TWEETOP™

EcoHeat Mono

User manual

Inverter air-to-water heat pump

Before using the appliance, please read this instruction manual and keep it for future reference.

ver. 1.6

Contents

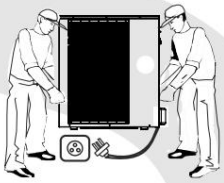
1. Before use

1.1 Precautions

When reading this manual, pay special attention to the descriptions next to the symbols below. Their meaning has a huge impact on the correct operation of the device and safe use.

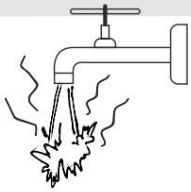
Seriously, no! Attention! Forbidden!

Montage, dismantling and maintenance devices must be performed by qualified installer/service technician. It is forbidden to make any changes technical in the heat pump. In otherwise it may result in damage to the device and injury to the user.

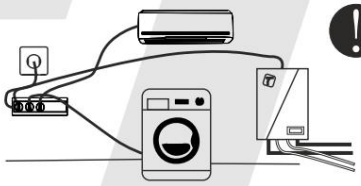


To avoid electric shock, always remember to unplug the power cord. Disconnect the power supply from the device before starting service work. After disconnecting the power supply, wait for a voltage on the while, take a measurement main terminals for at least 1 minute and only after determining that the voltage is lower than the safe level commence service work.

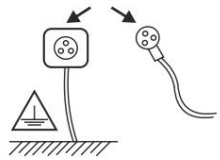
Remember to read this manual before installing or using the device. read this Operating Instructions.



In the domestic hot water (DHW) installation, it is necessary to install thermostatic mixing valve for protect users from burn.

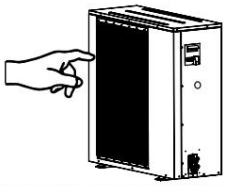


The heat pump is connected directly to the building's electrical switchboard to a separate electrical protection (fuse).



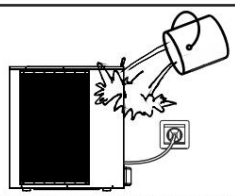
The electrical power supply to the heat pump must be provided using an efficient grounding wire.

This device should not be used by children under 8 years of age or by persons with limited psychophysical or sensory abilities. It should also not be used by people with little experience and knowledge in the field of heating technology. Children should not play at all and the Cleaning and maintenance device should not be operated by the user, but by a qualified installer or serviceman.



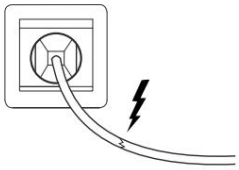
It is forbidden to touch, especially put in shapes or other items to the air outlet grille of the fans.

Do not touch electrical appliances power cords having wet hands. Do not pull the plug out of the socket by pulling directly on the wire. power supply

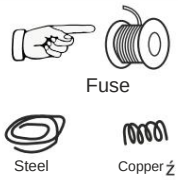


It is not allowed to pour water from or to another person device, especially when it is working and under electrical voltage. It will cause it is electric shock and damage devices.

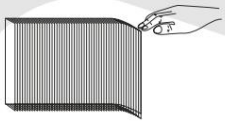
1. Before use



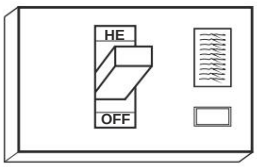
When you notice an electric wire the power supply is damaged immediately from the device from the power supply electric.



A suitable fuse or circuit breaker must be selected in accordance with the manufacturer's recommendations. Steel or copper wire must not be considered a substitute for a fuse or circuit breaker.

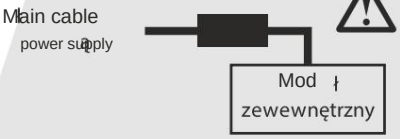


Do not touch the body. The edges Aluminum fins are very sharp. This can cause injuries.

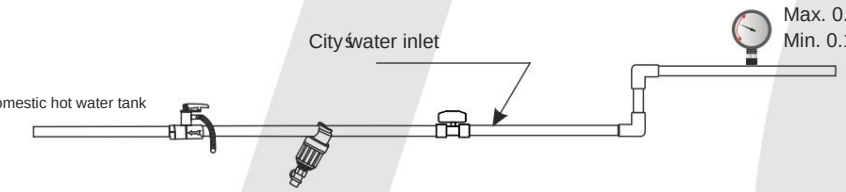


The appliance must be disconnected from the electrical supply by means of an appropriate circuit breaker or fuse. Failure to provide a circuit breaker or fuse may result in electric shock to the user of the appliance.

Disposal of the device. In case of dismantling of the device should be carried out segregate dismantled parts and transfer them to the appropriate institutions dealing with waste disposal.



It is advisable to use a suitable power supply for the device. differential protection with a value of 30 mA.



Maximum cold water pressure: 0.6 MPa
Minimum cold water pressure: 0.1 MPa

This symbol indicates that the individual components of this appliance, after dismantling, should not be disposed of with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle responsibly to promote reuse. use of materials. The used device should be returned to the appropriate company recycling or contact the point of sale where the product was purchased got drunk.

1. Before use

1.2 Principle of operation

1.2.1 The idea of a heat pump

The idea of the EcoHeat Mono heat pump is to supply the necessary amount of thermal energy to the building's heating system and to the domestic hot water heater by using free energy accumulated in the outside air.

It is undeniable that outdoor air, as a source of renewable energy, has an unquestionable advantage and superiority over other sources, e.g. ground! Outdoor air is available to everyone without restrictions and free of charge, and its acquisition does not require complicated earthworks - drilling or burying an exchanger in the ground.

The EcoHeat Mono heat pump can recover heat energy from the outside air and transform it to efficiently power the building's heating system and heat utility water. It can therefore be said that the EcoHeat Mono heat pump is a device for recovering heat from outside air.

Observing the recent climate changes in the world and the course of the winter period in Poland, where average temperatures range from +2°C to +8°C, and the minimum temperature only reaches -10°C, it seems that the future of Polish energy, in its individual version, lies in air-to-water heat pumps.

1.2.2. The principle of operation of a heat pump

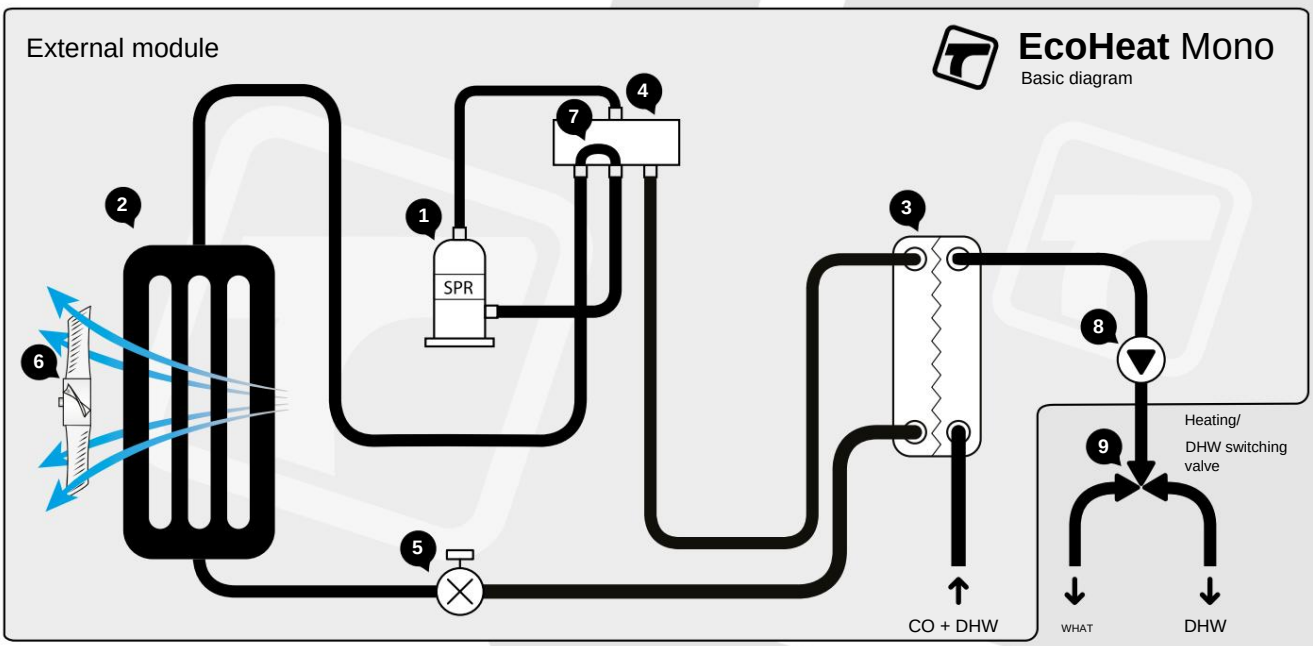
The process of heating a building and heating utility water is based on thermodynamic changes of the refrigerant, occurring in the heat pump cycle. The thermodynamic cycle is the refrigeration cycle (so-called left-hand circulation). The operating principle of a compressor heat pump is identical to the operating principle of a household refrigerator. The task of a household refrigerator is to lower the temperature in the cooling chamber, i.e. to cool food products. However, a household refrigerator, simultaneously with the cooling process, transfers heat to the environment, because the heat exchanger (condenser), which is placed on the rear wall of the refrigerator, is hot during its operation, has a temperature of approx. +55°C. The EcoHeat Mono heat pump works in the same way, it cools the outside air, through the external module (evaporator) and the heat energy obtained in this way is transferred to the building.

In detail, the process of delivering heat to the building using the EcoHeat Mono heat pump is as follows: the fan (or fans) located in the external module of the heat pump, draws in outside air. This air flows through a heat exchanger called the evaporator. This exchanger has a lamella structure, so it is similar to the radiator in a car. Inside the refrigeration system of the heat pump there is a refrigerant. This is a substance that has an unusual property, namely the ability to boil (evaporate) at very low temperatures. EcoHeat Mono heat pumps use a refrigerant with the symbol R32, characterized by a low GWP of 625, whose normal boiling point is -51.6°C (minus fifty-one and six tenths degrees Celsius). This means that any substance or body that has a higher temperature than -51.6°C will be a source of heat for this agent and will cause it to boil (evaporate). Therefore, outside air flowing through the evaporator, which has a temperature of, for example, -10°C, will cause the refrigerant inside the heat exchanger to evaporate thanks to the thermal energy from the outside air.

The size of the heat exchanger and the amount of air flowing through are selected so that the entire refrigerant in the evaporator boils and turns into steam (just like boiling water in a kettle). However, it should be remembered that when the refrigerant evaporates, it takes over some of the free heat energy from the outside air, as a result of which the outside air cools down on this exchanger by about 2 to 4°C. The fan forces the cooled air through the front part of the outside module housing.

1. Before use

The refrigerant in the form of vapour flows out of the evaporator (2) and flows further through the pipeline to the four-way valve (4). This valve was installed to perform two functions. First, it is to defrost the evaporator in winter. This is its most important function, without it the heat pump would not be able to work properly in winter. The second function is to enable the process of cooling the building in summer. Thanks to it, in summer it is possible to switch the refrigerant circuit of the heat pump to prepare chilled water in the air conditioning system of the building. Therefore, the refrigerant in the form of vapour flows through the four-way valve and is directed further to the compressor (1). The compressor sucks in the vapour of the refrigerant and compresses it, significantly increasing the pressure. The second property of refrigerants is that during a rapid increase in pressure, their temperature increases equally rapidly. Therefore, it turns out that the vapour of the refrigerant extruded from the compressor has a very high temperature. Therefore, the hot refrigerant vapour leaving the compressor is further pumped to the four-way valve, where it flows through the appropriate nozzles, and then through the pipeline reaches the next heat exchanger - the condenser (3). This condenser is made in the form of a plate exchanger commonly used in thermal power engineering. The hot refrigerant vapour flows into this heat exchanger, then flowing inside it, between the individual plates, gives off heat to the water from the building's heating system, which is pumped into its interior by the operation of the circulation pump (8). Due to the fact that the water returning from the central heating system is relatively cold, and the refrigerant vapour is very hot, the refrigerant vapour begins to condense inside the heat exchanger during the transfer of heat to the water (an identical phenomenon occurs on a cold element, e.g. a spoon, placed under the stream of hot steam flowing out of a kettle while boiling water).



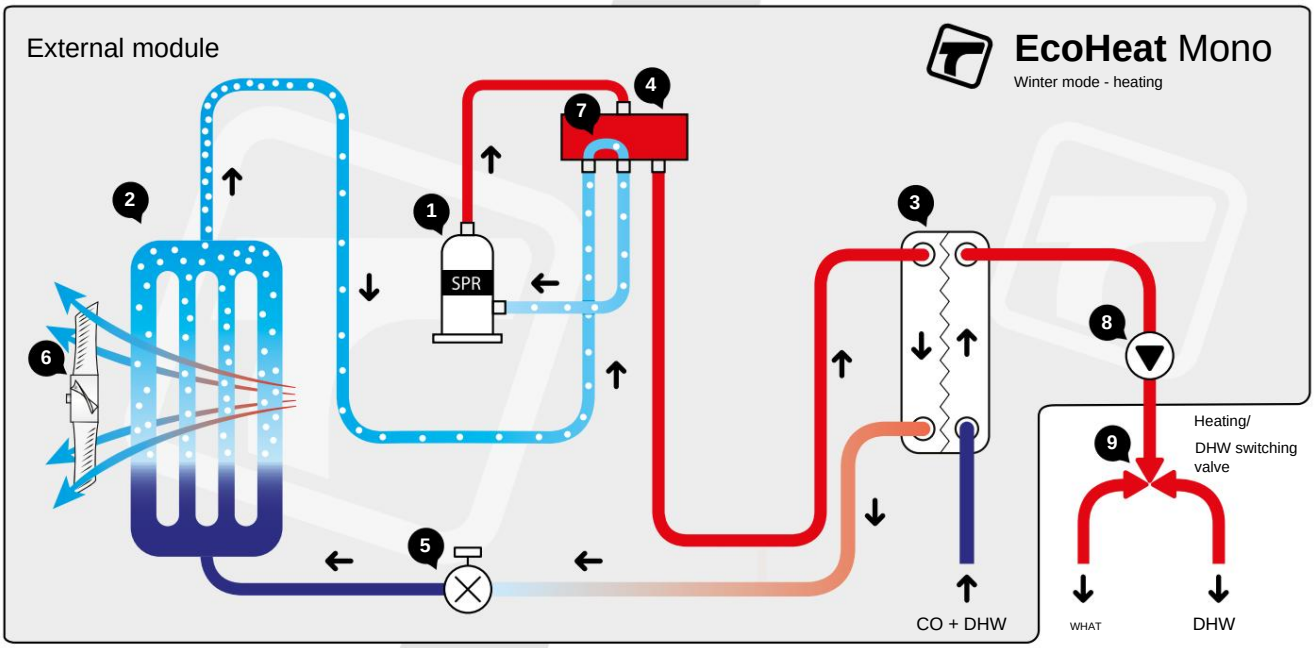
Due to the process of changing the state of the refrigerant from vapor to liquid, this exchanger is called a condenser. Its size is selected so that the entire factor flowing into the condenser in the form of vapor, after giving off heat to the central heating water, flows out of it already in the form of liquid. It is necessary to have the refrigerant in the form of liquid again, so that it can be supplied back to the evaporator, so that the whole process of the heat pump operation can start again and last continuously all the time. However, it is not possible to simply supply the factor flowing out of the condenser back to the evaporator.

1. Before use

The obstacle is the pressure difference that prevails in both of these heat exchangers. Namely, in the condenser, behind the compressor, there is a very high pressure, reaching even 40 bar (4.0 MPa), while in the evaporator, before the compressor, there is a low pressure of about 5 bar (0.5 MPa). Such a pressure difference must be maintained in the heat pump to be able to draw heat from the outside air at a low temperature of the refrigerant (and low pressure) in the evaporator and to release this heat to the heated water, which at a much higher temperature (and high pressure) prevailing in the heat pump condenser. Therefore, between the heat pump condenser and the evaporator, the refrigerant must flow through a throttling element, called a throttling valve (expansion valve). This valve, like the compressor, but, as it were, in the opposite direction, rapidly reduces the pressure of the refrigerant. It is made as an orifice, i.e. a local reduction in the diameter of the pipeline. When the refrigerant flows at high speed through such a constriction, its pressure drops to the value prevailing in the evaporator. In this way, the heat pump's refrigerant circuit closes and all processes start again.

1.2.3 Winter mode - heating

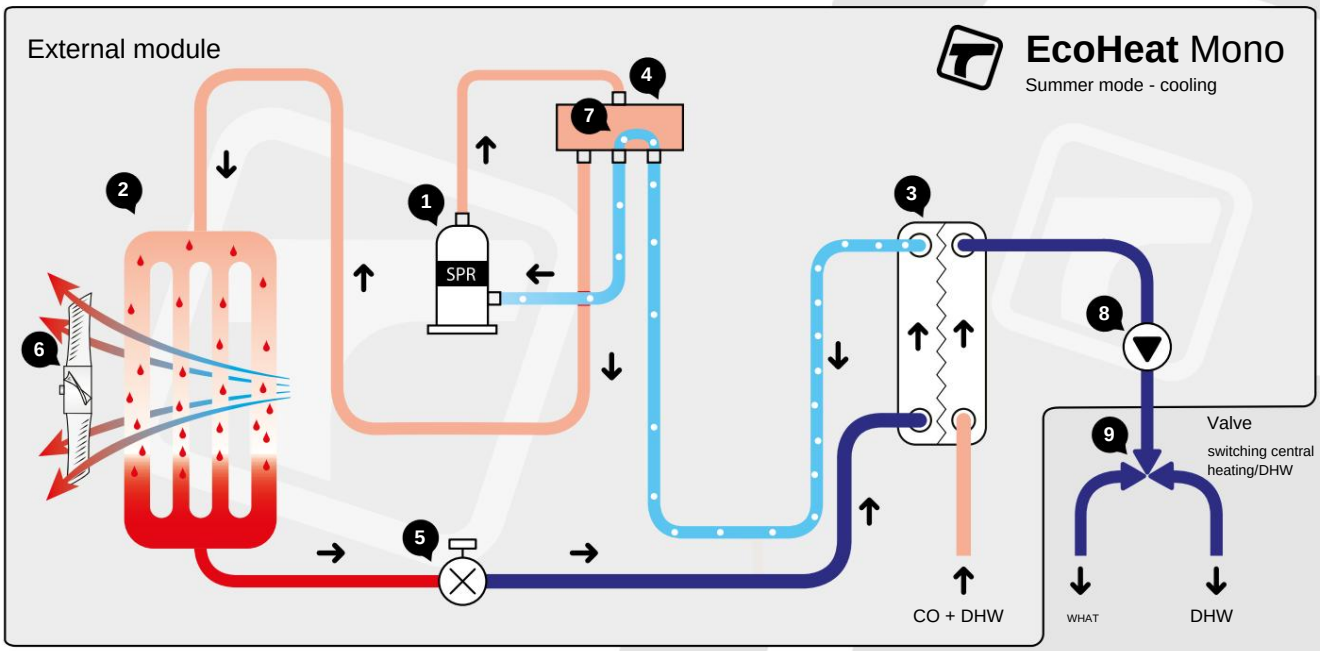
The above description of the heat pump operation applies to the winter period, where the heat pump supplies heat to the building and the utility water heater. The position of the slider in the four-way valve is important for this process. The left and middle connectors of the four-way valve are connected by a slider, so that the refrigerant vapour leaving the evaporator flows freely to the compressor. Hot vapour from the compressor enters the upper connector of the four-way valve and due to the above-described slider position, it leaves the valve through the lower right connector, heading to the condenser. Thanks to this position of the slider in the four-way valve, the heat pump is in heating mode.



1.2.4 Summer mode - cooling

Cooling mode, i.e. cooling the water in the central heating system of the building, is carried out by moving the slider in the four-way valve in the external module. The heat pump controller, after measuring the temperature outside and inside the building and checking the individual user settings, sends a signal to the four-way valve actuator (electromagnet coil) about the need to change the slider position. The valve servo drive system moves the slider to the second extreme position, so that now the slider connects with itself

in a hydraulic way, connections: middle and right. As a result, the heating function of the heat pump is "reversed" to a cooling function by changing the direction of the refrigerant flow.



