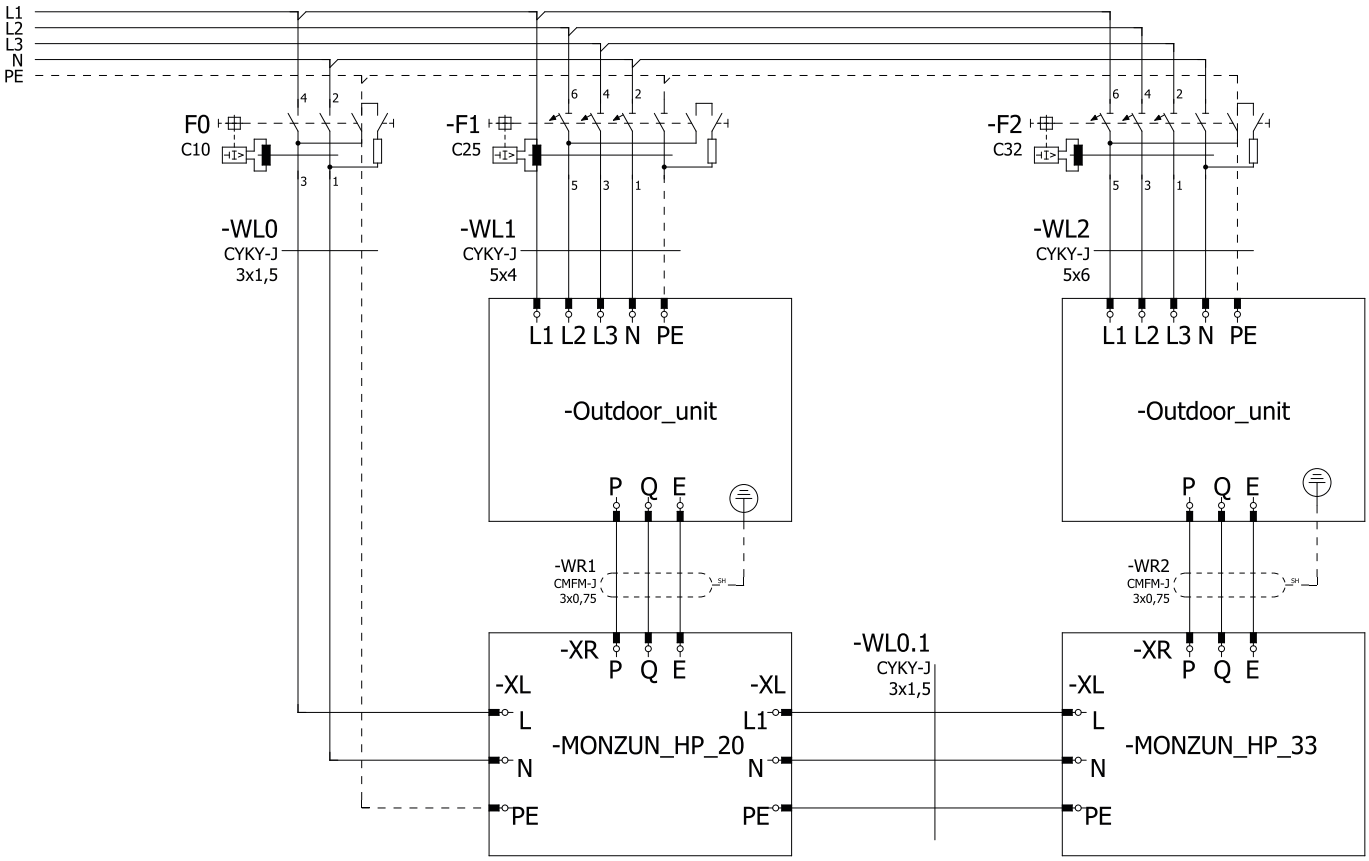


Fig. 20: Power to the outdoor unit must have a circuit breaker, an overcurrent protection device and a manual disconnect switch.



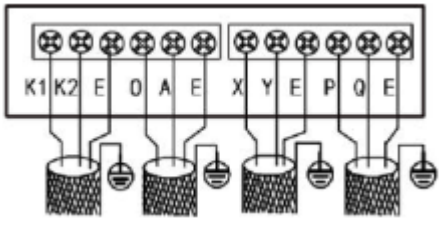
F0, F1, F2 ... circuit breaker with overcurrent protection device

Fig. 21: Electrical connection diagram of MONZUN-HP indoor and outdoor units

Communication cabling

Communication cabling is subject to the following requirements:

- Shielded 0.75 mm^2 three-conductor cabling is used for communication. Using other types of cables may cause interference and malfunction.
- Communication with the indoor unit
  - Communication wires P, Q and E are connected to the terminals of the indoor unit.
  - Communication lines P and Q must not be earthed.
  - The shielding of the communication cables should be grounded by connecting to the metal jacket near the P and Q terminals of the outdoor unit. In the indoor unit, the shielding is not grounded.
  - The conductors of the communication cable are connected to the terminals according to *Figure 22* and the attached table.
  - **ATTENTION:** the communication cabling has polarity. Connect the individual conductors carefully.