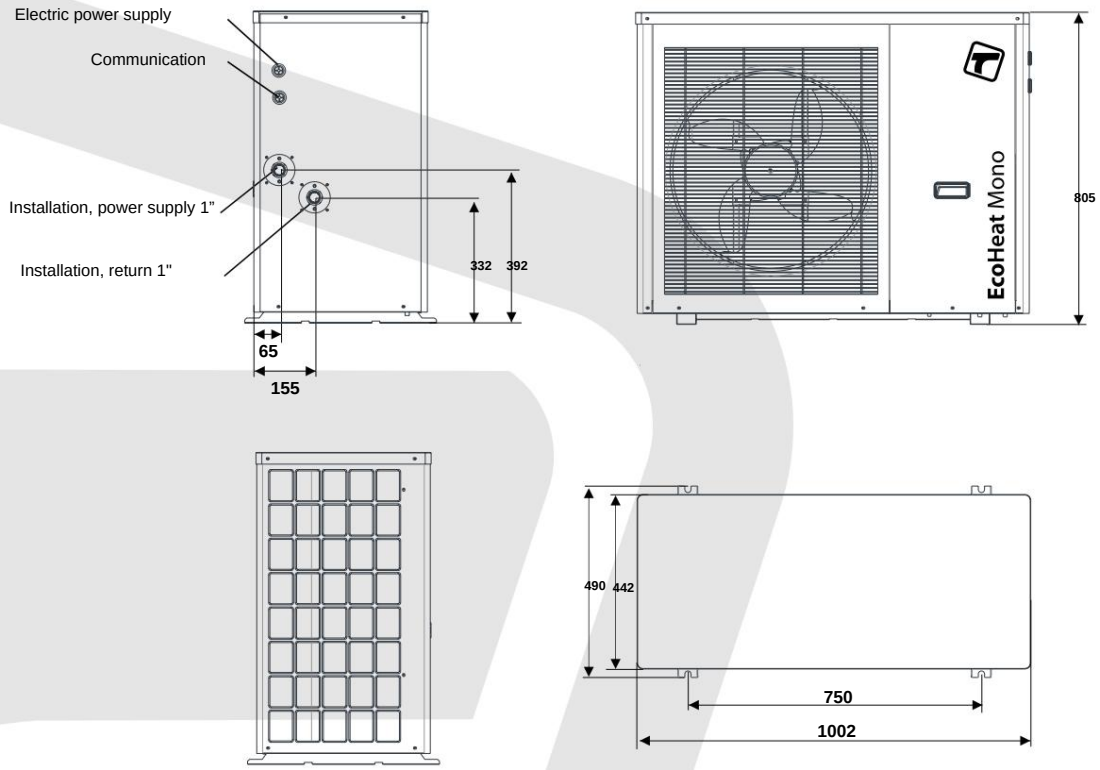
The compressor, identically as during heating, extrudes hot refrigerant vapour to the upper connector of the four-way valve. However, now the slider is in a completely different position, so that hot refrigerant vapour flows out of the four-way valve through the lower left connector, which directs the flow to the evaporator, which in this case changes its function to: condenser. Therefore, the vapour flows into this exchanger, which is washed by outside air forced by the fan (fans). It should be remembered that the refrigerant vapour has a very high temperature, and the air washing the exchanger tubes is approx. +35°C (summer). As a result, the refrigerant cools down and changes into a liquid state (condensation). In this form it leaves the heat exchanger and goes to the throttle valve. Here, the entire process takes place identically to that described above. The refrigerant is throttled, which causes its temperature to drop, and in this form it goes to the plate exchanger, which now takes over the evaporator function. At the same time, water from the building's cooling system (chilled water) (from fan coils, from the air handling unit cooler or from the underfloor heating) is supplied to this exchanger. In this exchanger, the refrigerant boils (evaporates), drawing heat from the central heating water. As a result, the water cools down, and the refrigerant changes to a vapor state. The cooled water is further used to cool the building, while the refrigerant flows to the four-way valve on the lower left connector. Currently, the position of the slide redirects the flow of the agent to the compressor, which closes the refrigerant circuit.

1.2.5 Summary

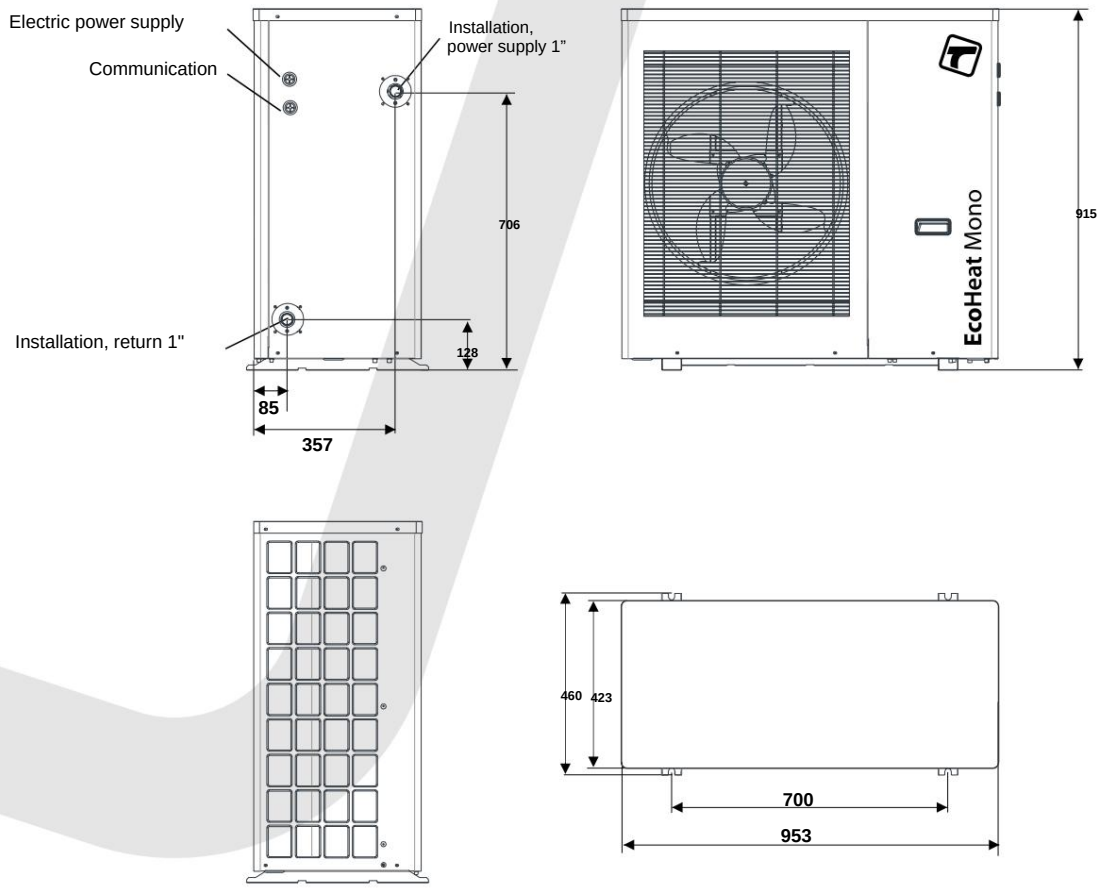
It can therefore be stated that the process of transferring heat energy from the outside air to the heated central heating water in the EcoHeat Mono heat pump takes place using four thermodynamic processes of the refrigerant: evaporation as a result of the refrigerant absorbing heat from the outside air, compression of the refrigerant vapour, which is accompanied by a rapid increase in the temperature of the refrigerant vapour, and further transfer of heat from the hot refrigerant vapour to the heated central heating water in the condenser, which is accompanied by the transformation of the refrigerant vapour into liquid, and throttling of the liquid refrigerant flowing through the throttling valve, which is accompanied by a rapid drop in the refrigerant pressure.

1. Before use

1.3 Basic components and dimensions 1.3.1 Model P6

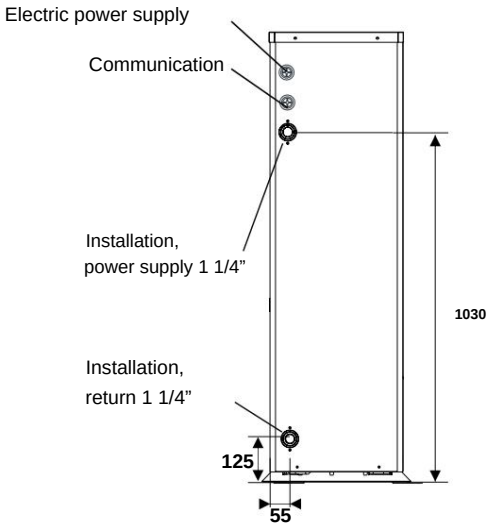


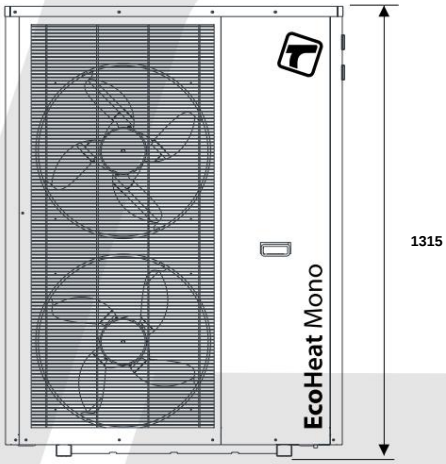
1.3.2 P10 T Model

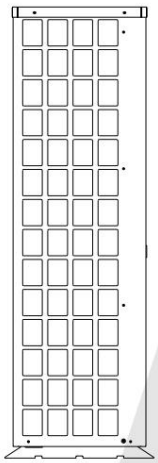


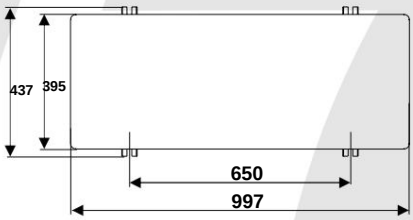
1. Before use

1.3.3 Model P17 T









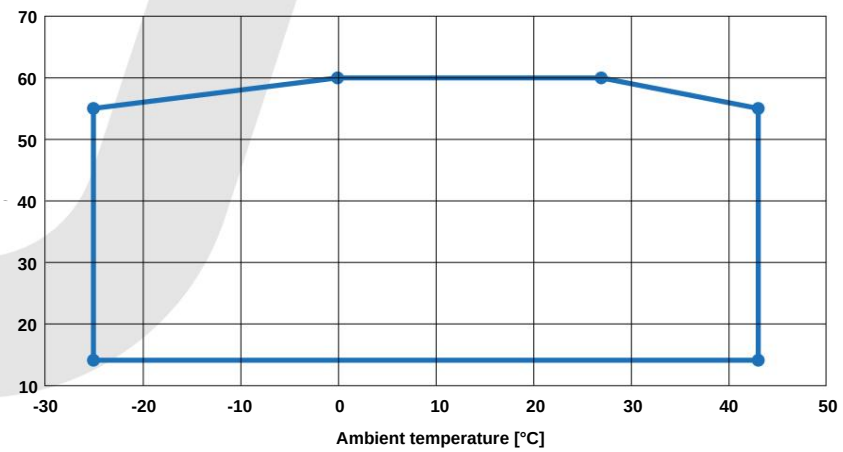
1. Before use

1.4 Technical data

Parameter	unit	**EcoHeat** Mono P6	**EcoHeat** Mono P10 T	**EcoHeat** Mono P17 T
Nominal voltage/supply frequency	Volts/Hz	220-240V~/50Hz	380-415V/ 3 phase/50Hz	380-415V/ 3 phase/50Hz
IP tightness class		IPX4		
Insulation class				
Energy label +35°C		A+++	A++	A++
Energy label +55°C		A++		
SCOP +35°C		4.57	4.17	4.20
SCOP +55°C		3.22	3.23	3.23
Heating power +7/+35°C	kW	2.29-8.25	4.70-12.50	7.00-20.50
Maximum COP value +7/+35°C		5.22	4.39	4.55
Electric power consumption for heating	kW	0.63-1.81	1.08-3.44	1.50-6.00
Cooling capacity +35/ +7°C	kW	1.98-6.10	3.22-11.30	5.50-15.50
Electric power consumption in cooling Heating	kW	0.70-2.22	1.27-4.64	1.50-6.00
power in DHW mode	kW	3.00-9.77	5.76-16.20	9.35-24.30
Electric power consumption in DHW mode	kW	0.60-2.35	1.16-4.20	2.06-6.40
Maximum electrical power consumption	kW	2.90	4.64	7.20
Maximum current draw Operating range in heating	AND	13.0	7.6	12.0
mode Maximum medium temperature	°C	-25~43		
on the supply Maximum medium temperature on the	°C	60		
supply at -20°C outside (without electric heater operation)	°C	55		
Number of		1		
compressors		Twin rotary		
Compressor type		Panasonic		
Compressor manufacturer	kg	1.3	1.7	2.0
Refrigerant R32 tCO2 equivalent	t	0.878	1.148	1.350
Number of fans Fan		1	1	2
motor electrical power Fan rotation speed	IN	75	75	130
Sound pressure level (1 m)	RPM	300-850	300-800	350-850
	dB(A)	37-54	42-55	44-58
Circulation pump manufacturer		Grundfos / Shimge		
Circulation pump power consumption	IN	52	52	180
Heating medium flow through condenser Circulation pump	m3 /h	1.0	1.7	2.9
lifting height Water connection Net dimensions of	kPa	55	55	125
the device (length/	inch	1	1	1 1/4
width/height)	mm	1002x490x805	953x460x915	997x437x1315
Dimensions of the device with packaging (L/H/W)	mm	1070x510x970	1050x500x1060	1080x450x1470
Net weight of the device	kg	90	100	155

Parameters for data in heating function: (DB/WB) 7°C/6°C, (Flow/ Return) 35°C/30°C. Parameters for data in cooling function: (DB/WB) 35°C/24°C, (Flow/ Return) 7°C/12°C. Parameters for data in DHW function: (DB/WB) 20°C/15°C, Water heating from 15 to 55°C. Thermal and cooling capacity, electrical power are given according to EN 14511-2007.

1.4.1 Work envelope



1. Before use

1.4.2 Heating power, electrical power consumption and COP at operating points

EcoHeat Mono P6
compressor operating frequency **30Hz**

EcoHeat Mono P6	Heating power [kW]																	30Hz
Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	1.03	1.12	1.24	1.39	1.47	1.72	1.81	1.85	1.95	2.30	2.56	2.67	2.90	3.08	3.29	3.46	3.68	
41	0.98	1.08	1.19	1.35	1.43	1.68	1.75	1.77	1.86	2.22	2.50	2.60	2.83	3.01	3.22	3.40	3.65	
45	0.96	1.05	1.17	1.32	1.40	1.64	1.72	1.71	1.81	2.16	2.46	2.55	2.78	2.96	3.17	3.36	3.63	
50		1.02	1.13	1.29	1.37	1.60	1.67	1.66	1.74	2.06	2.39	2.45	2.68	2.86	3.09	3.29	3.56	
55			1.10	1.25	1.33	1.56	1.63	1.62	1.70	1.96	2.31	2.35	2.58	2.76	3.01	3.22	3.51	
60			1.06	1.22	1.30	1.52	1.58	1.57	1.65	1.86	2.24	2.25	2.48	2.66	2.91	3.15	3.43	

EcoHeat Mono P6	Electric power consumption [kW]																	30Hz
Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	0.30	0.32	0.35	0.38	0.40	0.44	0.46	0.46	0.48	0.48	0.49	0.50		0.52	0.54	0.57	0.59	0.62
41	0.33	0.35	0.38	0.41	0.43	0.47	0.49	0.49	0.51	0.51	0.53	0.54		0.55	0.57	0.60	0.62	0.65
45	0.35	0.37	0.40	0.42	0.44	0.50	0.51	0.51	0.53	0.53	0.56	0.56		0.57	0.59	0.62	0.64	0.67
50		0.40	0.42	0.44	0.47	0.52	0.54	0.54	0.55	0.56	0.60	0.59		0.60	0.62	0.64	0.67	0.69
55			0.45	0.47	0.49	0.55	0.56	0.55	0.57	0.58	0.63	0.62		0.62	0.64	0.67	0.69	0.72
60			0.52	0.54	0.56	0.62	0.63	0.61	0.62	0.62	0.69	0.69		0.66	0.68	0.70	0.72	0.75

EcoHeat Mono P6	COP																	30Hz
Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	3.46	3.50	3.57	3.65	3.66	3.90	3.93	4.02	4.10	4.79	5.22	5.32	5.56	5.68	5.81	5.84	5.97	
41	3.02	3.08	3.18	3.28	3.36	3.55	3.58	3.60	3.69	4.34	4.70	4.83		5.13	5.26	5.40	5.47	5.64
45	2.76	2.84	2.94	3.15	3.17	3.31	3.34	3.35	3.44	4.08	4.39	4.54		4.87	5.00	5.14	5.24	5.44
50		2.57	2.69	2.90	2.93	3.08	3.10	3.11	3.16	3.71	4.01	4.14	4.49	4.64	4.82	4.94	5.14	
55			2.46	2.67	2.71	2.84	2.91	2.94	2.98	3.38	3.67	3.78	4.15	4.30	4.52	4.66	4.89	
60			2.06	2.26	2.31	2.45	2.51	2.60	2.68	3.02	3.26	3.28	3.78	3.93	4.15	4.40	4.56	

EcoHeat Mono P6

compressor operating frequency **57.5Hz**

EcoHeat Mono P6	Heating power [kW]																	57.5Hz
Ambient temperature [°C]	-30	-25	-20	-15	-12		-7	-5	0	2	5	7	10	15	20	25	30	35
35	2.46	2.82	2.98	3.17	3.35	3.88	4.11	4.37	4.75	5.35	5.83	6.00	6.24	6.63	7.08	7.44	7.74	
41	2.38	2.73	2.90	3.09	3.27	3.79	4.01	4.20	4.59	5.19	5.68	5.85	6.09	6.48	6.93	7.32	7.63	
45	2.32	2.68	2.84	3.03	3.21	3.72	3.93	4.10	4.48	5.08	5.58	5.75	5.99	6.38	6.83	7.25	7.55	
50		2.61	2.77	2.96	3.14	3.64	3.84	4.01	4.34	4.86	5.38		5.55	5.79	6.18	6.63	7.10	7.40
55			2.70	2.89	3.07	3.56	3.75	3.92	4.21	4.61	5.18	5.35	5.59	5.98	6.43	6.96	7.26	
60			2.63	2.82	3.00	3.48	3.66	3.83	4.07	4.38	4.98	5.15		5.39	5.78	6.23	6.81	7.11

EcoHeat Mono P6	Electric power consumption [kW]																	57.5Hz
Ambient temperature [°C]	-30	-25	-20	-15	-12		-7	-5	0	2	5	7	10	15	20	25	30	35
35	0.91	0.95	0.99	1.02	1.05	1.08	1.10	1.13	1.17	1.18	1.21	1.23	1.27	1.31	1.36	1.41	1.45	
41	1.01	1.05	1.09	1.13	1.15	1.21	1.24	1.27	1.31	1.32	1.35	1.37	1.41	1.46	1.51	1.56	1.59	
45	1.08	1.12	1.16	1.19	1.22	1.30	1.33	1.36	1.40	1.41	1.44	1.46	1.51	1.55	1.60	1.65	1.69	
50		1.20	1.24	1.28	1.30	1.41	1.45	1.48	1.52	1.53	1.56	1.58	1.63	1.67	1.72	1.77	1.81	
55			1.33	1.36	1.39	1.52	1.56	1.59	1.63	1.64	1.67	1.69	1.75	1.79	1.84	1.89	1.93	
60			1.46	1.50	1.52	1.67	1.68	1.71	1.78	1.79	1.82	1.83	1.89	1.94	1.99	2.04	2.07	

EcoHeat Mono P6	COP																	57.5Hz
Ambient temperature [°C]	-30	-25	-20	-15	-12		-7	-5	0	2	5	7	10	15	20	25	30	35
35	2.71	2.97	3.01	3.09	3.21	3.59	3.74	3.86		4.06	4.53	4.82	4.87	4.93	5.05	5.20	5.27	5.35
41	2.35	2.60	2.65	2.74	2.85	3.12	3.24	3.32		3.51	3.94	4.21	4.27	4.32	4.45	4.61	4.71	4.80
45	2.15	2.39	2.45	2.54	2.64	2.86	2.96	3.01	3.20	3.60	3.88	3.93	3.98	4.11	4.27	4.39	4.48	
50		2.16	2.23	2.31	2.42	2.58	2.66	2.72	2.87	3.18	3.46	3.52	3.56	3.70	3.85	4.01	4.10	
55			2.03	2.12	2.22	2.34	2.41	2.46	2.58	2.81	3.10	3.16	3.20	3.34	3.49	3.68	3.77	
60			1.80	1.88	1.98	2.09	2.19	2.24	2.29	2.45	2.74	2.81	2.85	2.98	3.14	3.35	3.44	

EcoHeat Mono P6

compressor operating frequency **80Hz**

EcoHeat Mono P6	Heating power [kW]																	80Hz
Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	3.03	3.15	3.42	3.83	3.97	4.66	4.96	5.71	6.27	6.84	7.50	7.74	8.11	8.52	8.95	9.35	9.76	
41	2.91	3.03	3.30	3.71	3.89	4.59	4.85	5.53	6.09	6.66	7.32	7.56	7.93	8.34	8.77	9.23	9.64	
45	2.83	2.95	3.22	3.63	3.85	4.54	4.78	5.41	5.97	6.54	7.20	7.44	7.81	8.22	8.65	9.15	9.56	
50		2.85	3.12	3.56	3.79	4.48	4.69	5.31	5.87	6.29	6.95	7.19	7.56	7.97	8.40	9.00	9.41	
55			3.02	3.49	3.73	4.42	4.60	5.21	5.77	6.04	6.70	6.94		7.31	7.72	8.15	8.85	9.26
60			2.92	3.39	3.66	4.32	4.51	5.11	5.67	5.79	6.45	6.69	7.06	7.47	7.90	8.70	9,11	

EcoHeat Mono P6	Electric power consumption [kW]																	80Hz
Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	1.32	1.37	1.42	1.47	1.50	1.54	1.56	1.59	1.59	1.61	1.63	1.68	1.75	1.83	1.91	1.98	2.06	
41	1.47	1.52	1.57	1.62	1.65	1.69	1.74	1.78	1.80	1.82	1.83	1.86	1.93	1.95	2.05	2.12	2.19	
45	1.57	1.62	1.67	1.72	1.75	1.79	1.86	1.91	1.94	1.96	1.97	2.00	2.05	2.09	2.17	2.20	2.28	
50		1.75	1.80	1.85	1.86	1.90	2.01	2.07	2.12	2.14	2.15	2.16	2.23	2.26	2.34	2.40	2.39	
55			1.92	1.97	1.97	2.01	2.16	2.23	2.29	2.31	2.32	2.33	2.38	2.44	2.52		2.60	2.49
60			2.13	2.19	2.17	2.21	2.37	2.44	2.51		2.52	2.54	2.55	2.59	2.65	2.73	2.85	2.66

EcoHeat Mono P6	COP																	80Hz
Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	2.29	2.29	2.40	2.60	2.64	3.02	3.18	3.59	3.95	4.25	4.59	4.61	4.63	4.66	4.69	4.72		5.35
41	1.97	1.99	2.09	2.29	2.35	2.71	2.79	3.10	3.39	3.66	4.00	4.07	4.10	4.28	4.28	4.36		4.80
45	1.80	1.82	1.92	2.11	2.19	2.53	2.57	2.83	3.08	3.34	3.65	3.72	3.80	3.93	3.99	4.15		4.48
50		1.63	1.73	1.93	2.03	2.35	2.33	2.57	2.78	2.95	3.24	3.33	3.39	3.52	3.59	3.75		4.10
55			1.57	1.77	1.89	2.20	2.13	2.34	2.52		2.61	2.89	2.98	3.07	3.17	3.24	3.40	3.77
60			1.37	1.55	1.69	1.96	1.91	2.10	2.27	2.30	2.54	2.62	2.72	2.81	2.89	3.05		3.44

EcoHeat Mono P6

compressor operating frequency **90Hz**

EcoHeat Mono P6	Heating power [kW]	90Hz

Ambient temperature [°C]	-30	-25	-20	-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	3.33	3.46	3.76	4.57	4.71	5.46	5.64	5.85	6.50	7.37	8.25	8.58	9.13	9.80	10.17	10.70	11.20
41	3.21	3.34	3.64	4.45	4.59	5.34	5.46	5.67	6.32	7.19	8.07	8.40	8.95	9.62	9.99	10.52	11.02
45	3.13	3.26	3.56	4.37	4.51	5.26	5.34	5.55	6.20	7.07	7.95	8.28	8.83	9.50	9.87	10.40	10.90
50		3.16	3.46	4.27	4.41	5.16	5.24	5.45	6.10	6.82	7.70	8.03	8.58	9.25	9.62	10.15	10.65
55			3.36	4.17	4.31	5.06	5.14	5.35	6.00	6.57	7.45	7.78	8.33	9.00	9.37	9.90	10.40
60			3.26	4.07	4.21	4.96	5.04	5.25	5.90	6.32	7.20	7.53	8.08	8.75	9.12	9.65	10.15

EcoHeat Mono P6	Electric power consumption [kW]	90Hz

Ambient temperature [°C]	-30	-25	-20	-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	1.46	1.51	1.56	1.61	1.64	1.69	1.71	1.71	1.73	1.78	1.81	1.87	1.98	2.11	2.19	2.29	2.39
41	1.70	1.75	1.80	1.85	1.88	1.93	1.95	1.95	1.97	2.02	2.05	2.11	2.22	2.30	2.43	2.53	2.63
45	1.86	1.91	1.96	2.01	2.04	2.09	2.11	2.11	2.13	2.18	2.21	2.27	2.38	2.46	2.59	2.69	2.79
50		2.11	2.16	2.21	2.24	2.29	2.31	2.31	2.33	2.38	2.41	2.47	2.58	2.66	2.79	2.89	2.99
55			2.36	2.41	2.44	2.49	2.51	2.51	2.53	2.58	2.61	2.67	2.78	2.86	2.99	3.09	3.19
60			2.61	2.66	2.69	2.74	2.76	2.76	2.78	2.83	2.86	2.92	3.03	3.11	3.24	3.34	3.44

EcoHeat Mono P6	COP	90Hz

Ambient temperature [°C]	-30	-25	-20	-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	2.28	2.29	2.41	2.84	2.87	3.23	3.30	3.42	3.76	4.14	4.56	4.59	4.61	4.64	4.66	4.68	4.70
41	1.89	1.91	2.02	2.41	2.44	2.77	2.80	2.91	3.21	3.56	3.94	3.98	4.03	4.18	4.12	4.17	4.20
45	1.68	1.71	1.81	2.18	2.21	2.52	2.53	2.63	2.91	3.24	3.60	3.65	3.71	3.86	3.82	3.87	3.91
50		1.50	1.60	1.93	1.97	2.26	2.27	2.36	2.62	2.86	3.20	3.25	3.32	3.47	3.46	3.52	3.57
55			1.42	1.73	1.76	2.03	2.05	2.13	2.37	2.54	2.85	2.91	3.00	3.14	3.14	3.21	3.27
60			1.25	1.53	1.56	1.81	1.83	1.90	2.12	2.23	2.52	2.58	2.67	2.81	2.82	2.89	2.96

EcoHeat Mono P10T

compressor operating frequency **30Hz**

EcoHeat Mono P10T	Heating power [kW]																	30Hz
Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	2.05	2.27	2.64	2.89	3.02	3.40	3.55	3.72	3.98	4.38	4.70	4.85		5.09	5.34	5.67	5.93	6.17
41	1.96	2.18	2.55	2.80	2.93	3.29	3.45	3.54	3.80	4.20	4.52		4.67	4.91	5.16	5.49	5.81	6.05
45	1.90	2.12	2.49	2.74	2.86	3.22	3.37	3.42	3.68	4.08	4.40	4.55		4.79	5.04	5.37	5.73	5.97
50		2.05	2.42	2.67	2.78	3.13	3.28	3.32	3.58	3.83	4.15		4.30	4.54	4.79	5.12	5.58	5.82
55			2.34	2.59	2.70	3.04	3.19	3.22	3.48	3.58	3.90		4.05	4.29	4.54	4.87	5.43	5.67
60			2.27	2.52	2.62	2.94	3.10	3.12	3.38	3.33	3.65		3.80	4.04	4.29	4.62	5.28	5.52

EcoHeat Mono P10T	Electric power consumption [kW]																	30Hz
Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	0.91	0.93	0.95	0.98	1.00	1.02	1.03	1.04	1.05	1.06	1.07	1.09	1.12	1.18	1.22	1.26	1.29	
41	0.97	0.99	1.01	1.04	1.06	1.08	1.09	1.10	1.11	1.12	1.13	1.15	1.19	1.24	1.28	1.32	1.35	
45	1.01	1.03	1.05	1.09	1.10	1.12	1.13	1.14	1.15	1.16	1.17	1.19	1.24	1.30	1.33	1.36	1.40	
50		1.08	1.10	1.14	1.15	1.17	1.18	1.19	1.20	1.21	1.22	1.25	1.30	1.37	1.38	1.41	1.45	
55			1.15	1.19	1.20	1.22	1.23	1.24	1.25	1.26	1.27	1.30	1.36	1.44	1.44	1.46	1.50	
60			1.21	1.24	1.26	1.28	1.29	1.30	1.31	1.32	1.33	1.35	1.44	1.51	1.51	1.53	1.57	

EcoHeat Mono P10T	COP																	30Hz
Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	2.25	2.44	2.78		2.96	3.04	3.34	3.45	3.58	3.79	4.13	4.39	4.46	4.55	4.51	4.66	4.71	4.77
41	2.02	2.20	2.52	2.69	2.76	3.05	3.16	3.22	3.42	3.75	4.00	4.07	4.12	4.15	4.28	4.39		4.47
45	1.88	2.05	2.37	2.52	2.60	2.88	2.99	3.00	3.20	3.51	3.76	3.83	3.87	3.88	4.04	4.20		4.27
50		1.89	2.19	2.35	2.42	2.68	2.78	2.79	2.98	3.16	3.40	3.44	3.49	3.50	3.70	3.94	4.01	
55			2.03	2.18	2.25	2.49	2.60	2.60	2.78	2.84	3.07	3.12	3.16	3.15	3.38	3.71	3.77	
60			1.88	2.03	2.09	2.31	2.42	2.41	2.59	2.53	2.75	2.82	2.81	2.84	3.06	3.45	3.51	

EcoHeat Mono P10T

compressor operating frequency **57.5Hz**

EcoHeat Mono P10T	Heating power [kW]																		57.5Hz
Ambient temperature [°C]	-30	-25	-20	-15	-12			-7	-5	0	2	5	7	10	15	20	25	30	35
35	3.50	3.88	4.52	4.94	5.16	5.81	6.07	6.35	6.65	7.32	8.03	8.28	8.69	9.12	9.69	10.13	10.54		
41	3.41	3.79	4.43	4.85	5.07	5.70	5.96	6.17	6.47	7.14	7.85	8,10	8.51	8.94	9.51	10.01	10.42		
45	3.35	3.73	4.37	4.79	5.00	5.63	5.89	6.05	6.35	7.02	7.73	7.98	8.39	8.82	9.39	9.93	10.34		
50		3.65	4.29	4.72	4.92	5.54	5.80	5.95	6.25	6.77	7.48	7.73	8.14	8.57		9.14	9.78	10.19	
55			4.22	4.64	4.84	5.45	5.71	5.85	6.15	6.52	7.23	7.48	7.89	8.32	8.89	9.63	10.04		
60			4.14	4.57	4.76	5.35	5.62	5.75	6.05	6.27	6.98	7.23	7.64	8.07	8.64	9.48	9.89		

EcoHeat Mono P10T	Electric power consumption [kW]																		57.5Hz
Ambient temperature [°C]	-30	-25	-20	-15	-12			-7	-5	0	2	5	7	10	15	20	25	30	35
35	1.76	1.78	1.80	1.83	1.85	1.87	1.88	1.90	1.93	1.96	2.00	2.03	2.09	2.15	2.22	2.26	2.30		
41	1.92	1.94	1.96	1.98	2.00	2.03	2.04	2.06	2.09	2.12	2.16	2.19	2.25	2.31	2.37	2.41	2.45		
45	2.03	2.04	2.06	2.09	2.11	2.13	2.14	2.17	2.19	2.22	2.27	2.29	2.36	2.41	2.48	2.52	2.56		
50		2.17	2.19	2.22	2.24	2.26	2.28	2.31	2.32	2.35	2.41	2.42	2.49	2.54	2.61	2.65	2.69		
55			2.32	2.35	2.37	2.39	2.41	2.44	2.45	2.48	2.54	2.55	2.63	2.67	2.74	2.78	2.82		
60			2.49	2.51	2.53	2.56	2.57	2.60	2.62	2.64	2.70	2.71	2.79	2.82	2.89	2.93	2.97		

EcoHeat Mono P10T	COP																		57.5Hz
Ambient temperature [°C]	-30	-25	-20	-15	-12			-7	-5	0	2	5	7	10	15	20	25	30	35
35	1.99	2.18	2.51	2.71	2.80	3.11	3.23	3.34	3.44	3.74	4.02	4.07	4.16		4.24	4.37	4.49		4.58
41	1.78	1.96	2.26	2.45	2.53	2.82	2.93	2.99	3.10	3.38	3.63	3.70	3.78	3.87	4.00	4.15	4.25		
45	1.65	1.83	2.12	2.30	2.38	2.64	2.75	2.79	2.90	3.16	3.41	3.48	3.56	3.66	3.79	3.94	4.04		
50		1.68	1.96	2.13	2.20	2.45	2.55	2.58	2.69	2.88	3.11	3.19	3.26	3.37	3.50	3.69	3.79		
55			1.82	1.98	2.05	2.28	2.38	2.40	2.51	2.63	2.85	2.93	3.00	3.11	3.25	3.47	3.56		
60			1.66	1.82	1.88	2.10	2.19	2.22	2.31	2.38	2.59	2.67	2.73	2.86	2.99	3.23	3.33		

EcoHeat Mono P10T

compressor operating frequency **80Hz**

EcoHeat Mono P10T	Heating power [kW]	80Hz

Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	4.56	5.10	6.05	6.62	6.73	7.57	8.16	8.78	9.47	10.25	11.30	11.69	12.39	13.01	13.66	14.28	14.90	
41	4.44	4.98	5.93	6.50	6.65	7.49	8.05	8.60	9.29	10.07	11.12	11.51	12.21	12.83	13.48	14.16	14.78	
45	4.36	4.90	5.85	6.42	6.61	7.41	7.97	8.48	9.17	9.95	11.00	11.39	12.09	12.71	13.36	14.08	14.70	
50		4.80	5.75	6.35	6.55	7.31	7.87	8.38	9.07	9.70	10.75	11.14	11.84	12.46	13.11	13.93	14.55	
55			5.65	6.28	6.45	7.21	7.77	8.28	8.97	9.45	10.50	10.89	11.59	12.21	12.86	13.78	14.40	
60			5.55	6.18	6.38	7.11		7.67	8.18	8.87	9.20	10.25	10.64	11.34	11.96	12.61	13.63	14.25

EcoHeat Mono P10T	Electric power consumption [kW]	80Hz

Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	2.75	2.77	2.80	2.82	2.85	2.89	2.91	2.94	2.95		3.00	3.05	3.11	3.21	3.31	3.39	3.49	3.59
41	3.08	3.10	3.13	3.15	3.18	3.22	3.21	3.24	3.25		3.30	3.35	3.41	3.45	3.55	3.63	3.73	3.83
45	3.30	3.32	3.35	3.37	3.40	3.44	3.39	3.44	3.45		3.46	3.55	3.57	3.61	3.71	3.79	3.89	3.99
50		3.57	3.62	3.65	3.67	3.72	3.62	3.69	3.70		3.71	3.80	3.77	3.81	3.91	3.99	4.09	4.19
55			3.90	3.92	3.95	3.99	3.84	3.94	3.95		3.96	4.05	3.97	4.01	4.11	4.19	4.29	4.39
60			4.20	4.22		4.25	4.29	4.14	4.24	4.25	4.26	4.35	4.17	4.26	4.36	4.44	4.54	4.62

EcoHeat Mono P10T	COP	80Hz

Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	1.66	1.84	2.16	2.35	2.36	2.62	2.80	2.98	3.21	3.42	3.70	3.76	3.86	3.93	4.03	4.09	4.15	
41	1.44	1.61	1.90	2.06	2.10	2.33	2.51	2.65	2.86	3.05	3.32	3.38	3.54	3.61	3.71	3.80	3.86	
45	1.32	1.48	1.75	1.90	1.95	2.16	2.35	2.46	2.66	2.88	3.10	3.19	3.35	3.43	3.53	3.62	3.68	
50		1.34	1.59	1.74	1.78	1.97	2.18	2.27	2.45	2.61	2.83	2.96	3.11	3.19	3.29	3.41	3.47	
55			1.45	1.60	1.63	1.81	2.02	2.10	2.27	2.39	2.59	2.74	2.89	2.97	3.07	3.21	3.28	
60			1.32	1.46	1.50	1.66	1.85	1.93	2.09	2.16	2.36	2.55	2.66	2.74	2.84	3.00	3.09	

EcoHeat Mono P10T

compressor operating frequency **90Hz**

EcoHeat Mono P10T	Heating power [kW]	90Hz

Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	4.59	5.64	6.55		7.10	7.60	8.37	8.74	9.49	10.45	11.16	12.50	12.67	13.48	14.62	15.19	15.97	16.72
41	4.36	5.44	6.34		6.89	7.45	8.22	8.56	9.31	10.27	10.98	12.32	12.49	13.30	14.44	15.01	15.79	16.54
45	4.21	5.30	6.21		6.77	7.35	8.12	8.44	9.19	10.15	10.86	12.20	12.37	13.18	14.32	14.89	15.67	16.42
50		5.13	6.04		6.62	7.22	8.00	8.34	9.09	10.05	10.61	11.95	12.12	12.93	14.07	14.64	15.42	16.17
55			5.84		6.42	7.10	7.87	8.24	8.99	9.95	10.36	11.70	11.87	12.68	13.82	14.39	15.17	15.92
60			5.64		6.22	6.90	7.70	8.14	8.89	9.85	10.11	11.45	11.62	12.43	13.57	14.14	14.92	15.67

EcoHeat Mono P10T	Electric power consumption [kW]	90Hz

Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	3.17	3.19	3.22	3.24	3.26	3.28	3.29	3.34	3.36		3.40	3.44	3.49	3.59	3.70	3.82	3.92	4.05
41	3.50	3.52	3.55	3.57	3.59	3.61	3.62	3.67	3.69	3.73	3.77	3.73	3.92	3.94	4.06	4.16		4.29
45	3.72	3.74	3.77		3.79	3.81	3.83	3.84	3.89	3.91	3.95	3.99	3.89	4.14	4.10	4.22	4.32	4.45
50		4.02	4.04	4.07		4.08	4.13	4.12	4.17	4.19	4.23		4.27	4.09	4.42	4.30	4.42	4.52	4.65
55			4.32	4.34		4.36	4.41	4.39	4.44	4.46	4.50		4.54	4.29	4.69	4.50	4.62	4.72	4.85
60			4.62	4.64		4.66	4.71	4.67	4.72	4.74	4.78		4.84	4.59	4.99	4.80	4.92	5.02	5.15

EcoHeat Mono P10T	COP	90Hz

Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	1.45	1.77	2.04	2.19	2.33	2.55	2.66	2.84	3.11		3.28	3.63	3.64	3.76	3.96	3.98	4.07	4.10
41	1.25	1.55	1.79	1.93	2.08	2.28	2.36	2.54	2.78		2.94	3.27	3.35	3.39	3.67	3.70	3.80	3.80
45	1.13	1.42	1.65	1.79	1.93	2.12	2.20	2.36	2.59	2.75	3.06	3.18	3.18	3.50	3.53	3.63	3.60	
50		1.28	1.49	1.63	1.77	1.94	2.03	2.18	2.40	2.51	2.80	2.97	2.93	3.28	3.31	3.41	3.40	
55			1.35	1.48	1.63	1.79	1.88	2.02	2.23	2.30	2.58	2.77	2.70	3.08	3.11	3.21	3.20	
60			1.22	1.34	1.48	1.64	1.74	1.88	2.08	2.12	2.37	2.53	2.49	2.83	2.87	2.97	3.00	