Terminal markings	Connection to
K1 K2 E	Outdoor unit motor
O A E	Connection to a digital electricity meter
X Y E	Connecting the central controller of the indoor units
P Q E	Connection between the indoor unit and the "master" outdoor unit

Fig. 22: outdoor unit communication terminals

Analogue control

To control the MONZUN-HP heaters, the VULCAN MHP controller is supplied with the optional extension OMH 3 for controlling three heaters or OMH 6 for controlling up to six heaters.

The MHP control box is used to control the MONZUN-HP units.

It includes a Siemens RDG160T room thermostat, which is used for control and modulation, a main switch and a fuse. Control of the units is possible manually or according to a weekly program. Power modulation is automatic according to the difference between the desired and actual room temperature.

A fault condition is indicated on the MONZUN-HP unit by lighting up the red Fault light.

The Siemens RDG160T room thermostat can be equipped (not included in the package) with an external temperature sensor.

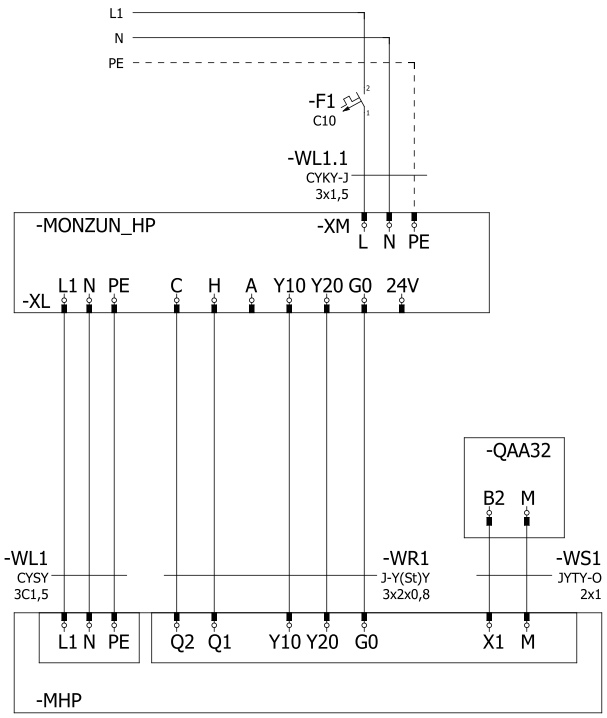


Fig. 23: Connecting the MONMZUM-HP heater to the MHP control panel

The MHP+OMH3 (OMH6) control panel for up to 3 heaters (6 heaters) is used to control multiple MONZUN-HP heaters in one temperature zone.

The device allows for each unit to be individually switched between control using the MHP thermostat (e.g. according to the weekly program) or manually (in heating or cooling mode) or to turn off the device. A fault condition is indicated both on the MONZUN-HP heater by the red Fault light, and also on the control box by the ERROR light for the given unit.

On the left side is the HEAT/COOL switch used to switch between these modes in manual control.