EcoHeat Mono P17T

compressor operating frequency **30Hz**

EcoHeat Mono P17T	Heating power [kW]																	30Hz
Ambient temperature [°C]	-30	-25		-20	-15	-12		-7	-5	0	2	5	7	10	15	20	25	30	35
35	3.23	3.74		4.14	4.86	5.33		5.67	5.95	6.14	6.36	6.84	7.33	7.61	8.22	8.82	9.16	9.69	10.29
41	3.10	3.60		4.01	4.73	5.21		5.55	5.83	6.02	6.18	6.66	7.15	7.43	8.03	8.63	8.97	9.50	10.10
45	3.01	3.52		3.92	4.64	5.13		5.47	5.75	5.94	6.06	6.54	7.03	7.31	7.90	8.50	8.84	9.37	9.97
50		3.41		3.81	4.53	5.03		5.37	5.65	5.84	5.91	6.39	6.88	7.16	7.65	8.25	8.59	9.12	9.72
55				3.70	4.42	4.93		5.27	5.55	5.71	5.76	6.24	6.73	7.01	7.40	8.00	8.34	8.87	9.47
60				3.60	4.31	4.83		5.17	5.44	5.58	5.61	6.09	6.58	6.86	7.15	7.75	8.09	8.62	9.22

EcoHeat Mono P17T	Electric power consumption [kW]																	30Hz
Ambient temperature [°C]	-30	-25		-20	-15	-12		-7	-5	0	2	5	7	10	15	20	25	30	35
35	1.27	1.37		1.47	1.52	1.54		1.56	1.56	1.57	1.59	1.60	1.61	1.66	1.76	1.87	1.97	2.07	2.17
41	1.48	1.58		1.68	1.73	1.75		1.77	1.77	1.78	1.80	1.81	1.82	1.87	1.97	2.08	2.18	2.25	2.35
45	1.62	1.72		1.82	1.87	1.89		1.91	1.91	1.92	1.94	1.95	1.96	2.01	2.11	2.22	2.32	2.37	2.47
50		1.90		2.00	2.05	2.06		2.09	2.09	2.10	2.12	2.13	2.14	2.18	2.29	2.39	2.48	2.52	2.62
55				2.17	2.22	2.24		2.26	2.26	2.27	2.29	2.30	2.31	2.36	2.44	2.57		2.63	2.67	2.77
60				2.35	2.40	2.41		2.44	2.44	2.45		2.47	2.48	2.49	2.53	2.60	2.74	2.79	2.83	2.92

EcoHeat Mono P17T	COP																	30Hz
Ambient temperature [°C]	-30	-25		-20	-15	-12		-7	-5	0	2	5	7	10	15	20	25	30	35
35	2.54	2.73		2.82	3.20	3.47		3.64	3.81	3.91	4.00	4.27	4.55	4.60	4.67	4.73	4.65	4.68	4.74
41	2.09	2.28		2.39	2.73	2.98		3.14	3.29	3.38	3.43	3.68	3.93	3.99	4.07	4.16	4.11	4.22	4.30
45	1.86	2.04		2.16	2.48	2.72		2.87	3.01	3.09	3.12	3.35	3.59	3.65	3.74	3.84	3.81	3.95	4.04
50		1.80		1.91	2.22	2.44		2.58	2.71	2.79	2.79	3.01	3.22	3.29	3.35	3.45	3.47	3.62	3.71
55				1.71	1.99	2.20		2.33	2.46	2.52	2.51	2.71	2.91	2.98	3.03	3.12	3.17	3.32	3.42
60				1.53	1.80	2.00		2.13	2.23	2.28	2.27	2.46	2.65	2.71	2.75	2.83	2.90	3.05	3.16

EcoHeat Mono P17T

compressor operating frequency **57.5Hz**

EcoHeat Mono P17T	Heating power [kW]	57.5Hz

Ambient temperature [°C]	-30	-25	-20	-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	5.99	6.93	7.69	9.02	9.88	10.53	11.04	11.39	11.80	12.69	13.60	13.86	14.96	16.06	16.68	17.54	18.64
41	5.85	6.79	7.54	8.88	9.76	10.40	10.91	11.25	11.59	12.49	13.40	13.66	14.76	15.86	16.48	17.34	18.43
45	5.75	6.69	7.45	8.78	9.68	10.32	10.82	11.15	11.46	12.35	13.26	13.52	14.62	15.72	16.34	17.20	18.30
50		6.57	7.33	8.67	9.57	10.21	10.71	11.04	11.29	12.18	13.00	13.26	14.36	15.46	16.08	16.94	18.04
55			7.21	8.55	9.47	10.11	10.60	10.89	11.12	11.99	12.74	13.00	14.10	15.20	15.82	16.68	17.78
60			7.09	8.43	9.36	10.00	10.48	10.74	10.95	11.80	12.48	12.74	13.84	14.94	15.56	16.42	17.52

EcoHeat Mono P17T	Electric power consumption [kW]	57.5Hz

Ambient temperature [°C]	-30	-25	-20	-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	3.16	3.26	3.36	3.41	3.43	3.45	3.46	3.48	3.50	3.54	3.56	3.61	3.74	3.88	4.00	4.10	4.23
41	3.62	3.72	3.82	3.87	3.89	3.91	3.92	3.94	3.96	4.00	4.02	4.07	4.14	4.28	4.40	4.50	4.63
45	3.93	4.03	4.13	4.18	4.20	4.22	4.23	4.25	4.27	4.31	4.33	4.38	4.41	4.57	4.67	4.77	4.90
50		4.42	4.52	4.57	4.58	4.61	4.62	4.64	4.66	4.70	4.72	4.74	4.79	4.91	5.01	5.11	5.23
55			4.90	4.95	4.97	4.99	5.00	5.02	5.04	5.08	5.10	5.12	5.13	5.24	5.34	5.44	5.57
60			5.29	5.34	5.35	5.38	5.43	5.45	5.47	5.47	5.49	5.51	5.46	5.58	5.68	5.78	5.90

EcoHeat Mono P17T	COP	57.5Hz

Ambient temperature [°C]	-30	-25	-20	-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	1.90	2.13	2.29	2.65	2.89	3.05	3.19	3.27	3.37	3.58	3.82	3.84	4.01	4.14	4.17	4.28	4.41
41	1.61	1.82	1.97	2.29	2.51	2.66	2.78	2.85	2.93	3.12	3.33	3.35	3.57	3.71	3.74	3.85	3.98
45	1.46	1.66	1.80	2.10	2.31	2.45	2.56	2.62	2.68	2.87	3.06	3.09	3.32	3.44	3.50	3.61	3.74
50		1.49	1.62	1.90	2.09	2.22	2.32	2.38	2.42	2.59	2.76	2.80	3.00	3.15	3.21	3.32	3.45
55			1.47	1.73	1.91	2.03	2.12	2.17	2.21	2.36	2.50	2.54	2.75	2.90	2.96	3.07	3.19
60			1.34	1.58	1.75	1.86	1.93	1.97	2.00	2.16	2.28	2.31	2.53	2.68	2.74	2.84	2.97

EcoHeat Mono P17T

compressor operating frequency **80Hz**

EcoHeat Mono P17T	Heating power [kW]	80Hz

Ambient temperature [°C]	-30	-25	-20	-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	7.51	8.90	9.83	11.06	12.47	13.63	14.29	14.70	15.14	16.96	18.60	18.96	20.46	21.97	22.81	23.99	25.18
41	7.35	8.73	9.66	10.90	12.30	13.47	14.13	14.54	14.97	16.75	18.42	18.72	20.16	21.66	22.51	23.69	24.88
45	7.24	8.63	9.56	10.79	12.20	13.36	14.02	14.43	14.87	16.61	18.30	18.56	19.95	21.46	22.31	23.49	24.68
50		8.49	9.42	10.66	12.06	13.23	13.89	14.23	14.67	16.31	17.95	18.21	19.53	21.03	21.91	23.09	24.28
55			9.29	10.52	11.93	13.09	13.75	14.03	14.47	16.01	17.60	17.86	19.10	20.61	21.51	22.69	23.88
60			9.15	10.37	11.79	12.94	13.60	13.83	14.27	15.71	17.25	17.51	18.68	20.18	21.11	22.29	23.48

EcoHeat Mono P17T	Electric power consumption [kW]	80Hz

Ambient temperature [°C]	-30	-25	-20	-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	4.43	4.53	4.63	4.68	4.70	4.71	4.72	4.73	4.73	4.95	5.15	5.20	5.33	5.50	5.68	5.83	5.98
41	5.15	5.25	5.35	5.40	5.42	5.43	5.44	5.45	5.45	5.61	5.81	5.86	5.99	6.10	6.28	6.43	6.64
45	5.63	5.73	5.83	5.88	5.90	5.91	5.92	5.93	5.93	6.05	6.25	6.30	6.43	6.50	6.68	6.83	7.04
50		6.33	6.43	6.48	6.50	6.51	6.52	6.53	6.53	6.60	6.80	6.85	6.98	7.05	7.18	7.33	7, 54
55			7.03	7.08	7.10	7.11	7.12	7.13	7.13	7.20	7.35	7.40	7.53	7.60	7.68	7.83	8.04
60			7.63	7.68	7.70	7.76	7.77	7.78	7.78	7.80	7.95	7.95	8.13	8.15	8.28	8.43	8.64

EcoHeat Mono P17T	COP	80Hz

Ambient temperature [°C]	-30	-25	-20	-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	1.70	1.96	2.12	2.36	2.66	2.89	3.03	3.11	3.20	3.43	3.61	3.65	3.84	3.99	4.02	4.12	4.21
41	1.43	1.66	1.81	2.02	2.27	2.48	2.60	2.67	2.75	2.99	3.17	3.19	3.37	3.55	3.59	3.69	3.75
45	1.29	1.51	1.64	1.84	2.07	2.26	2.37	2.44	2.51	2.75	2.93	2.95	3.11	3.30	3.34	3.44	3.51
50		1.34	1.47	1.64	1.86	2.03	2.13	2.18	2.25	2.47	2.64	2.66	2.80	2.98	3.05	3.15	3.22
55			1.32	1.49	1.68	1.84	1.93	1.97	2.03	2.22	2.39	2.41	2.54	2.71	2.80	2.90	2.97
60			1.20	1.35	1.53	1.67	1.75	1.78	1.83	2.01	2.17	2.20	2.30	2.48	2.55	2.65	2.72

EcoHeat Mono P17T

compressor operating frequency **90Hz**

EcoHeat Mono P17T	Heating power [kW]																	90Hz
Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	8.28		9.80	11.06	12.62	14.13	15.03	15.43	16.03	16.68	18.70	20.50	20.90	22.55	24.21	25.14	26.44	27.75
41	8.12		9.64	10.90	12.46	13.96	14.87	15.25	15.79	16.38	18.46	20.19	20.59	22.25	23.91	24.84	26.14	27.45
45	8.01		9.53	10.79	12.35	13.86	14.76	15.13	15.63	16.17	18.30	19.99	20.39	22.04	23.70	24.64	25.94	27.25
50			9.40	10.66	12.21	13.72	14.62	14.98	15.33	15.75	18.00	19.57	19.96	21.62	23.28	24.24	25.54	26.85
55				10.52	12.08	13.59	14.49	14.83	15.03	15.32	17.70	19.14	19.54	21.19	22.85	23.84	25.14	26.45
60				10.39	11.93	13.45	14.34	14.63	14.73	15.12	17.40	18.72	19.11	20.77	22.43	23.44	24.74	26.05

EcoHeat Mono P17T	Electric power consumption [kW]																	90Hz
Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	5.45	5.55	5.65	5.70	5.72	5.73	5.78	5.80	5.84	5.87	6.00	6.05	6.18	6.32	6.46	6.60	6.74	
41	6.17	6.27	6.37	6.42	6.44	6.45	6.50	6.52	6.56	6.59	6.72	6.77	6.90	6.98	7.12	7.26	7.40	
45	6.65	6.75	6.85	6.90	6.92	6.93	6.98	7.00	7.04	7.07	7.20	7.25	7.38	7.42	7.56	7.70	7.84	
50		7.35	7.45	7.50	7.52	7.53	7.58	7.60	7.64	7.67	7.80	7.85	7.98	8.02	8.11	8.25	8.39	
55			8.05	8,10	8.12	8.13	8.18	8.20	8.24	8.27	8.40	8.45	8.58	8.62	8.66	8.80	8.94	
60			8.65	8.70	8.72	8.78	8.83	8.85	8.89	8.87	9.05	9.05	9.23	9.22	9.31	9.40	9.54	

EcoHeat Mono P17T	COP																	90Hz
Ambient temperature [°C]	-30	-25	-20		-15	-12	-7	-5	0	2	5	7	10	15	20	25	30	35
35	1.52	1.77	1.96	2.21	2.47	2.62	2.67	2.76	2.86	3.19	3.42	3.45	3.65	3.83	3.89	4.01	4.12	
41	1.32	1.54	1.71	1.94	2.17	2.30	2.35	2.42	2.50	2.80	3.01	3.04	3.23	3.43	3.49	3.60	3.71	
45	1.20	1.41	1.58	1.79	2.00	2.13	2.17	2.23	2.30	2.59	2.78	2.81	2.99	3.20	3.26	3.37	3.48	
50		1.28	1.43	1.63	1.83	1.94	1.98	2.02	2.06	2.35	2.51	2.54	2.71	2.90	2.99	3.10	3.20	
55			1.31	1.49	1.67	1.78	1.81	1.83	1.86	2.14	2.28	2.31	2.47	2.65	2.75	2.86	2.96	
60			1.20	1.37	1.54	1.63	1.66	1.66	1.70	1.96	2.07	2.11	2.25	2.43	2.52	2.63	2.73	

2. Installation

2.1 Technological diagrams of connecting EcoHeat Mono heat pumps

2.1.1 Heating schemes

The correct connection of the heat pump to the building's heating system and the domestic hot water heater must be made so that the heat pump can operate without any restrictions or failures throughout the heating season and throughout its operation. As it turns out in practice, the correct connection is one that ensures the correct flow of the heating medium through the heat pump condenser, operation with the appropriate delta, i.e. the difference between the supply and return temperatures, and the appropriate water volume of the heat source circuit.

For the heat pump to operate correctly, a central heating buffer connected in parallel (like a hydraulic clutch) should be used to separate the heat source circuit from the building's internal heating system. Depending on the size of the heat pump series, the system and the control solution of the heating system, it is recommended that the water capacity of the central heating buffer be from 120 to 300 liters.

In order to ensure the right amount of domestic hot water and trouble-free operation of the device throughout the year, a domestic hot water heater with the right capacity and the right coil surface should be selected. It is recommended that these surfaces are from 2.1 m2 for the P6 pump and from 5.1 m2 for the P17T pump. The preparation of domestic hot water is carried out by a central heating/domestic hot water switch valve with a 230V, On/Off actuator with an opening time of max. 120 seconds.

In areas exposed to problems with access to electricity, an anti-freeze system should be provided. For EcoHeat Mono heat pumps, it is recommended to provide protection:

- **Installation of an additional circulation pump with an independent power supply (so-called UPS) for the EcoHeat pump MonoP6;**
- **Anti-freeze valves for EcoHeat Mono P10T and P17T pumps.**

The heating installation solution (heat pump circulation outside the building) can also be made using water as a heating medium, but only in agreement between the Investor and the Contractor (with all the consequences) in areas where there are no interruptions in the electricity supply to the building.

In order to ensure appropriate thermal parameters inside the rooms and the correct selection of the heat pump, the EcoHeat Mono device must be equipped with an additional, peak heat source (electric heater or boiler).

To control the internal temperature in the heating zone (rooms), a controller, e.g. Tweetop Digitime TT700, should be used. If the heating system in the building, e.g. underfloor heating, has a temperature control system with control of the operation of the heating circuit water pump after the central heating buffer, then this system takes over control of the temperature inside the rooms (zones) and the control should not be equipped with the aforementioned TT700 controller.

The table below shows the nominal heating medium flows for heat pumps:

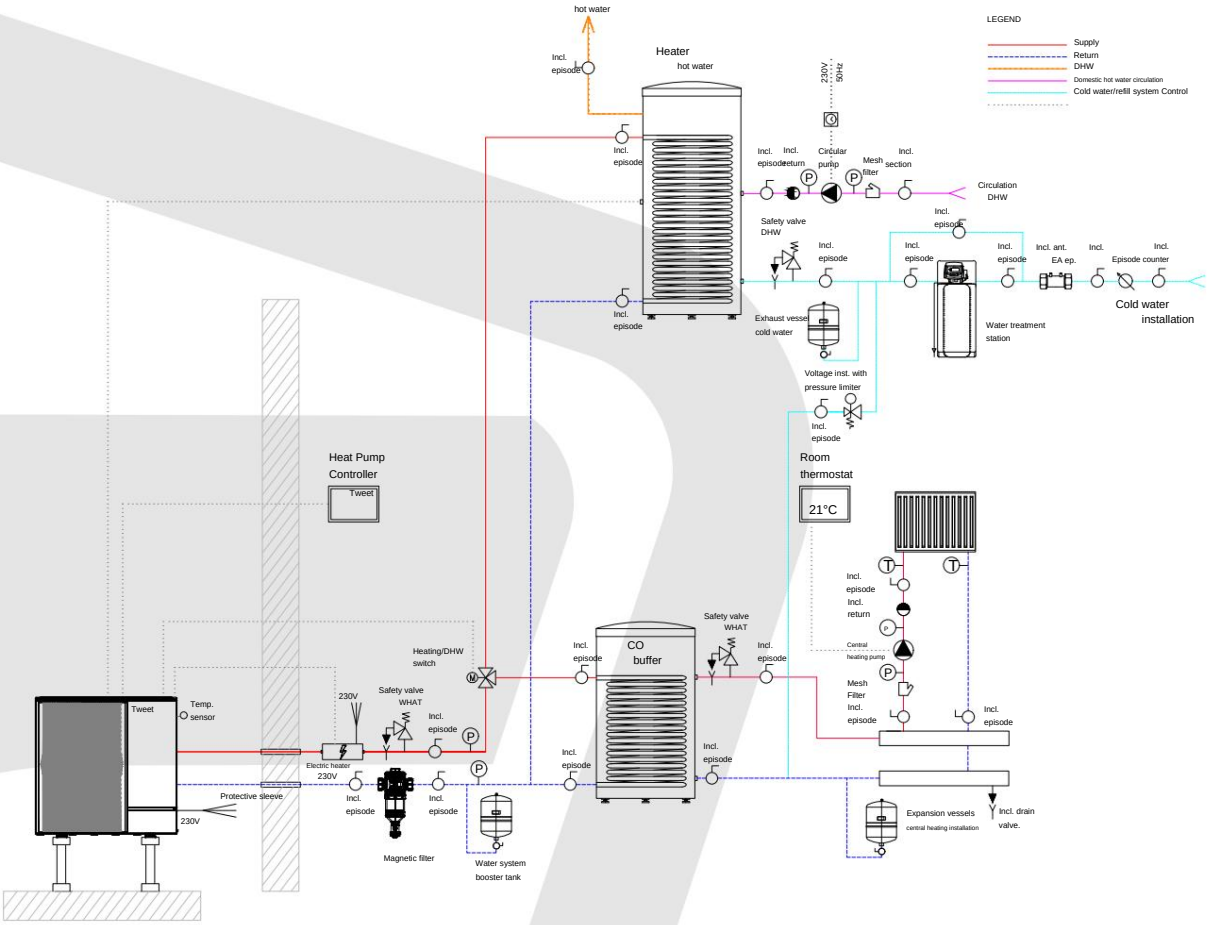
Model	**EcoHeat** Mono P6	**EcoHeat** Mono P10 T	**EcoHeat** Mono P17 T
Nominal flow of heating medium through the condenser [m3 /s]	1.0	1.7	2.9

The minimum heating medium flow for the above heat pumps is 60% of the nominal value.

The technological diagrams on the following pages show the required method of connecting the EcoHeat Mono heat pump to the cooperating installations: the building's heating system and the domestic hot water system.

2. Installation

Diagram 1. Technological diagram of the heat pump connection (underfloor/radiator heating, direct circulation).