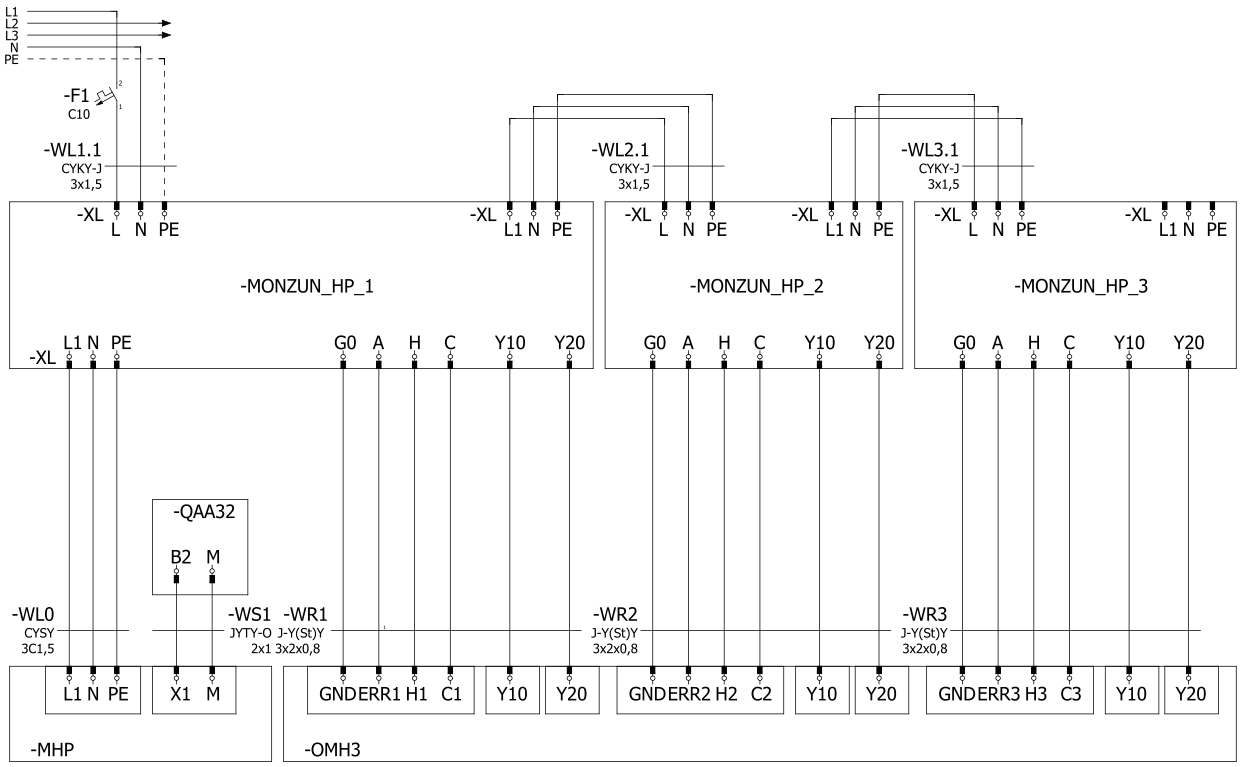


Fig. 24: Wiring diagram for MONZUN-HP heaters with the MHP+OMH3 control panel

Installation

The MHP control panel is designed exclusively for interior use. A suitable installation is in an occupied space on an interior wall approximately 1.5 m above the floor. Do not mount above heat sources (television receiver, heater, refrigerator, etc.), or where it would be exposed to direct sunlight, drafts, radiation from devices, or in a humid environment.

Mount the control panel using anchors and screws in the chosen location.

Bring the cables through the grommets on the bottom or through the holes in the back wall of the cabinet and plug them into the terminal block according to *Fig. 23* or *24*.

Modbus control

MONZUN-HP is compatible with bus control. This option is beneficial for saving cabling, as the bus communication cable can connect up to 31 devices per branch. The units are then controlled and monitored individually, their assignment to zones is done at the controller level.

For proper operation, it is necessary that each unit has its own address, which is unique on the given branch. The address in the range 1–31 is set using switches 4–8 in socket S1 on the control board *(Fig. 26)* according to *Table 8*. The last unit on the line is marked with a 120 Ω termination resistance by turning the END switch in socket S1 to the ON position. Control board communication on the bus is indicated by a blue LED in the place where the other diodes indicating the function of the device are located.

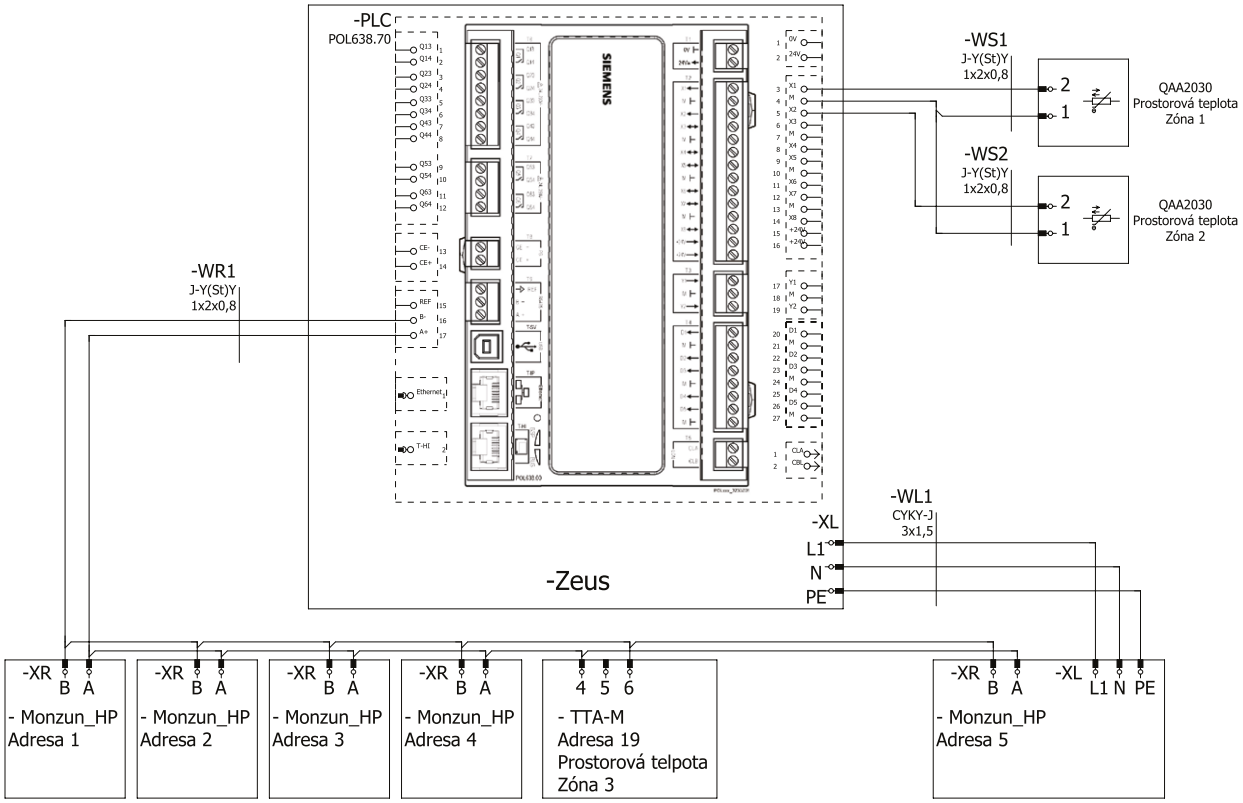


Fig. 25: Wiring diagram for MODBUS control

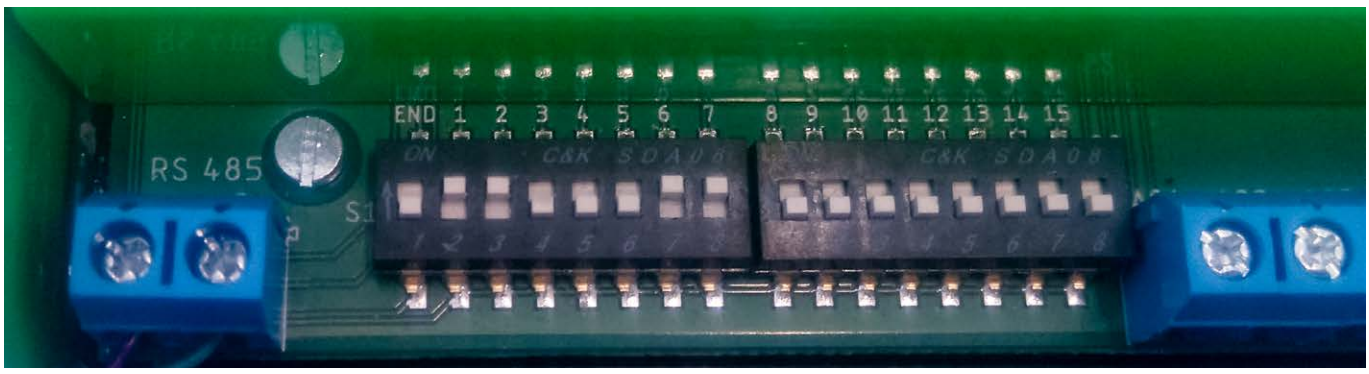


Fig. 26: DIP switches for configuring communication parameters

Table 8: Address configuration using DIP switches (white = OFF; black = ON)

S1	Modbus adress																														
Switch	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
8	■		■		■		■		■		■		■		■		■		■		■		■		■		■		■		■	
7		■	■			■	■			■	■			■	■			■	■			■	■			■	■			■	■	
6				■	■	■	■					■	■	■	■					■	■	■	■					■	■	■	■	
5								■	■	■	■	■	■	■	■									■	■	■	■	■	■	■	■	
4																■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	

The individual units are sent commands, and their status is determined over the bus. Bus communication is therefore extremely suitable from the point of view of monitoring, fault reporting and remote diagnostics. *Table 13* is used to configure communications. A Zeus controller may be selected as a central controller as it has a ready interface for assigning units to zones, time programs for individual zones, saving historical data, displaying the current status, etc. The Zeus controller is already equipped with a library of commands for communication with the MONZUN-HP unit. The ZEUS controller can be powered directly from the MONZUN-HP unit. However, it is also possible to control units via another instrumentation and control system (I&C system or BMS). When using your own solution, remember that the permission to run needs to be renewed every 60 seconds. If the machine does not receive permission to run within this interval, it will automatically shut down. *Table 10* is used for communication with the unit: Modbus heat pump commands. Parity is factory-set to Even (DIP1 in socket S2 on), switching DIP1 in socket S2 to Off turns parity off (none). Communication uses 8 data bits, one STOP bit.

Table 9: Modbus communication configuration (white = OFF; black = ON)

S1	Switch	
Speed	2	3
4800		
9600		■
19200	■	
38400	■	■

Table 10: Modbus commands for heat pump

Register address	Read/Write	Command	Description	Size		Note
23	R/–	0×03	Fault	1	U16	True/False
24	R/–	0×03	Defrost	1	U16	True/False
25	R/–	0×03	Run	1	U16	True/False
32	R/W	0×03 0×06 0×10	HEAT command Current value	1	U16	True/False
33	R/W	0×03 0×06 0×10	COOL command Current value	1	U16	True/False
34	R/W	0×03 0×06 0×10	Unit run permission	1	U16	True/False
40	R/W	0×03 0×06	Unit output setpoint	1	U16	0–100
0	R/–	0×03	Unit output current value	2	U32	0–1000
2	R/–	0×03	Temperature (NTC) – input AI2	2	U32	Electrical resistance [Ω]
53	R/W	0×03 0×06	Configuration of AI2	1	U16	True = NTC 10 K False = 0–10 V

Commissioning

WARNING!

- **Commissioning requires removal of the guard on the outdoor unit while energised. The enclosure rating drops to IP 00 with the guard removed, which poses an electrocution hazard!**
- **Only a qualified and trained service technician may remove the cover and work on the equipment with the cover removed.**

Outdoor unit output is configured using DIP switches S9-1 and S9-2. This is set from the factory and you must simply check it to make sure it is correct.

Table 11: outdoor unit output configuration

DIP Switch S9	Code	MONZUN-HP
	11	20
	10	33

Fig. 27: Position of DIP switches S9-1 and S9-2 to set outdoor unit performance

MONZUN-HP multi-heater systems

For projects where there are multiple MONZUN-HP heaters, each heater, i.e. outdoor unit and connected indoor unit, must first be tested independently and before multiple heaters are started at the same time.