Heat pump installation guidelines: 1. Mount
the outdoor unit on a supporting structure at least 35 cm above ground level using anti-vibration pads.
2. A gravel base (cobblestone) at a depth of at least 40 cm should be provided under the outdoor unit.
3. Pipes running outdoors must be insulated in accordance with technical specifications and in a protective jacket.
4. Pipes must pass through the partition using protective sleeves.

The table below summarizes the description of the elements used in the technological diagram:

The table below summarizes the description of the elements used in the technological diagram:

Symbol	Description	Symbol	Description	Symbol	Description	Symbol	Description
	Safety valve		Check valve		Expansion tank		Water treatment plant
	Shut-off valve		Water meter		Filling valve		Mesh filter
	Magnetic filter	P	Technical manometer		Filling valve for the installation system		Circulation pump
		T	Technical thermometer		Electric heater		Shut-off valve, Shut-off valve, drain drain
	Three-way valve changeover/mixing		EA anti-contamination valve		Heat exchanger		

Connecting a heat pump presents the idea of connecting a heat pump to a heating system and heating domestic hot water. The presented technological diagram of an air-water monoblock heat pump assumes that the heating medium leaving the heat pump is water.

In order for the heat pump to work properly, a central heating buffer with a coil connected in parallel to the system should be installed between the heat pump and the heating system. It acts as a hydraulic clutch, as it is equipped with four connection stubs. The heat pump is connected to two of them, the supply and return from the coil, while the supply and return from the heating system are connected to the other two. A circulation pump should be installed on the supply side of the heating system, which should be matched to the thermal and hydraulic parameters of the underfloor/radiator heating, taking into account the required central heating water flow and the hydraulic resistance of the heating system.

2. Installation

It should be noted that the underfloor/radiator heating circuit is not equipped with a three-way mixing valve. In such a technological solution, with one heating circuit, it is not needed, because the heat pump can operate without any technical obstacles at a low return water temperature from the heating system. Moreover, the lower the temperature of the water supplying the central heating circuit, the higher the COP value the heat pump will achieve. The control of the supply temperature of the heating system is carried out by weather control (heating curve). Therefore, there is no question of exceeding the maximum supply temperature of the underfloor system, so the installation of a mixing valve is not recommended.

The heating installation should have properly sized expansion vessels and safety valves.
As a support, i.e. peak heat source, during periods of low outside temperatures, an electric heater is assumed to be used. It will be responsible for heating the heating medium and providing adequate power for the preparation of domestic hot water and central heating. The central heating circulation pump behind the buffer can be controlled by, for example, an external room thermostat Tweetop Digitime TT700.

The circulation pump in the external module of the heat pump must be protected with a filter.

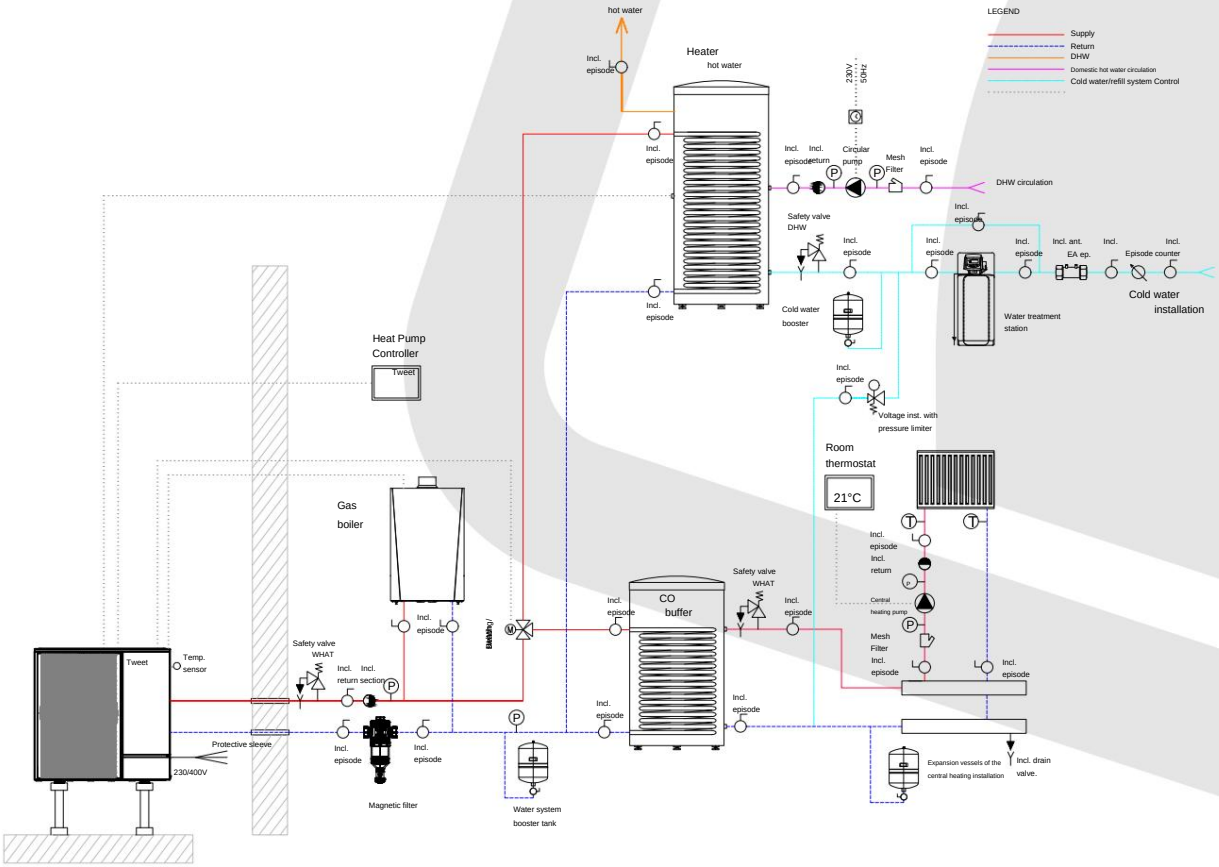
Before starting work, the power of the heat source should be verified.

The heating power of the heat pump is regulated by measuring the temperature of the heating medium at the supply and return from the installation.

The heat pump automation system controls:

- An electric heater or other support for the heating system (e.g. a gas boiler); • Connecting the heater via a contactor; • A central heating/ domestic hot water switching valve; • The temperature of the domestic hot water.

Diagram 2. Radiator heating installation supported by a gas boiler.



Heat pump installation guidelines: 1. Mount
the outdoor unit on a supporting structure at least 35 cm above ground level using anti-vibration pads.
2. A gravel base (cobblestone) at a depth of at least 40 cm should be provided under the outdoor unit.
3. Pipes running outdoors must be insulated in accordance with technical specifications and in a protective jacket.
4. Pipes must pass through the partition using protective sleeves.

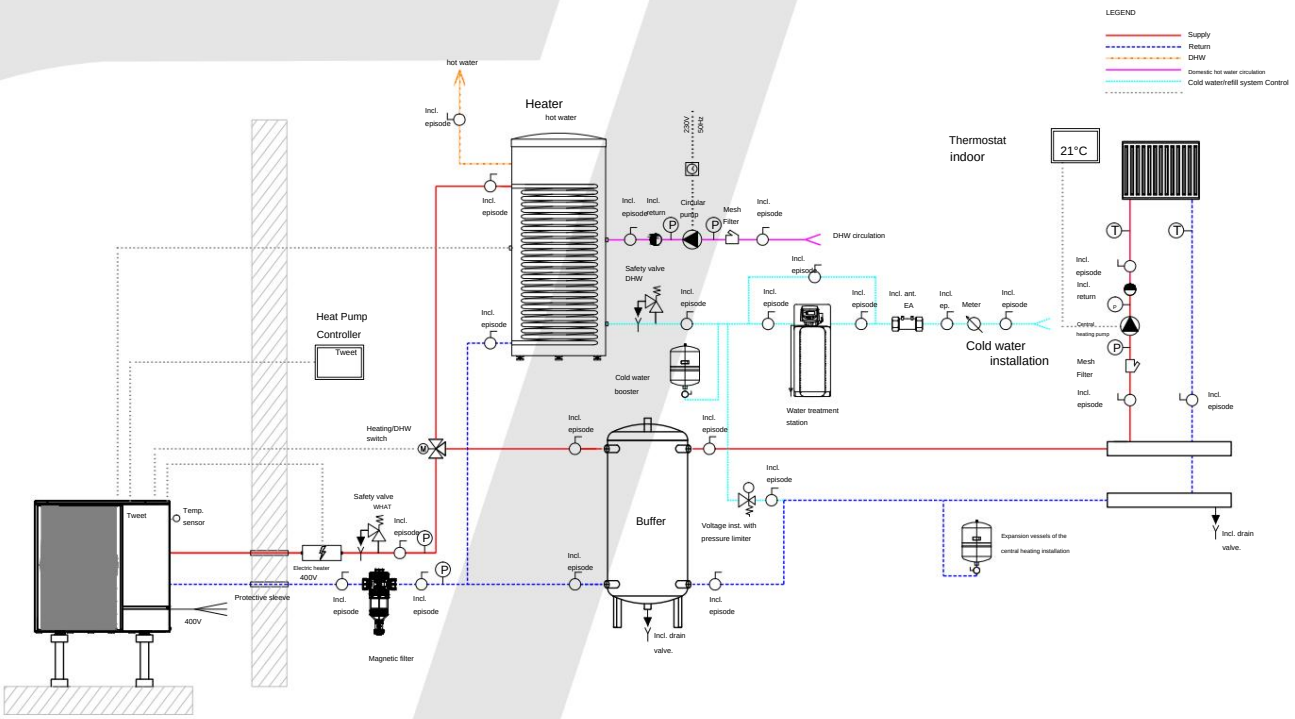
2. Installation

The diagram above shows the possibility of cooperation of additional heating devices with an air heat pump. In order to use hydraulic support at extreme outside temperatures both for the needs of radiator heating of the building and for the needs of preparing domestic hot water, it is recommended to connect the boiler before the three-way valve switching central heating/domestic hot water. The boiler will be started automatically by appropriately connecting the automation systems.
The on/off input will be used in the boiler, while the output in the heat pump will be used to control an external electric heater. In the boiler settings, the appropriate heating medium supply temperature should also be set.

Cooperation of a heat pump with a low-temperature (condensing) boiler is characterised by the fact that the heat pump operates independently up to a certain outside temperature set by the user (usually in the range of -5 °C to 0 °C), and below this value the heat pump controller starts the condensing boiler and from this temperature the boiler supplies heat to the heating system and domestic hot water.

Such a system is most often used when the selected heat pump has a much lower heating capacity than the building's demand. The heat pump heats the building on its own for most of the heating season, and when the building's heat demand increases (because the outside temperature drops significantly), the condensing boiler will be activated and will supply the heating system.

Diagram 3. Installation of radiator/underfloor heating in a system with a central heating buffer without a coil.



Heat pump installation guidelines: 1.
Mount the outdoor unit on a supporting structure at least 35 cm above ground level using anti-vibration pads.
2. A gravel base (cobblestone) at a depth of at least 40 cm should be provided under the outdoor unit.
3. Pipes running outdoors must be insulated in accordance with technical specifications and in a protective jacket.
4. Pipes must pass through the partition using protective sleeves.

2. Installation

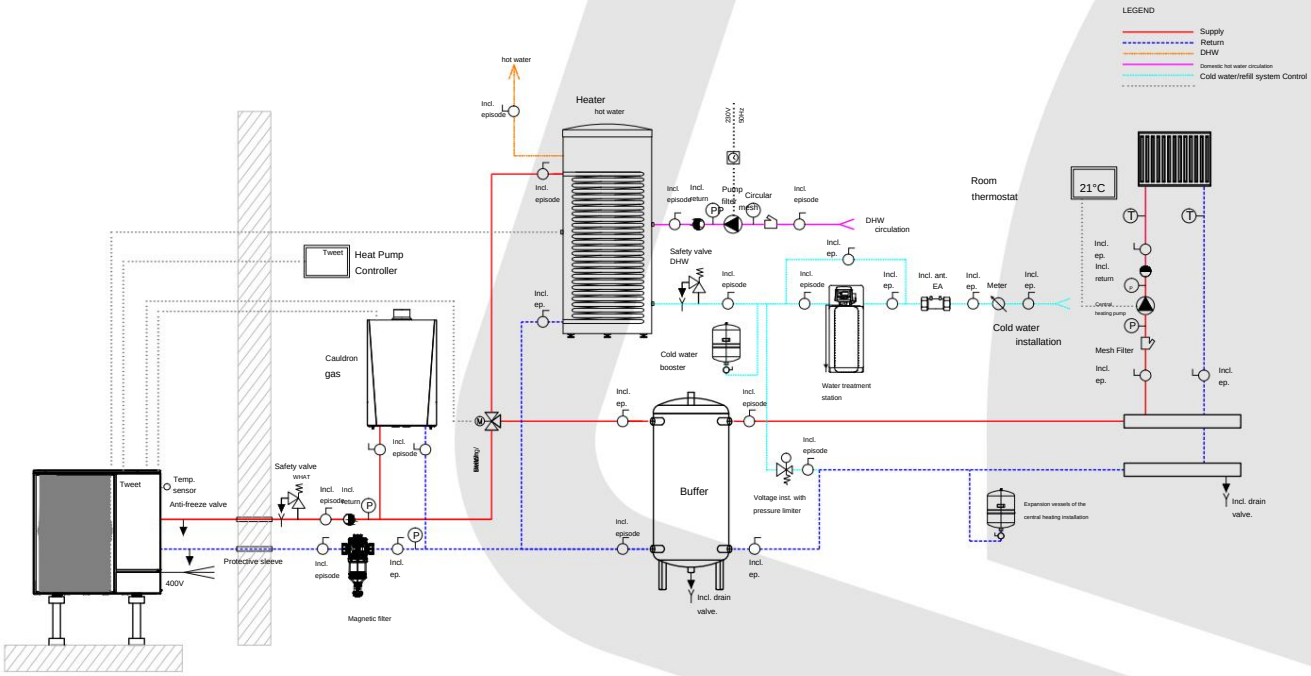
The technological diagram presented above, unlike the two previous ones, has been equipped with a central heating buffer without a coil. The entire system operates on a heating medium, which is water. A buffer of appropriate capacity should also be used to ensure appropriate operating conditions for the compressor in the circuit. The system is hydraulically protected against pressure increase by an expansion tank and a safety valve.

The anti-freeze system for the P10T and P17T pumps is implemented using anti-freeze valves. These valves cause a slow flow of the medium from the installation when its temperature reaches an average value of 3°C. This prevents the formation of ice in the system, which protects the pipelines and the device from damage. The valves must be installed in a vertical position with the outlet directed downwards in such a way as to allow the free flow of the medium. The valves should be installed outside the building in the place where the lowest temperatures occur in the event of the heat pump being switched off. It is recommended to install them on the supply and return pipe to the device. In the case of other installation, one of the pipes may freeze.

Before starting work, please read the instructions for the anti-freeze valves.

In this scheme, the additional heat source is an electric heater cooperating with a heat pump. It is located before the central heating/domestic hot water switch valve. The domestic hot water temperature sensor is located in the hot water heater. Hot utility water is provided by a 3-way central heating/domestic hot water switch valve.

Diagram 4. Radiator heating system operates on water supported by a gas boiler. Protection by anti-freeze valves for P10T and P17T pumps.



Heat pump installation guidelines: 1. Mount
the outdoor unit on a supporting structure at least 35 cm above ground level using anti-vibration pads.
2. A gravel base (cobblestone) at a depth of at least 40 cm should be provided under the outdoor unit.
3. Pipes running outdoors must be insulated in accordance with technical specifications and in a protective jacket.
4. Pipes must pass through the partition using protective sleeves.

The above heating scheme no. 4 is based on the same operating principles as scheme no. 3, except that the heat pump support below the bivalent point is realized by a gas boiler, not by an electric heater. This scheme shows the recommended place to connect the gas boiler.

2. Installation

2.2 Water quality in the central heating system

Please ensure that the heating system is filled with water that meets the following requirements:

Parameter	Value
Temperature	Below 60°C
pH reaction	6-8
Conductivity	<500 µS/cm
Chlorine particle content	<0.5 mg/l
Nitrate content	<100mg/l

Water should not be softened to less than 3.5 ÿdH. Corrosion inhibitors must be used in conjunction with softeners. If one or more of the conditions cannot be met, water treatment is recommended. Water treatment in the system reduces corrosion, scale build-up and contamination.

2. Installation

2.3 Preparation of domestic hot water

The process of heating domestic hot water by a heat pump is a difficult process, because the heat pump is a low-temperature device. Therefore, to obtain the appropriate temperature of domestic hot water, a heater with a suitably large heat exchange surface of the heating coil should be used.

The table below lists the required heating surfaces of the heating coils that should be used for EcoHeat Mono heat pumps. As for the heat pump heating power for domestic hot water purposes, it is necessary to assume approximately 200-250 W/person for a standard demand for hot water.

Parameter	**EcoHeat** Mono P6	**EcoHeat** Mono P10 T	**EcoHeat** Mono P17 T
Minimum coil area in m2	1.9	2.8	4.6
Recommended coil area in m2	2.1 and more	3.0 and more	5.1 and more
Maximum coil flow resistance in kPa	15.0	15.0	12.0
Dedicated domestic hot water heater	**TRINNITY PC1T 200** (2.1 m2 ; dp=2 kPa; 200 liters)	**TRINNITY PC1T 300** (3.0 m2 ; dp=3 kPa; 300 liters)	**TRINNITY PC1T 400** (5.1 m2 ; dp=12 kPa; 400 liters)

The basic technological diagram of the EcoHeat Mono heat pump connection (chapter 2.1) shows how to connect the DHW heater. For this purpose, a three-way valve should be used to switch between the supply of the central heating system and the supply of the DHW heater. The heat pump controller decides which part of the system will be supplied with heat at a given time. It should be remembered that due to the different required supply temperatures, it is never the case that both processes, i.e. heating DHW and heating the central heating buffer, are carried out simultaneously. Heating DHW has a priority character for the controller, which means that the heat pump will always heat DHW first. However, if the water heating process lasts too long due to the continuous consumption of hot water, the heat pump will switch to supplementing the heat in the heating system anyway, and after an appropriate time it will return to heating DHW (setting in the controller: maximum heat pump operation time for DHW).

The circulation pump, which is installed in the internal unit, ensures the flow of heating water through the heat pump condenser and then to the domestic hot water heater or to the central heating buffer (in the basic scheme).
The circulation pump has electronic control, and therefore adjusts its rotational speed to the hydraulic resistance of the installation. When the three-way valve switches from supplying the central heating buffer and switches back to supplying the domestic hot water heater, the circulation pump adjusts its rotational speed to the greater hydraulic resistance of the coil exchanger. In air heat pumps, the amount, or speed of heating hot water, depends mainly on the instantaneous thermal power of the heat pump, and this depends directly on the outside temperature. In summer, when outside temperatures are high, the instantaneous thermal power of the heat pump is higher than its nominal power, therefore the speed (amount) of water heating is high.

The heat pump is supplied with a domestic hot water temperature sensor. The sensor cable is 10 meters long. The domestic hot water preparation system should be supplemented with a central heating/domestic hot water switch valve with an actuator, preferably a two-wire On/Off actuator, powered by 230V with a maximum opening time.
120 seconds.

When selecting the size of the valve, care should be taken to ensure that its resistance is as low as possible. This valve only serves the function of separating the heating medium (it is not a control valve that requires appropriate authority).

2. Installation

Example solutions for P6 heat pumps.

Parameter	**EcoHeat** Mono P6
Honeywell	
Heating/DHW changeover valve with actuator Actuator	V4044 DN20, Kvs 6.0
	Supplied with valve, two-wire actuator
Valve flow resistance, kPa	3,3
AFRISO	
Heating/DHW switching valve	ARV DN20; Kvs 6.3
Actuator	ARM349, three-wire actuator ARM703, three-wire actuator
Valve flow resistance, kPa	2.7

Example solutions for P10T heat pumps.

Parameter	**EcoHeat** Mono P10T
Honeywell	
Heating/DHW changeover valve with actuator	V4044 DN25, Kvs 8.2
Actuator	Supplied with valve, two-wire actuator
Valve flow resistance, kPa	4.5
AFRISO	
Heating/DHW switching valve	ARV DN25; Kvs 10
Actuator	ARM349, three-wire actuator ARM703, three-wire actuator
Valve flow resistance, kPa	3.0

Example solutions for P17T heat pumps.