Pre-commissioning inspection

Before turning on the electricity to the indoor and outdoor unit, make sure that:

1. All refrigerant pipes and communication cables are connected to the correct indoor and outdoor units and that the indoor and outdoor units connected together are clearly marked.
2. Pipe flushing the gas leak test and vacuum purge were satisfactorily carried out as per the instructions above.
3. All condensate drain piping is complete and with a satisfactory leak test result.
4. All power and communication wiring is connected to the correct terminals of the units and control panels. Check that the individual phases of the 3-phase supply are connected to the correct terminals.
5. No electrical circuit is short-circuited.
6. The voltage supplied to the indoor and outdoor unit is measured and within +10 % of the rated voltage.
7. All communication wiring is made with shielded 0.75 mm^2 three-conductor cabling and the shielding of the cables is grounded.
8. The outdoor unit output configuration is correct according to *Fig. 23* and all other indoor and outdoor unit configurations are correct.
9. Refrigerant was added to the system according to the procedure above. Note: sometimes it is necessary to turn on the system in cooling mode when charging the refrigerant. In this case, it is necessary to check according to points 1 to 8 before opening the gas and liquid refrigerant shut-off valves and starting the system.

During commissioning it is important that:

- R410A refrigerant was available.
- The location of the system, the refrigerant circuit and electrical diagrams were available.

Test operation during commissioning

Trial operation of individual MONZUN-HP units

Once items 1 to 9 have been checked according to the Pre-commissioning Inspection chapter, perform a test run as described below and complete the Commissioning Report form as a record of the functional status of the system at commissioning.

Test run procedure:

1. Open the liquid and gas refrigerant shut-off valves on the outdoor unit.
2. Turn on the power of the outdoor unit.
3. If manual addressing is used, set the address of the indoor unit.
4. Leave the power on for min. 12 hours before you start the compressor to ensure sufficient heating of the compressor oil by the crankcase heater (valid for the winter season, in warm weather it can be shortened accordingly).
5. Start the system:

a) Turn on the cooling system with the setting: temperature 17 °C or less.

b) After one hour of operation, complete page A of the Commissioning Report form, and then check the system parameters with the UP/DOWN button on the outdoor unit control board and fill in the Cooling columns on pages D and E of the Commissioning Report form.

c) Turn on the heating system with the setting: temperature 30 °C or more.

d) After one hour of operation, fill in page B of the Commissioning Report form, and then check the system parameters with the UP/DOWN button on the outdoor unit control board, and fill in the Heating columns on pages D and E of the Commissioning Report form.

6. Finally, fill in page F of the Commissioning Report form.

Operating the display to show parameters

The display is located on the main electronic board of the outdoor unit and is only accessible after removing the cover.

ATTENTION!

The enclosure rating drops to IP 00 with the guard removed, which poses an electrocution hazard!

Only a qualified and trained service technician may remove the cover and work on the equipment with the cover removed.

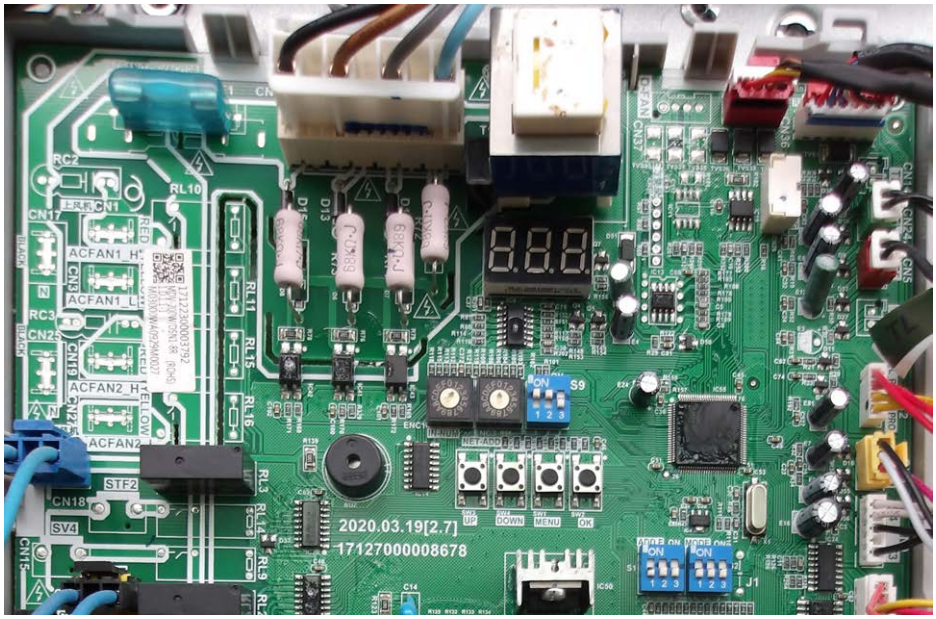


Fig. 28: Location of the display on the main electrical board of the outdoor unit and detail for operating the display

Table 12: Functions of buttons used to operate the display

Button	Function
SW5(MENU)	Enter/exit MENU mode or return to the previous MENU
SW3 (UP)	In MENU mode: previous and next MENU
SW4(DOWN)	Outside MENU mode: display operating parameters
SW6(OK)	Confirmation to access the MENU

Navigating in the menu:

Press and hold the SW5 "MENU" button for 5 seconds ➞ the display will show n1
Press SW3/SW4 "UP/DOWN" buttons to select the first menu level "n1", "n2", "n3", "n4" or "nb"
Press the SW6 "OK" button to confirm the first level of the menu ➞ the display will show nX1
Press the SW3/SW4 "UP/DOWN" buttons to select the second menu level "nXY"
Press the SW6 "OK" button to confirm the second menu level ➞ the display will show nXY

Table 13: List of parameters

Parameter	Description	Note
0.--	Outdoor unit output (Hp)	Actual displayed value
1.--	Configuration of the number of indoor units	
2.--	Functional state	**0: off, 2:c ooling** **3: heating; 4: forced cooling**
3.--	Fan speed index	Between 1 (min. rpm) and 11 (max. rpm)
4.--	Total outdoor unit output	
6.--	Temperature of heat exchanger main piping T3 (°C)	Actual displayed value
7.--	Outdoor air temperature T4 (°C)	Actual displayed value
8.--	Temperature at compressor outlet (°C)	Actual displayed value
9.--	Temperature of invert module (TF) (°C)	Actual displayed value
10.--	Temperature of refrigerant cooling piping	Actual displayed value
11.--	Pressure at compressor outlet (MPa)	Actual Value = Displayed × 0.1
12.--	Discharge superheat degree (°C)	Actual displayed value
13.--	EXVA expansion valve position	Actual Value = Displayed × 8
14.--	Instantaneous current (A)	Actual displayed value
15.--	Compressor current (A)	Actual displayed value
16.--	Instantaneous voltage	Actual displayed value
17.--	DC bus voltage	Actual displayed value
18.--	Temperature of indoor unit piping T2/T2B) (°C)	Actual displayed value
19.--	Priority	**0: priority heating, 1: priority cooling,** **2: First ON priority, 3: Only heating,** **4: Only cooling, 5: Test mode 1,** **6: Test mode 2**
20.--	The number of indoor units currently communicating with the outdoor unit	Actual displayed value
21.--	Number of indoor units currently in operation	Actual displayed value
22.--	Last error or protection code	"nn" is displayed if there is no fault or intervention of protection against switching on
23.--	Software version	
--.--		End

Description of micro switches on the main board

Fig. 29: Micro switches on the main board of the outdoor unit

Table 13: Micro switches on the main board of the outdoor unit

Switch	Code	Meaning
ENC1	0 – 2	Configuration of outdoor unit address
ENC2	0 – C	Configuration of outdoor unit output
ENC4	0 – 7	**Configuration of outdoor unit network address**
ENC5	0 – F	Quiet mode configuration
ENC3 + S12	0 – F 000	Number of indoor units, configuration from 0 to 15
	0 – F 001	Number of indoor units, configuration from 16 to 31
	0 – F 010	Number of indoor units, configuration from 32 to 48
	0 – F 011	Number of indoor units, configuration from 48 to 63
	0 100	Sets the number of indoor units to 64
S4	/	Configuration of the static pressure of the outdoor unit
S5	/	Priority configuration
S6-1	/	Spare
S6-2	0/1	Nothing/delete address of indoor unit
S6-3	0/1	Automatic/manual address configuration
S7	/	Spare
S8-1	/	Spare
S8-2	0/1	Configured start period to 12/7 minutes
S8-3	/	Spare
S9	/	Spare
S13	0/1	New/Legacy protocol

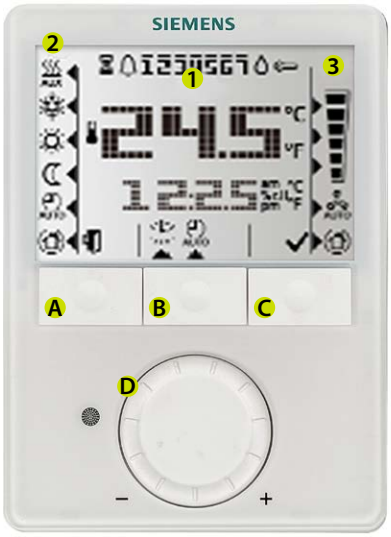
INSTRUCTIONS FOR USE

To control the MONZUN-HP heaters, a VULCAN MHP analogue controller is supplied with the optional extension OMH 3 for controlling three heaters or OMH 6 for controlling up to six heaters. In the case of bus communication, the heater is controlled by a supervisory system or ZEUS controller.

1 thermostat RDG160T
2 main switch
3 fuse

Fig. 30: Description of the MHP control panel

RDG 160 T room thermostat control



A operating mode selection button
B button for setting the time program
C fan mode selection/confirm button. When controlling MANDÍK heaters, it is only used for confirmation
D setpoint wheel

Fig. 31: RDG 160 T room thermostat

1 – Main display

space temperature
° C, ° F – temperature unit
control lock
fault indicator
condensation in the space
transient timer active (party button)
1234567 day of week
1 = Mon, 2 = Tues … 7 = Sun
12:25 – current time
time and day settings
schedule settings
leave menu (Esc)
confirm (above button C)

2 – Type of operation

heating mode
cooling mode
comfort mode, default 21 °C
night mode, default 15 °C
freeze protection mode, default 5 °C
automatic operation based on schedule
arrow indicating selected mode

COMMISSIONING

This applies for 1 MONZUN-HP heater with an MHP control panel.