Parameter	**EcoHeat** Mono P17T
AFRISO	
Heating/DHW switching valve	ARV DN32; Kvs 16
Actuator	ARM349, three-wire actuator ARM703, three-wire actuator
Valve flow resistance, kPa	3.5

2.4 Selection of buffer what

The main task of the central heating buffer is to stabilize the operation of the heat pump by reducing the number of starts and stops. The device's timing has a negative impact on the compressor's service life. Thanks to the use of the buffer, this problem is reduced. Additionally, the central heating buffer connected in parallel ensures separation of the heat source circuit (heat pump) from the part of the central heating installation. Thanks to this, the required flow through the condenser is ensured regardless of the solution of the internal central heating installation.

Buffer application:

- underfloor heating installation with thermostats,
- radiator heating installation,
- underfloor and radiator heating installation (mixed).

2. Installation

Buffer installation is not necessary if the following conditions are met simultaneously:

- appropriate water capacity of the installation (discharge),
- appropriate, nominal flow of the heating medium through the condenser,
- appropriate dT of installation operation (5K).

Ensuring the above points is only possible when using underfloor heating without room thermostats.

Calculation of the central heating buffer capacity to ensure minimum compressor operation time:

- compressor operating time: 15 minutes;
- dT of heat pump operation while maintaining the minimum flow: 8 K;
- heat pump power depending on size.

Q = P/t, where P = V • ÿ • Cw • ÿT

Q - power [kW]

P - work [kJ]

t - time [s]

V- volume [m3]

Cw - specific heat [kJ/kg • K]

ÿT - temperature difference [K]

According to the calculations below, the minimum buffer capacities are shown below:

Model	**EcoHeat** Mono P6	**EcoHeat** Mono P10 T **EcoHeat** Mono P17 T	
Minimum buffer capacity in liters	50	100	200
Recommended buffer capacity in liters	120 and more	200 and more	300 and more

For simplicity, it is assumed that the minimum buffer capacity should be approximately 15-20 litres per kW of heat pump power.

2.5 Selection of safety valve

The safety valve, depending on the hydraulic solution, should be used on the water side of the central heating installation. Example data for the safety valve are presented below.

EcoHeat Mono	**Diameter valve safety**	**Initial opening pressure [bar]**	**Maximum power [kW]**	**Discharge coefficient for:**		
				vapors and gases ÿ	liquid (b1=10%) ac	liquid (b1=25%) ac
P6, P10T, P17T	DN15	3.0	64	0.42	0.27	0.38

2. Installation

2.6 Selection of connecting pipe diameters

In order to ensure appropriate flow resistance of the heating medium and appropriate flow speed, the heat pump should be connected to the installation in accordance with the following guidelines:

EcoHeat Mono P6

Pipe type	Flow [m3 /h]	Pipe diameter [mm]	Diameter inside [mm]	Heating medium flow speed [m/s]	Heating medium: water Linear resistance [Pa/m]
PERT	1.0	32x3.0	26	0.54	135
Thin-walled steel	1.0	28x1.5	25	0.58	160
Copper	1.0	28x1.5	25	0.58	160

EcoHeat Mono P10T

Pipe type	Flow [m3 /h]	Pipe diameter [mm]	Diameter inside [mm]	Heating medium flow speed [m/s]	Heating medium: water Linear resistance [Pa/m]
PERT	1.7	40x4.0	32	0.60	130
Thin-walled steel	1.7	35x1.5	32	0.60	125
Copper	1.7	35x1.5	32	0.60	125

EcoHeat Mono P17T

Pipe type	Flow [m3 /h]	Pipe diameter [mm]	Diameter inside [mm]	Heating medium flow speed [m/s]	Heating medium: water Linear resistance [Pa/m]
PERT	2.9	50x4.5	41	0.62	100
Thin-walled steel	2.9	42x1.5	39	0.68	125
Copper	2.9	42x1.5	39	0.68	125

- The pipeline should be clean inside and free from burrs and irregularities that impede the flow of water. A tightness test should be performed to prevent leaks from the installation. The installation should also be flushed before start-up.
- Only after the leak test has been completed, can the pipeline insulation be started. Please note that the pipeline should be tested separately. DO NOT test the pipeline together with the heat pump.

- There is a flow sensor inside the heat pump, make sure it is connected and are operating correctly and are subject to the pump controller commands.
- Air entry into the system should be avoided, and a vent should be installed at the highest point of the installation/ pipeline.
- In order to have full insight into the parameters of the working heat pump, there should be a temperature sensor and a pressure sensor at both the water inlet and outlet.
- It is recommended to use a magnetic filter on the heat pump return.
- The heating system must be closed, pressure-protected with safety valves and expansion tanks.

2. Installation

2.7 Selection of the expansion tank

The capacities of the expansion tanks are presented in tables below:

Type	Supply temperature 60°C				
	Water system capacity in liters				
	<120	130-270	280-450	460-670	680-960
Minimum capacity of the expansion tank	<11.8	12.2-17.8	18.2-24.9	25.3-34.5	35-49.5
Type of tank	12	18	25	35	50
Required internal diameter of the expansion pipe	20mm				

Type	Supply temperature 40°C				
	Water system capacity in liters				
	<260	270-590	600-830	840-1160	1170-1660
Minimum capacity of the expansion tank	<11.8	12-17.8	18-24.9	25.2-34.8	35.1-49.8
Type of tank	12	18	25	35	50
Required internal diameter of the expansion pipe	20mm				

2.8 Installing the outdoor unit

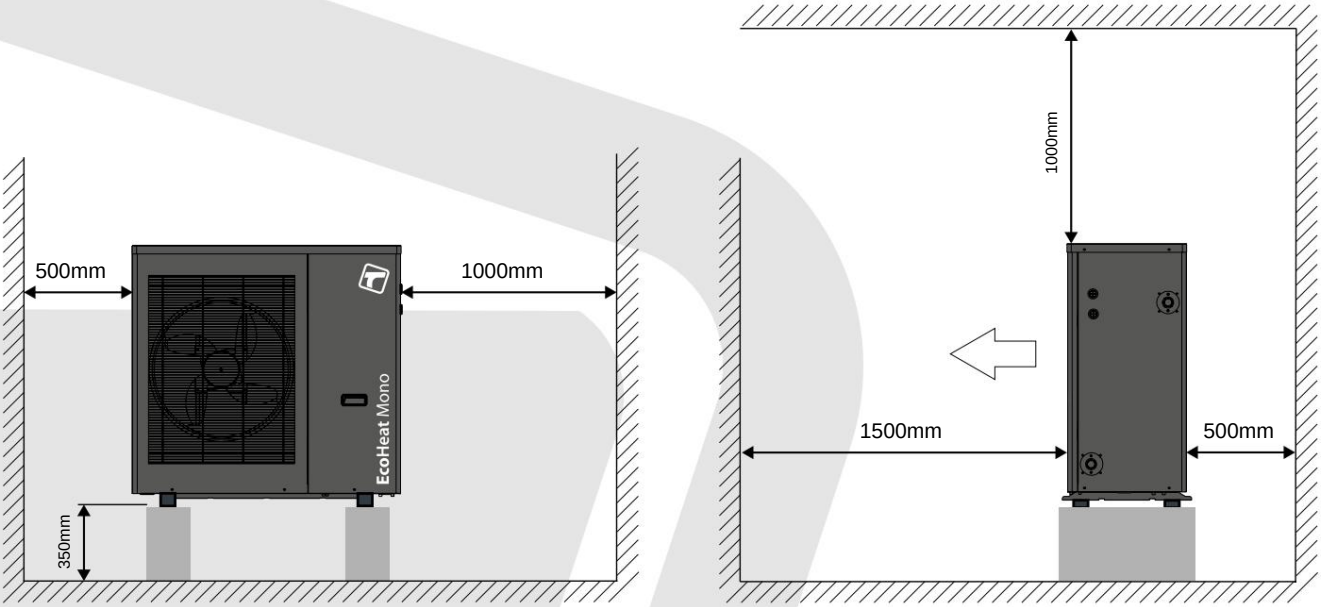
The device can be installed in any outdoor location that is adapted to its high weight. However, it is recommended to mount the external heat pump unit on a support structure or concrete base approximately 35 cm above ground level using anti-vibration pads. A gravel pad (cobblestone) at a depth of approximately 50 cm should be provided under the heat pump for condensate drainage.

When it comes to the optimal location in relation to the cardinal directions, in the case of operation of the device for the needs of central heating and domestic hot water, it is recommended to install the device on the north side. Considering the problem of too high temperatures on the south side in the summer (operation for domestic hot water) and the compressor going outside its operating envelope, the problem can be reduced by using, for example, a roof, which will provide additional protection against snow.

The place where the device is installed must provide good ventilation and free air flow to the device. The heat pump should be installed while maintaining the minimum distances from the surrounding

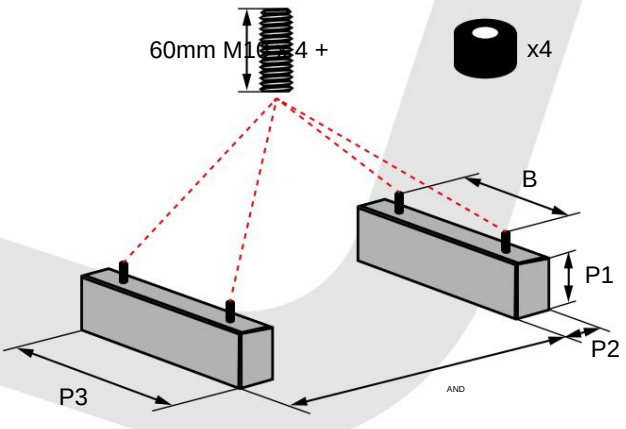
2. Installation

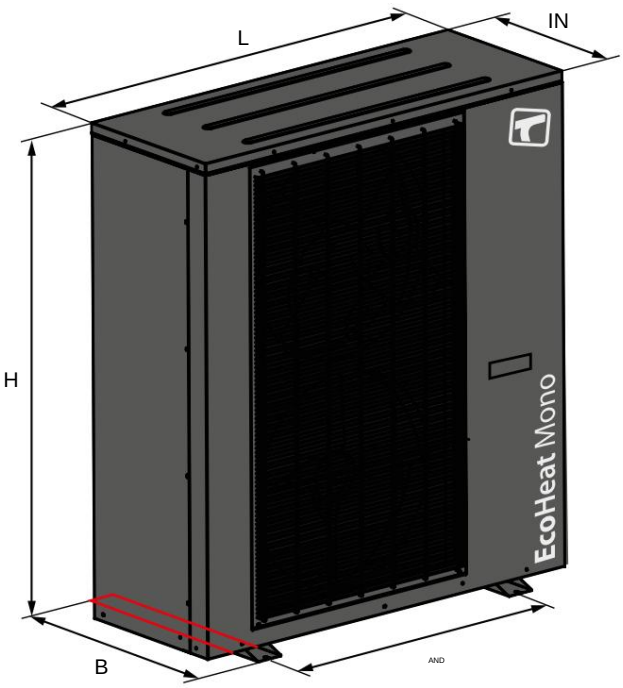
elements. There should be no obstacles near the air inlet and outlet. The place should be protected from strong gusts of wind. It is also necessary to ensure that there is enough space around the device to carry out free operation and maintenance. The minimum distances (in mm) are shown in the following figures:



Guidelines for mounting EcoHeat mono heat pumps on a concrete plinth below:

Dimension [mm]	EcoHeat Mono P6	EcoHeat Mono P10 T	EcoHeat Mono P17 T
L	750	953	997
H	805	915	1315
IN	442	423	395
AND	750	700	650
B	473	443	400
P1	200	200	200
P2	150	150	150
P3	B+100	B+100	B+100





2. Installation

During the operation of the EcoHeat Mono heat pump, condensate will be formed. This is a natural phenomenon, depending on weather conditions and the operating parameters of the device. In the case of a heat pump, condensate is formed as a result of cooling the outside air in the evaporator below the dew point temperature. In order to ensure trouble-free operation of the device and the accumulation of ice, the condensate must be drained:

- to the sewage system - this solution requires the installation of drainage pipes, it is worth remembering to always insulate them, or install a low-power heating cable in them to prevent the condensate from freezing,
- construction of a soakaway well - a much more popular solution, the well usually consists of a pipe under a unit inserted into the ground, reaching below the frost zone.

A simple but effective solution is to place a gravel base below the external heat pump unit. Condensate will flow onto the surface of the base, gradually soaking into the lower parts of the ground. When deciding on such a condensate drain, it is necessary to ensure that the gravel base is surrounded by a curb. The most important thing is to separate it from the building wall to avoid moisture and damage to the insulation layer.

When locating the outdoor unit, you should also pay attention to the noise generated by the devices.
The table below shows the maximum sound pressure levels at the plot boundary depending on the intended use of the land.

No.	Land use	Permissible long-term average sound level A in dB			
		Roads or railways1)		Installations and other facilities and groups of noise sources	
		LDWN time interval reference equal to all days in a year	**LN** time interval reference equal to all time of night	**LDWN** time interval reference equal to all days in a year	**LN** time interval reference equal to all time of night
1	a) A areas of health resort protection b) areas of hospitals outside the	**50**	**45**	**45**	**40**
2	city a) areas of single-family housing development b) development areas associated with the permanent or long-term stay of children and adolescents2)	**55**	**50**	**50**	**40**
3	a) residential development areas multi-family and collective housing b) farm development areas c) recreational and leisure areas d) residential and service areas	**60**	**50**	**55**	**45**
4	Areas in the city centre zone of cities with more than 100,000 inhabitants3)	**65**	**55**	**55**	**45**

1) The values specified for roads and railways also apply to tram tracks outside the road zone and to cable railways.

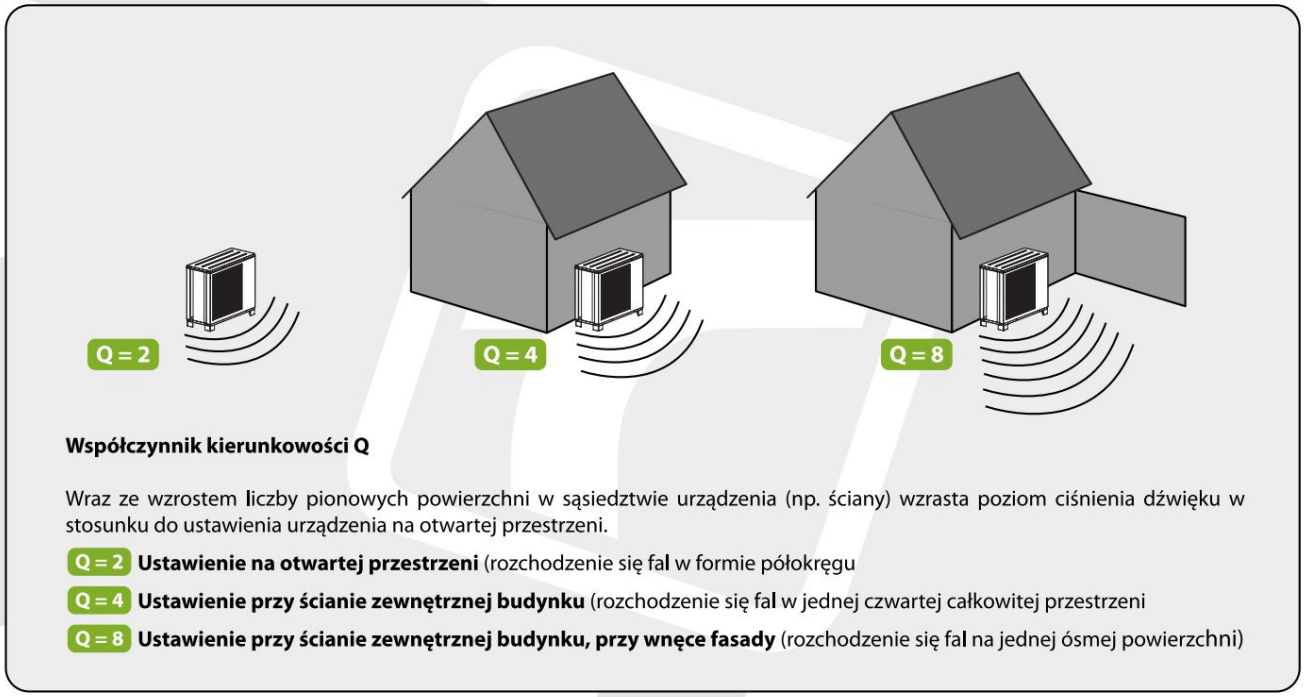
2) If these areas are not used, in accordance with their function, at night, the permissible noise level at night does not apply.

2) The city centre zone of cities with more than 100,000 inhabitants is an area of compact residential development with a concentration of administrative, commercial and service facilities. In the case of cities with districts with a population of more than 100,000, a city centre zone can be designated in these districts if it is characterised by compact residential development with a concentration of administrative, commercial and service facilities.

2. Installation

The sound pressure level is influenced by the sound power generated by the device and the directional factor Q. The data are summarized in the tables below.

The EcoHeat Mono device has the following pressure levels depending on the directional coefficient:



EcoHeat Mono P6 heat pump: sound power 64 dB(A)

Directivity factor Q	Sound source distance [m]								
	1	2	4	5	6	8	10	12	15
	Sound pressure level LP related to the sound power level determined at the heat pump/outlet LWAeq in dB(A)								
2	56	50	44	42	41	38	36	35	33
4	59	53	47	45	44	41	39	38	36
8	62	56	50	48	47	44	42	41	39

EcoHeat Mono P10T heat pump: sound power 65 dB(A)

Directivity factor Q	Sound source distance [m]								
	1	2	4	5	6	8	10	12	15
	Sound pressure level LP related to the sound power level determined at the heat pump/outlet LWAeq in dB(A)								
2	57	51	45	43	42	39	37	36	34
4	60	54	48	46	45	42	40	39	37
8	63	57	51	49	48	45	43	42	40

EcoHeat Mono P17T heat pump: sound power: 68 dB(A)

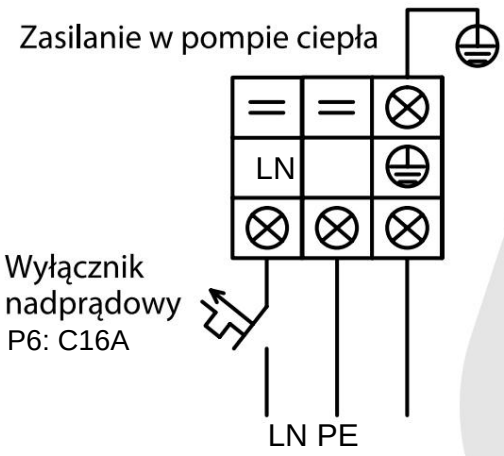
Directivity factor Q	Sound source distance [m]								
	1	2	4	5	6	8	10	12	15
	Sound pressure level LP related to the sound power level determined at the heat pump/outlet LWAeq in dB(A)								
2	60	54	48	46	45	42	40	39	37
4	63	57	51	49	48	45	43	42	40
8	66	60	54	52	51	48	46	45	43

2.9 Electrical installation

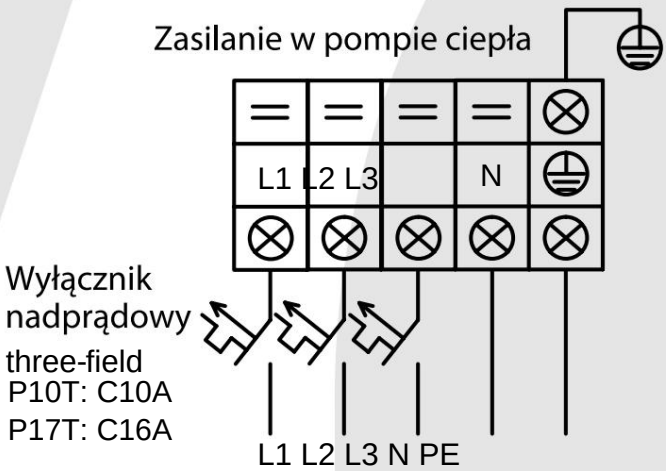
The heat pump power cable should be connected directly to the electrical power supply from the building's electrical switchboard. To connect the heat pump power supply, open the front panel of the device. The main power cable should be routed through a dedicated passage (grommet) in the housing, and then connected to the appropriate connection sockets for the pump power supply in accordance with the diagrams below and the specified protections. The connection points for the P6 pump (single-phase) and for the P10T and P17T pumps (three-phase) are shown below.