By connecting the MONZUN-HP heater to the mains, the connected room thermostat RDG 160 T will be switched on at the same time.

Manual activation of heating

Press the left button repeatedly to select heating mode and comfort mode . If the current room temperature is lower than the set comfort temperature, the heater is switched on. If the set comfort temperature is lower than the current room temperature, increase it by rotating the wheel in a clockwise direction, the desired temperature flashes and does not have a thermometer symbol. Heater output is proportional to the difference between the desired and actual room temperature.

Manual shutdown of heating

Use the left button to set a mode with a lower desired temperature than the current room temperature (night , freeze protection) or reduce it by rotating the wheel in an anticlockwise direction to the desired comfort temperature.

Manual activation of cooling (summer operation)

Use the left button to set the cooling mode and comfort . If the current room temperature is higher than the set comfort temperature, the heater fan is switched on. If the current room temperature is lower than the set comfort temperature, in order to turn on the ventilation, it is necessary to reduce the desired comfort temperature below the current one.

Manual shutdown of cooling

Use the left button to select another mode, e.g. cooling + freeze protection or cooling + night .

EXPANSION FOR MULTIPLE UNITS

1 AUTO/OFF/MANUAL switch
2 HEATING/COOLING switch
3 MANUAL indicator
4 AUTO indicator
5 ERROR indicator

Fig. 32: Description of the OMH3 (OMH6) control panel

Description

The MHP+OMH3 (OMH6) control panel is used to control up to three (six) MONZUN-HP units in one temperature zone.

The device allows for each unit to be individually switched between control using the MHP thermostat (e.g. according to the weekly program) or manually (in heating or cooling mode) or to turn off the device. A fault condition is indicated both on the MONZUN-HP heater by the red Fault light, and also on the control box by the ERROR light for the given unit.

On the left side is the HEAT/COOL switch used to switch between these modes in manual control.

Operation

Use the lever switch (1) to select the operating mode for each individual MONZUN-HP unit. We can choose from three main states.

- **AUTO** – The unit is fully controlled by the MHP thermostat, either according to the weekly scheduled or according to the individual required temperatures (the indicator (4) shows when it is active)
- **OFF** – The unit is off regardless of the command from the MHP thermostat
- **MANUAL** – The unit responds only to the switch on the left side of the OMH3 (OMH6) (the indicator (3) shows when it is active)

  I – HEATING – The unit heats at minimum output regardless of the space temperature

  II – COOLING – The unit cools at minimum output regardless of the space temperature

If for some reason there is a problem with the MONZUN-HP unit, the fault indicator lights up both on the MONZUN-HP heater and on the OMH3 (OMH6) control panel (5).

CONFIGURING THE RDG 160 T SPACE THERMOSTAT

Configuration of the current time and day of the week

Press the time program setting button (middle), the symbol appears on the display, and then conform with the right button ✔. The numbers displaying the time will start flashing, turn the wheel to set the current time.

To change the time display format from 24-hour to twelve-hour and vice versa, scroll over the value 23:59 or 00:00 when setting the time.

Confirm the set time with the right button ✔, the day of the week indicator starts to flash, set the current day by rotating the wheel anticlockwise.

Confirm the set day with the right button ✔. The (Esc) symbol appears over the left button, press the left button to exit programming mode.

Note: In the event of a power failure, the time will flash after power is restored to indicate a power failure. The schedule will then continue with the original time before the power failure.

Changing the schedule

The room thermostat contains 8 programmable time blocks that can be assigned to one or more days of the week.

1. Press the programming button (middle) twice to enter the time block setting, the symbol will appear.
2. Turn the wheel to select time block A1…A8, whichever you want to configure and confirm with the right button ✔.
3. Set the start of the comfort mode by turning the wheel and confirm with the right button ✔.
4. Turn the wheel to set the end of the comfort mode = and the start of night mode and confirm with the right button ✔.
5. Symbols for the day of the week 1, ok ✔ and Esc begin to blink. Press the ok ✔ button to insert or Esc to not insert the time block in the given day.
6. Once the block is inserted/not inserted into the seventh day, all the selected days of the week will start flashing. Confirm by pressing the ok ✔ button and then proceed to configuring the next time block.

To save your settings, remember to press ok after step 6 before pressing Esc to exit programming mode.

Navigating the settings

1. Press the programming button (middle) twice to enter the time block setting, the symbol will appear.
2. Turn the wheel to view all 8 time blocks in turn.
3. Press the Esc button to return to normal operation.

Using the transient timer (party button)

The transient timer is used to temporarily extend comfort or night mode in case of extraordinary occupancy or absence.

Space thermostat in automatic operation .

Press the left button for a maximum of 3 s and at the same time turn the wheel clockwise to extend the comfort mode display 0 +9:30 or anticlockwise to extend the night mode, display 0 -9:30. Both extensions can be set at a maximum of 9:30. After the set time has elapsed, the controller will return to normal operation according to the schedule.

Control lock

Press and hold the right button for 3 seconds to lock or unlock the controls.