2.9.1 Connecting the power supply

EcoHeat Mono P6



EcoHeat Mono P10T and **EcoHeat** Mono P17T



Then, also through dedicated bushings, connect the controller/wired controller power cable to the appropriate, dedicated vertical connector inside the heat pump. The cable included in the delivery is 10 meters long.

If the heat pump will also be used to supply domestic hot water, wiring must be made for the central heating/domestic hot water switch valve actuator and the domestic hot water sensor must be connected (sensor included in delivery, cable length 10 metres).

The use of an electric heater requires an external power supply directly from the electrical switchboard with appropriate protections. The connection of the heater and control of the individual power stages (stage 1, stage 2 and stage 3 as joint operation of stage 1 and 2) will be carried out by the heat pump automation. For this purpose, the heater should be connected via a contactor. It is recommended to install the heater

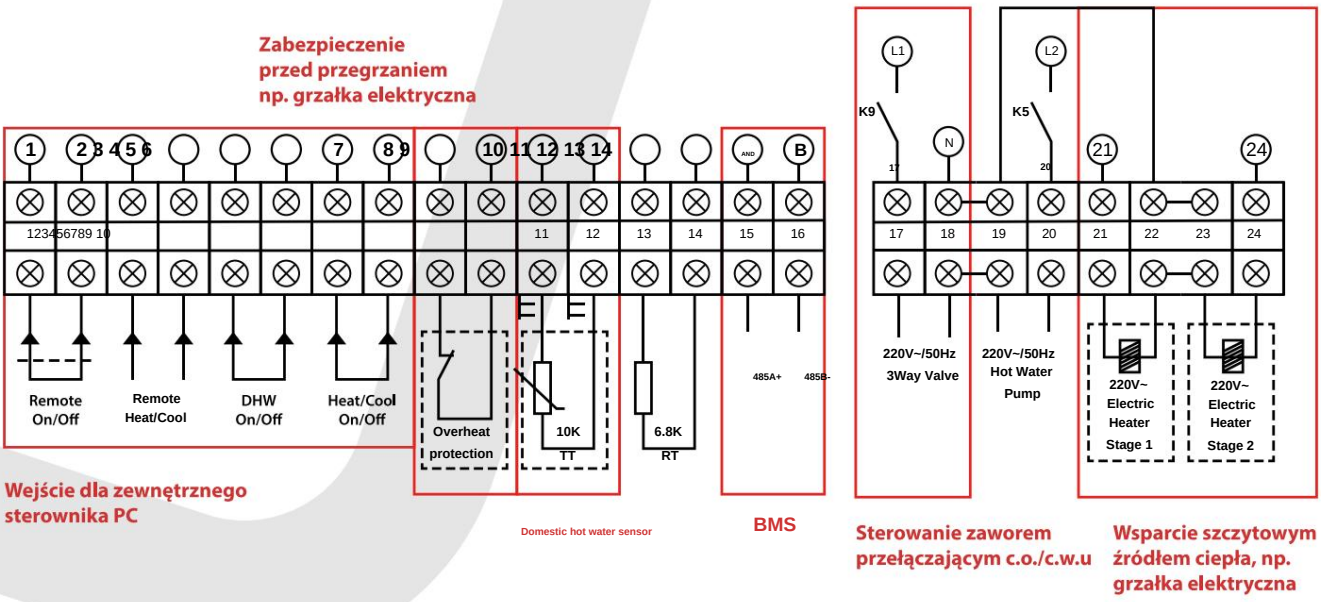
2. Installation

electric on the supply pipe, before the three-way valve switching central heating/domestic hot water. Then the electric heater working as a backup in extreme external temperatures has the ability to prepare domestic hot water and will provide the required power for heating the building.

Below is a table containing the required protections and cross-sections of electrical cables:

Electrical Guidelines	Heat Pump Model		
	EcoHeat Mono P6	**EcoHeat** Mono P10 T	**EcoHeat** Mono P17 T
Maximum electrical power consumption [kW]	2.9	4.64	7.2
Power supply voltage of the outdoor unit [V]	230	400	400
Maximum current [A]	13.0	7.6	12.0
Fuse with C characteristic Power	C16A	C10A	C16A
cable [mm2]	3x2.5	5x2.5	
Heat pump-controller communication cable	In delivery, length 10 meters		
Domestic hot water temperature sensor	In delivery, length 10 meters		
Central heating/DHW switching valve actuator [mm2]	2x0.75 or 3x0.75		
Central heating/DHW switching valve actuator	On/Off, 230V, opening time max. 120 sec.		
Outside temperature sensor	on the device		
Overheating protection [mm2]	2x0.75		
Peak heat source, e.g. electric heater	Stage1: 2x0.75mm2 Stage 2: 2x0.75mm2 Connection via contactor.		
	Electric heater		
Maximum electrical power consumption [kW]	3	6	9
Power supply voltage of the outdoor unit [V]	230	400	400
Fuse with characteristic B	B16 A	B10 A	B16 A
Power cord [mm2]	3x2.5	5x2.5	

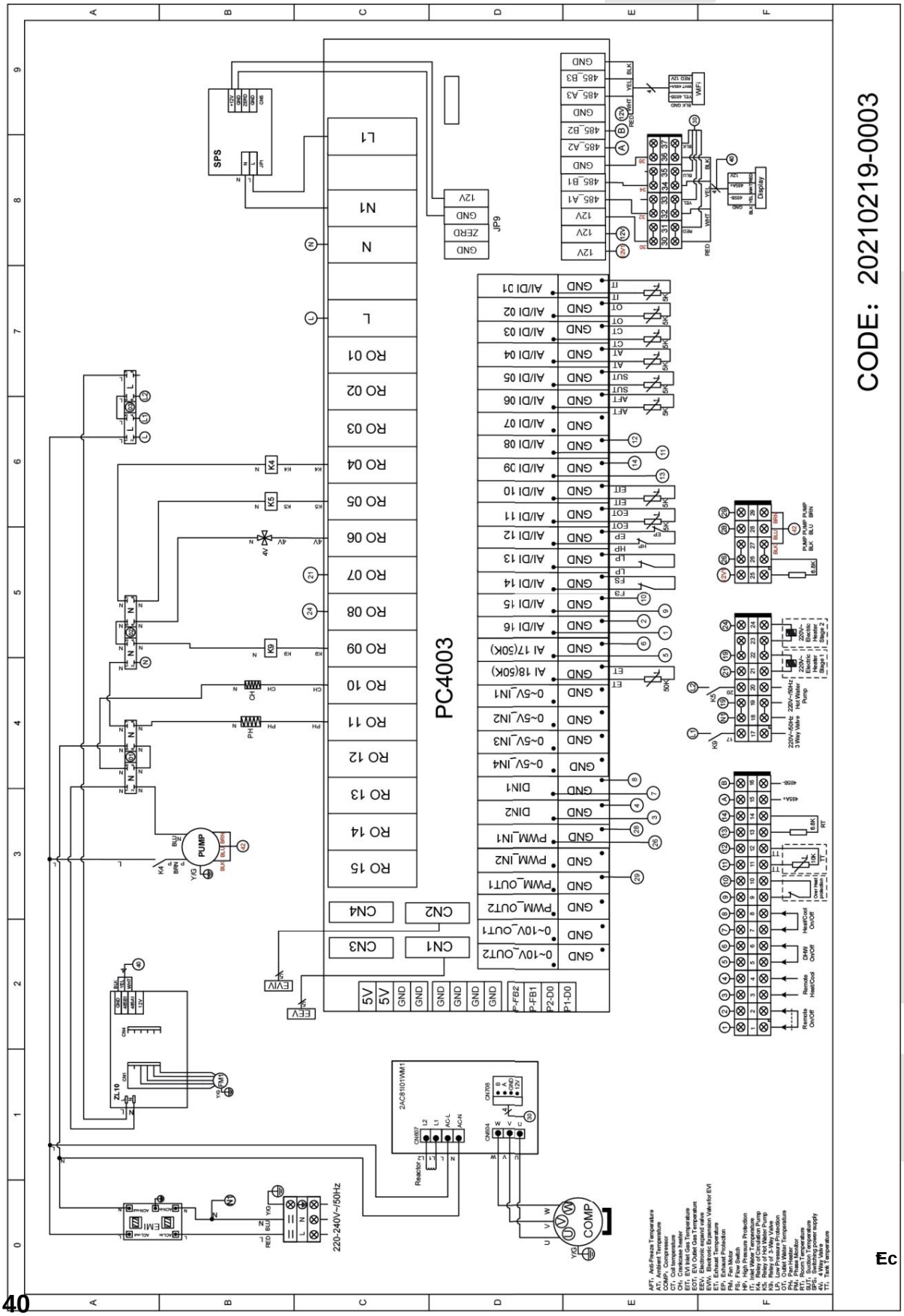
Below are the connection points for individual installation elements:



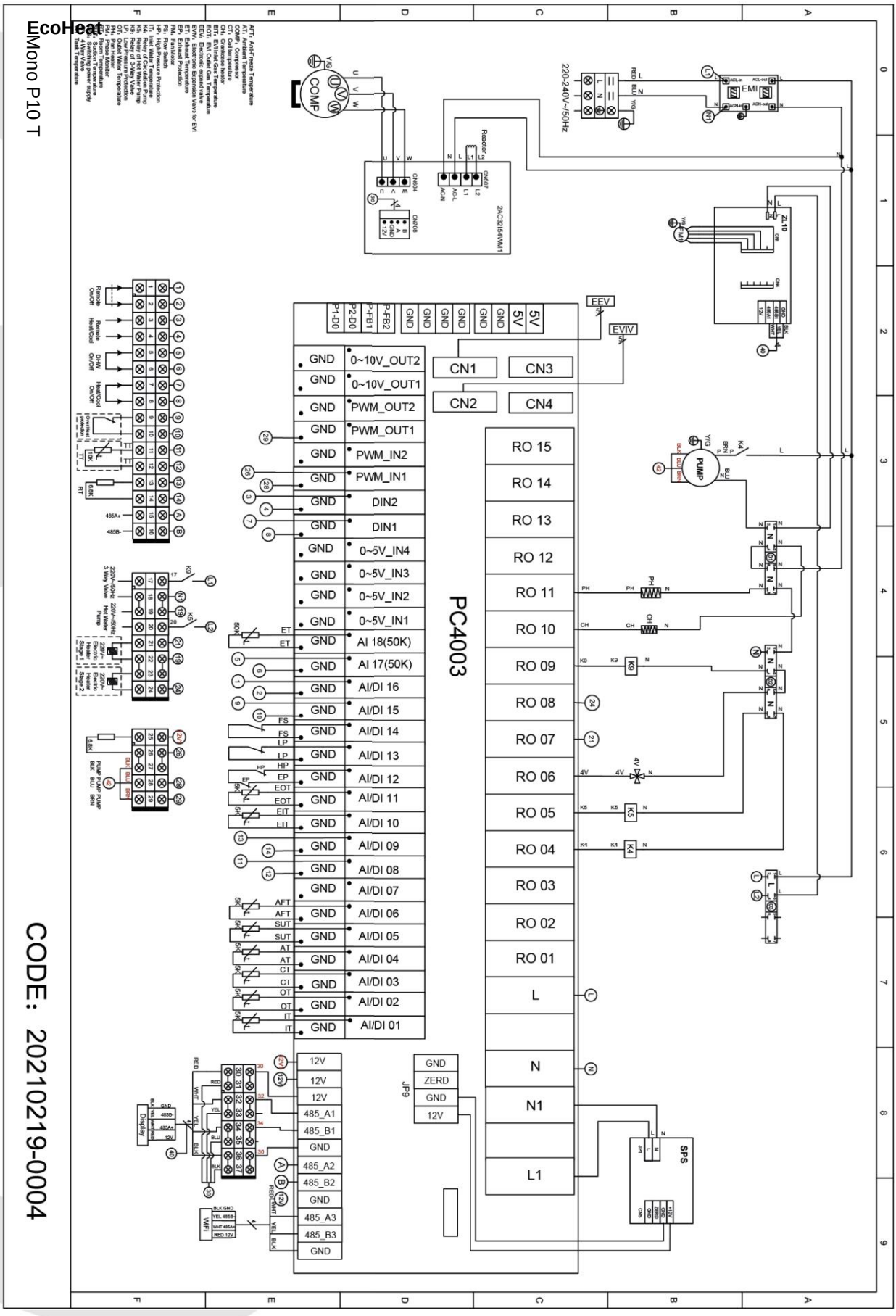
2. Installation

2.9.2 Electrical diagrams

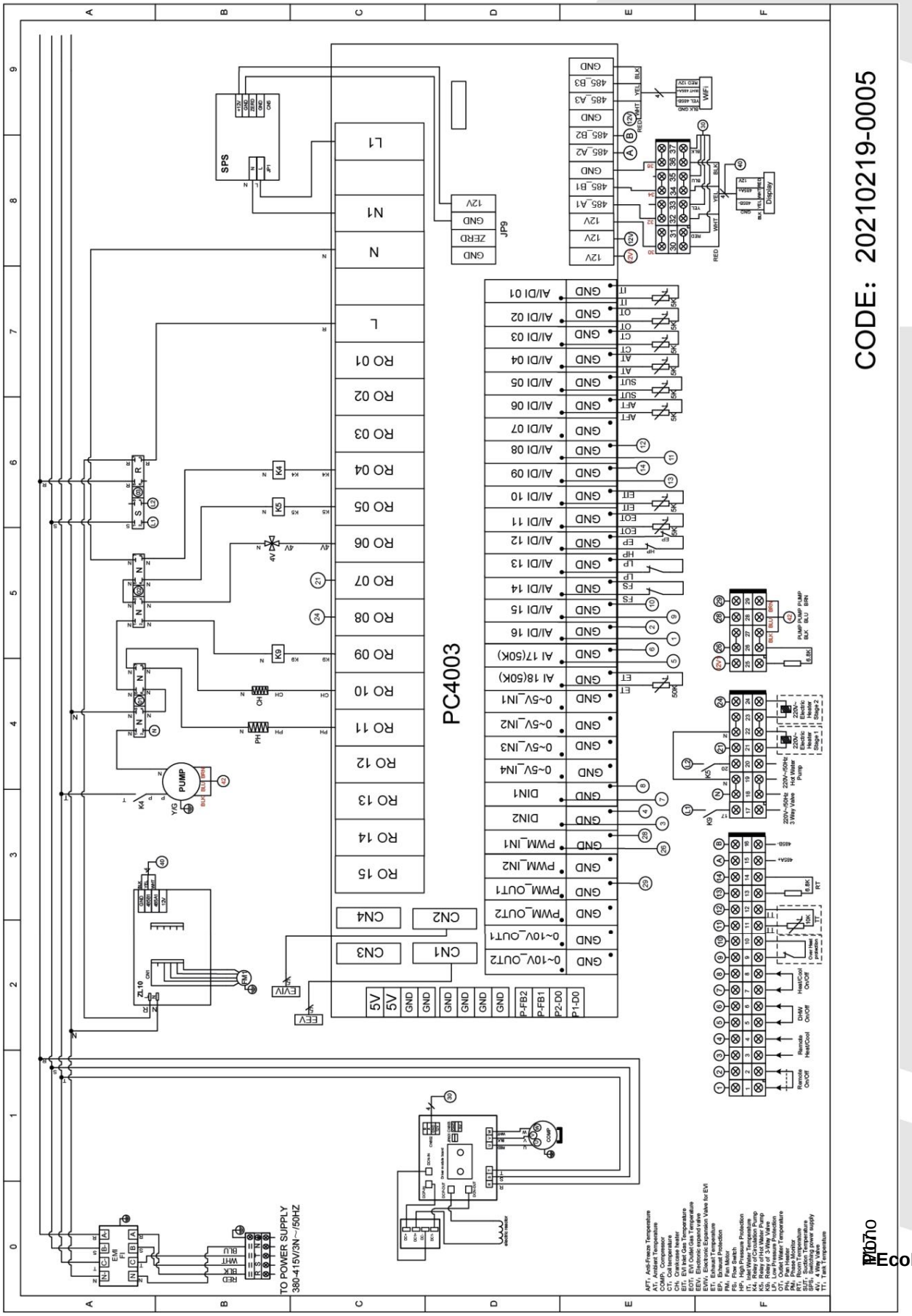
The following pages present electrical diagrams for each of the heat pumps in the Eco Heat Mono series.



2. Installation



2. Installation



2. Installation

2.9.3 Connecting the electric heater

Connection diagram of a 3-phase 400 V electric heater to EcoHeat Mono pumps (using a 9 kW heater as an example). The TL outputs of the electric heater should be connected to inputs 9 and 10 (overheat protection) in the heat pump board.

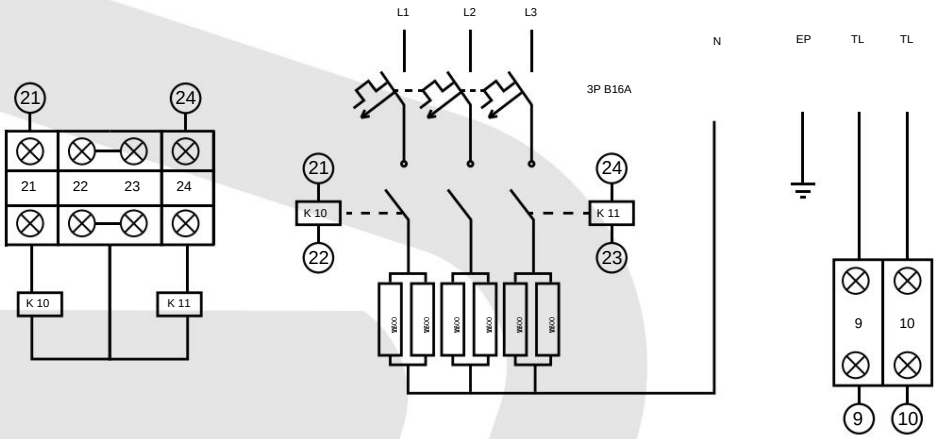
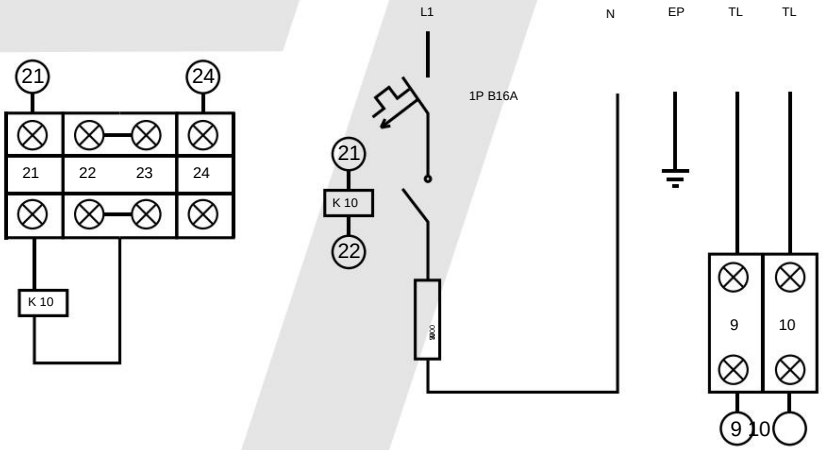
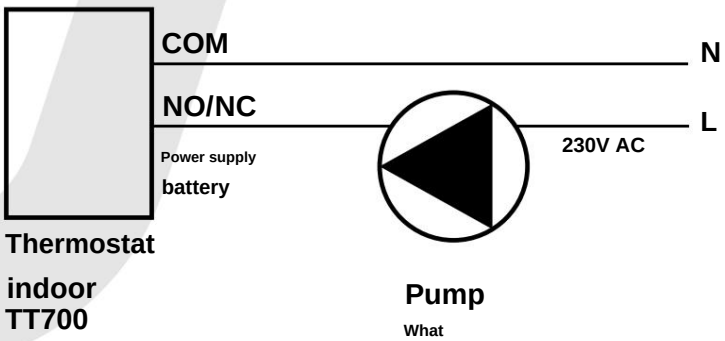


Diagram of connecting a single-phase heater (230 V) to the EcoHeat Mono heat pump (using a 3 kW heater as an example).