Procedure for configuring control parameters

1. Procedure for setting regulatory parameters
   Press the left and right buttons simultaneously for at least 4 seconds.
2. Release the buttons and immediately press the right button and hold for approx. 3 s until P01 appears instead of the temperature on the display.
3. Select the desired parameter by turning the wheel.
4. Press the right ok ✔ button, the value of the selected parameter starts flashing, you can change it by turning the wheel.
5. Press the right ok ✔ button to confirm the set value, press the Esc button to cancel the change.

Repeat steps 3 to 5 to set other parameters, press the Esc button to exit the parameter configuration mode.

Parameter	Parameter name	Default setting	Range
P01	Control sequence	2	0 – heating only 1 – cooling only 2 – manual Heat/Cool switch 3 – auto Heat/Cool switch 4 – heating and cooling
P02	Use the left button to select the operating mode	1	1 – AUTO/Comfort/Freeze protection 2 – Auto/Comfort/Night/Freeze protection
P04	Temperature display in F or °C	0	0 – °C 1 – °F
P05	Temperature sensor calibration	0.0 K	-3…+3 K
P06	Temperature shown on display	0	0 – space temperature 1 – temperature setpoint
P08	Temperature setpoint for comfort	21 °C	5…40 °C
P09	Minimum temperature setpoint restriction in comfort mode	5 °C	5…40 °C
P10	Maximum temperature setpoint restriction in comfort mode	35 °C	5…40 °C
P11	Heating setpoint in economy mode	10 °C	Off, 5 °C
P12	Cooling setpoint in economy mode	30 °C	Off, 40 °C
P14	Button lock	2	0 – disabled 1 – automatic 2 – manual

Material, surface finish

- The housing of MONZUN-HP heaters is made of galvanized steel sheet metal which is powder coated.
- The condensate tray and drip pan for the indoor unit are made of uncoated stainless steel.
- The heat exchangers are made of copper tubes with aluminium fins.

Shipment and storage

- The indoor and outdoor units of the MONZUN-HP heater are delivered on pallets in cardboard packaging, accessories such as stands are delivered loosely on pallets in protective foil.
- The units are transported by covered means of transport with a pallet underneath. During handling and transport, the units must be protected against physical damage and from exposure to weather. There must be no rough shocks and the ambient temperature must not exceed 50 °C.
- It is forbidden to put the outdoor unit down; it can damage the compressor.
- Storage of units in their original packaging is possible in covered buildings with a temperature of -10 to +40 °C, relative humidity max. 80 %. During storage, the units must be protected against mechanical damage.

Product data

Indoor unit nameplate

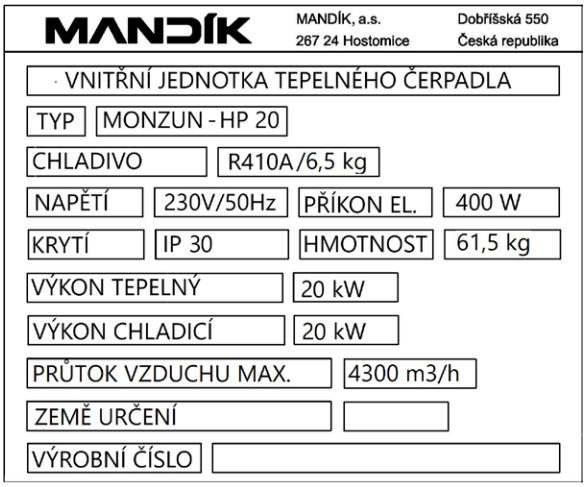


Fig. 33: MONZUN-HP indoor unit nameplate

Maintenance

Before beginning any maintenance, check to ensure the main disconnect switch for the device is off and that it is no longer energised.

It is recommended to regularly clean the heat exchanger on the indoor unit to remove dust. A plugged heat exchanger reduces the air flow rate and thereby the heating and cooling output. Cleaning the heat exchanger is possible by blowing compressed air from the front of the heat exchanger or after removing the fan from the back with a soft broom in the direction of the fins. Contamination of the exchanger is most easily detected by looking between the stopped fan blades (additional illumination is required).

WARNING!

The screws securing the fan in the diffuser are secured with a liquid thread locking agent. When reassembling the fan after cleaning the exchanger, the thread locking agent must be reapplied.

The heat exchanger for the outdoor unit must be cleaned when necessary, with soling identified on the outside surface of the heat exchanger. Use a soft broom or vacuum cleaner to clean.

During maintenance, it is recommended to inspect the accessible connections and valves of the refrigerant circuit and look for signs of grease, as this may be compressor oil and thus indicate a refrigerant leak. In this case, order a leak check of the refrigerant circuit immediately.

Refrigerant circuit leak check

The refrigerant circuits in MONZUN-HP heaters must be subjected to a leak test once every 12 months according to Regulation of the European Parliament and of the Council (EU) No. 517/2014. Only an authorised entity certified for this specific activity under the aforementioned regulation may conduct this check.

Equipment documentation

MONZUN-HP heater operators must maintain a Records Log for their heaters to record all the required data. The specific form of such records logs is specified in national legislation and the form valid for the Czech Republic is contained in Decree 257/2012 Coll. Records logs are retained for a period of at least 5 years.

Removal from service, disassembly and recycling

When taking a MONZUN-HP heater out of service, the refrigerant must first be evacuated from the circuit by a certified entity. The refrigerant circuit may then be disassembled and turned over for recycling, including the indoor and outdoor units.

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