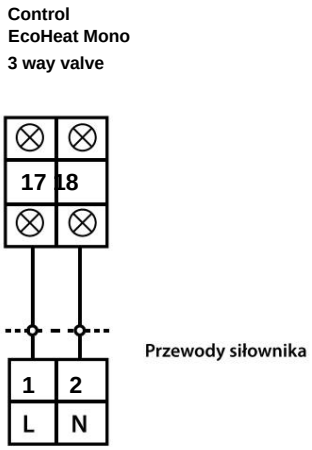
2.9.4 Connecting the room thermostat

The heat pump does not control the heating circuits behind the buffer. In order to set and control the temperature inside the room and ensure the heat pump operates in accordance with the heating curve, a room thermostat should be used, e.g. Tweetop TT700, in accordance with the following electrical diagram

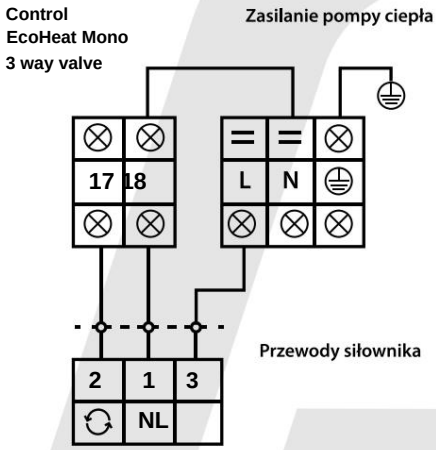


2. Installation

2.9.5 Connecting the central heating/domestic hot water switching valve actuator



Siłownik dwużyłowy zaworu przełączającego c.o/c.w.u.



Siłownik trójżyłowy zaworu przełączającego c.o/c.w.u.

2.10 Test run

The heat pump power supply should be switched on at least 5 hours before the planned first start-up of the system in order to warm up the compressor crankcase.

Inspection before test run of heat pump:

- Check the outdoor unit and make sure all pipe connections are correct, and the valves required to ensure flow are open.
- Then, check whether the entire system is properly filled with water and has been properly aired.
- The electrical connections should also be checked to ensure that the power and voltage of the supply are within normal limits, all screws have been properly tightened, all connections have been made according to the connection diagram, and the grounding has been properly connected.
- Finally, check all heat pump screw connections to make sure they are in good condition. After switching on the power, observe the pump controller and note whether any errors appear in the operation of the device.

Test run of heat pump:

- To start the heat pump, press the "power" button on the pump controller. Then, check if the pump has started.
- After 1 minute of heat pump operation, the compressor will start. Pay attention to whether the compressor is making any undesirable noises. If such noises occur, turn off the heat pump and check the compressor.
- Then check whether the input current and supply voltage are consistent with the values contained in in the instructions. If not, stop the device and look for the cause.
- The valves in the heating loop should be adjusted to ensure that the hot (or cold) water flows is correct and covers the heating (cooling) demand. • Then check

whether the outlet water temperature is stable.

- The device controller parameters have factory settings that should not be changed by the user. blacksmith.

3. Service

3.1 Main controller window

To start the display and continue operating the controller, touch the screen. In all display windows, if no operation is performed within 30 seconds, the screen will dim, and will turn off after 2 minutes. Touching the screen will turn the display back on and allow further operation.

Driver window
description: 1. Turning the device on and off (after turning it off, the screen will
be gray); 2. Screen lock (to unlock the screen, press the “2” icon on the keyboard that appears
enter the password “22” and click Enter. Then the controller will be unlocked again); 3.
Selecting the operating mode (heating, cooling, DHW, heating + DHW, cooling + DHW); 4. Setting the
target temperature; 5. Schedule timer;
6. Settings menu button;
7. Error icon; 8. Defrosting; 9.
Electric heater; 10.
Outside (ambient)
temperature; 11. Cooling
mode (one of the current operating modes);
12. Domestic hot water mode; 13. Domestic hot water
temperature; 14. Heating medium
flow; 15. Heating medium return temperature;
16. Heating medium supply
temperature.

3. Service

3.2 Operating modes

You can choose one of the five operating modes according to the above data. To be able to choose the right variant among all the above, you must activate the parameters: H05=1, activation of cooling mode, (when H05=0, none of the cooling modes will be available)
H28=1, activation of DHW mode (when H28=0, none of the DHW modes will be available).
Then, after activating the parameters and pressing the M button in the main window (marked with symbol 3), the screen will display all the mode possibilities.
After selecting the appropriate mode, the home screen will display appropriate animations depending on the selected mode:

 **heating**

 **cooling**

 **hot water**

3.3 Setting the target temperature in operating mode

The set temperature setting differs depending on the previously selected operating mode. For example, when the “DHW + Cooling” mode is active, the set temperature setting menu will display two set temperature values: one for DHW and one for cooling, as shown in the figure below:

After selecting the appropriate field, a keyboard will appear, use it to enter the expected temperature values.

3. Service

3.4 Programming the heat pump time function

In the main menu, when you tap the “Clock” icon, the screen will display the timer setting menu as shown in the figure below.

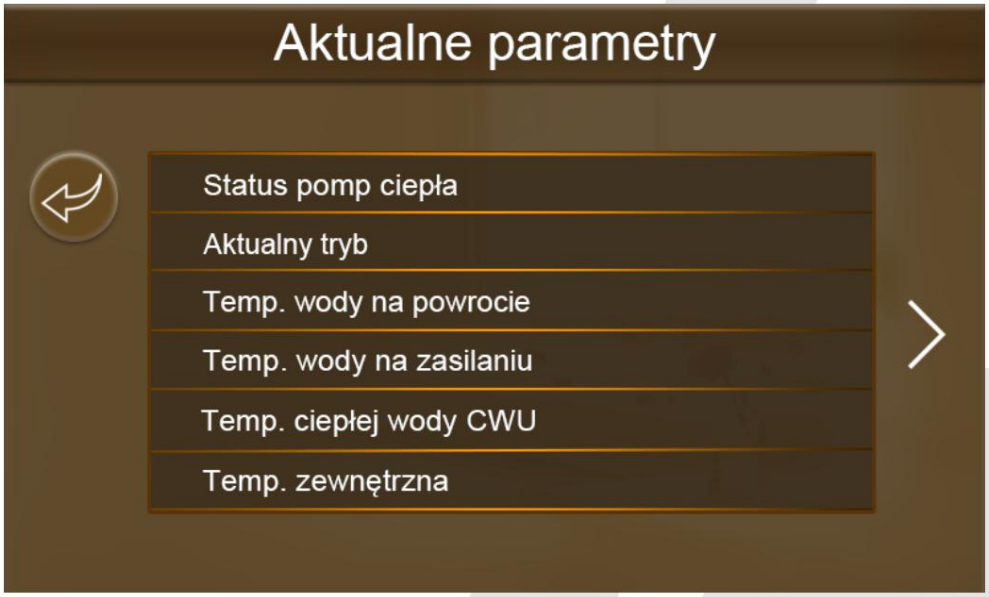
Controller window
description: 1. Return button to the main
menu; 2. Timer on/off (green field - on, gray field - off); 3. Selection of the
appropriate days of the week; 4.
Planned on time; 5. Planned off
time; 6. Page back for programming
time intervals; 7. Page forward for programming subsequent
time intervals.

3.5 Settings

3. Service

Function description:

Current parameters - current heat pump operations/unit parameters.



Date and time - setting the current time displayed by the controller.

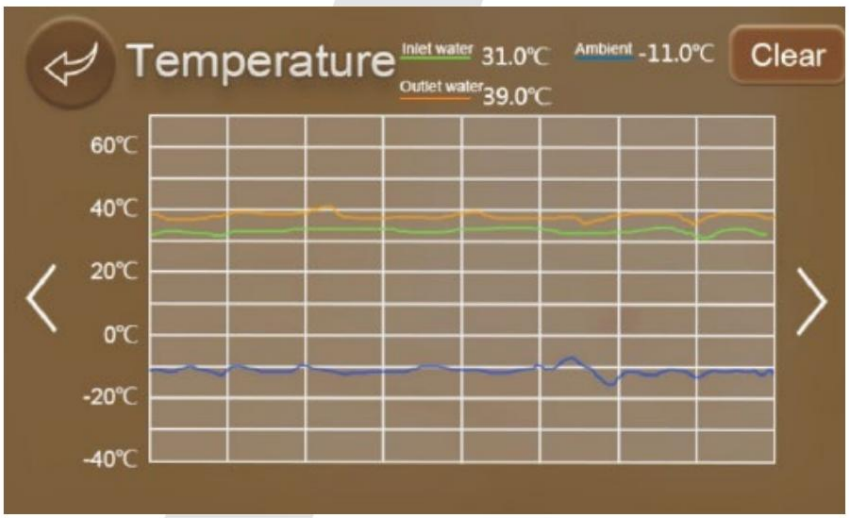
Electric heater - to activate the electric heater function, parameter R35=1 (installation) or R35=2 (tank). After pressing the “Electric heater” button, a window will appear with the heater on or off.

3. Service

Silent mode - to activate silent mode, parameter H22=1. After switching on silent mode, the fan icon the tylator will change from on If the device is working in silent mode, the following message will be displayed: spinning icon animation .

In the silent mode settings, you must set the appropriate time intervals during which the heat pump is to operate in the selected mode.

Work chart - after entering the field, a chart of the inlet (return) and outlet (supply) temperatures of the heating medium will appear. Additionally, changes in the outside temperature will be visible.



3. Service

Internal parameters - after entering the internal parameters menu, enter the access code "22" and click confirm. Then we will go to the user parameters window.

Description of internal parameters:

Errors - If an error occurs during operation that results in an alarm, the alarm icon will appear in the upper right corner of the pump interface. After pressing the alarm icon, the device will display the error log window.

Error log interface:

The error log contains the code, name and time of error occurrence in the appropriate columns.

3. Service

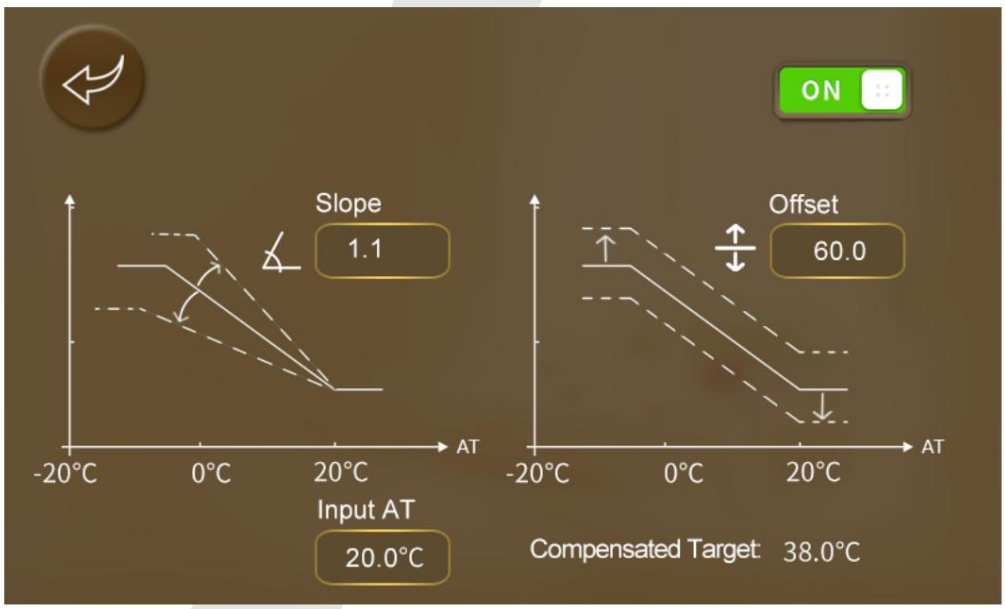
Unit Status - After entering the unit status, the current operating status of the device will be displayed.

Outside Temperature Compensation - Set the “Slope” and “Offset” values based on your home’s preferred heating needs.

Compensated Target Temperature = - Slope * Outside Temperature + Offset

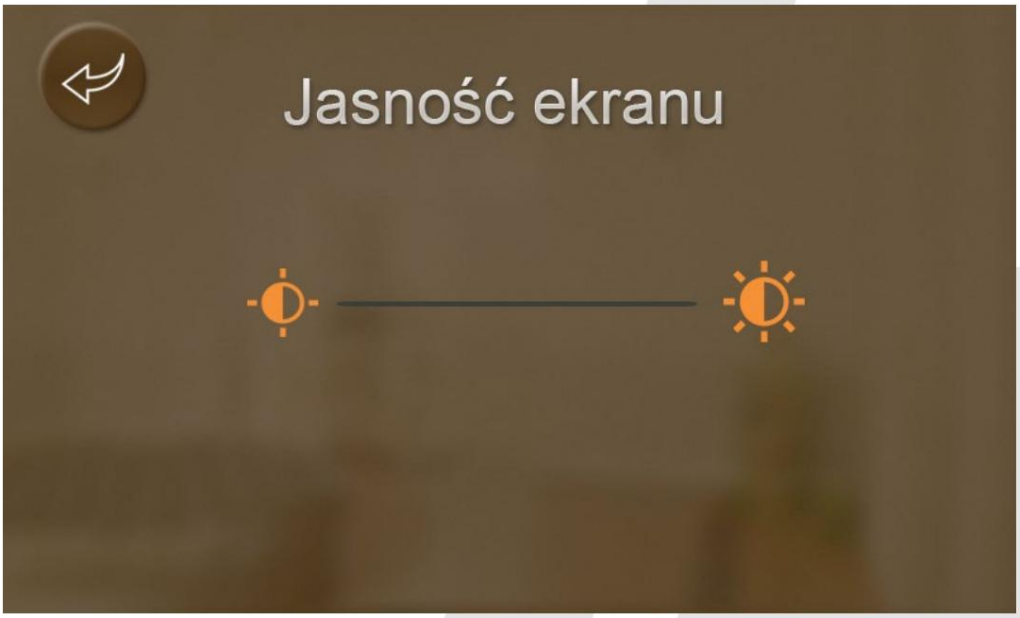
If the required heating energy demand is increased only when the outside temperature is low, the parameter should be increased.

"Slope". If the required heating energy demand is increased at each outside temperature, both parameters, i.e. "Slope" and "Offset", should be increased.



3. Service

Screen Brightness - After entering the Screen Brightness field, set the desired brightness by moving the slider from the left (the darkest setting) to the right (the image will be the brightest).
The device remembers the set brightness even after being disconnected from the power supply.



3.6 User parameters

Parameter	Description	Factory setting
A04	**Anti-freeze protection for return fluid temperature** If the return temperature of the heating medium is lower (equal) than A04=4°C and the ambient temperature is below (equal to) 0°C, then the heat pump will switch to the first protection mode and the circulation pump will start. Exit from the first protection mode occurs when the heating medium return temperature is higher (equal) by 4°C than A04 (i.e. 8°C) or the ambient temperature is higher than 1°C If the heating medium return temperature is lower (equal to) A04-2°C (i.e. 2°C) and the ambient temperature is lower (equal to) 0°C, the device will switch to the second protection mode and the heat pump will start operating. Exiting the second protection mode when the return temperature is higher (equal) by 11°C than A04 (i.e. 15°C) or the ambient temperature is higher than 1°C.	4°C
H05	**Activation of cooling mode** 0- No 1- Yes Activation of cooling mode depending on the heating/cooling solution in the rooms.	1
H07	**Device communication mode** 0- Superior 1- Subordinate Selection 0 - heat pump operation according to the wired controller Choice 1 - heat pump operation according to the remote controller	0

H18	**Electric heater adjustment level** 1- Stage 1; the heat pump works for 30 minutes, starting the electric heater at the first power stage 2- Stage 2; the heat pump operates for 30 minutes, the electric heater is turned on at the first power stage for 30 minutes; the first stage is turned off and the second power stage is turned on. 3- Level 3; the heat pump operates for 30 minutes, the electric heater is turned on at the first power level for 30 minutes; the first level is turned off and the second power level is turned on for 30 minutes; in the third level, the first and second level heaters operate. MODE R35=1 (INSTALLATION - central heating + domestic hot water) Conditions for starting the electric heater (all of the following). 1. Compressor operating frequency above 80% of maximum (Hz). 2. The electric heater will start only when the outside temperature is lower than the declared start temperature of the R45 electric heater (bivalent point, as selected or in the range of -7 to -10°C) 3. The supply medium temperature will be lower than the target temperature R02, taking into account the R04 hysteresis – 2°C for the central heating circuit; The domestic hot water temperature will be below the target temperature R01, taking into account the R16 hysteresis -2°C 4. The heater overheating protection does not activate. 5. The heating medium flows. 6. If in standby or central heating mode the temperature of the heating medium on the return is below 2°C for 15 minutes, then stage 1/2/3 will be activated. When the temperature of the medium on the return rises to 15°C, the heater will turn off. Conditions for switching off the electric heater (one of the points below). 1. Supply medium temperature in central heating mode above the target supply temperature R02 taking into account the hysteresis R04; domestic hot water temperature above the target temperature R01 taking into account the domestic hot water hysteresis R16. 2. Compressor operating frequency below 42 Hz. 3. No heating medium flow. 4. Activation of the electric heater overheating protection. MODE R35=2 (HOT DOMESTIC WATER) Conditions for starting the electric heater (all of the following). 1. Compressor operating frequency above 80% of maximum (Hz). 2. The electric heater will start only when the outside temperature is lower than the declared start temperature of the R45 electric heater (bivalent point, as selected or in the range of -7 to -10°C) 3. The domestic hot water temperature will be below the target temperature R01 taking into account the hysteresis R16 -2°C. 4. The heater overheating protection does not activate. 5. The heating medium flows. 6. If in standby or central heating mode the temperature of the heating medium on the return is below 2°C for 15 minutes, then stage 1/2/3 will be activated. When the temperature of the medium on the return rises to 15°C, the heater will turn off. Conditions for switching off the electric heater (one of the points below). 1. DHW temperature above target temperature R01 taking into account hysteresis R16; 2. Compressor operating frequency below 42 Hz. 3. No heating medium flow. 4. Activation of the electric heater overheating protection.	Level 3
H20	**Polarity of the central heating/DHW switching valve** 0- Power supply in DHW mode 1- No power in DHW mode When setting H20=0 in DHW mode, the three-way switching valve will be powered. When setting H20=1 in DHW mode, the three-way switching valve will not be powered.	0

3. Service

H22	**Activation of silent mode** 0- No 1- Yes In quiet mode, the device generates less noise. The fan speed and compressor operating frequency decrease (lower device power).	0
H25	**Device operation according to the power supply or room sensor** 0- Work according to the supply temperature sensor 1- Working according to the room temperature sensor When setting H25=0, switching the heat pump on or off will depend on the flow temperature of the heating medium. When setting H25=1, switching the heat pump off or on will depend on the room sensor temperature.	0
H32	**Three-way valve switching time (forced time to switch from DHW to central heating mode)** In heating + DHW mode, parameter H32 describes the maximum operating time of the heat pump for preparing DHW. After this time, the heat pump will switch to central heating mode, where the maximum operating time will also be H32.	120 minutes
D01	**Evaporator temperature to start defrosting** Evaporator temperature, measured at the lower corner of the exchanger, at which the defrost process can begin.	-7°C
D02	**Evaporator temperature at defrost end** Evaporator temperature, measured at the lower corner of the exchanger, at which the defrosting process can end.	10°C
D03	**Defrosting interval** Time required between previous and next defrosting process **Duration of defrosting**	45 minutes
D04	**process** Maximum duration of defrosting process **DHW target**	8 minutes
R01	**temperature** Domestic hot water temperature in the domestic hot water heater The temperature of hot water depends on the individual preferences of the user. The lower the temperature, the lower the costs of preparing hot water.	45°C
R02	**Target heating temperature** Temperature of the heating medium at the heat pump supply. Set temperature of the heating medium on the supply; the value depends on the heating system solution in the building. The lower the value, the lower the operating costs.	Radiators: 50-55 °C Underfloor heating: 35-40°C
R03	**Cooling target temperature** Chilled water temperature supplying the heat pump. Set chilled water supply temperature; value depends on the air conditioning system solution in the building. The higher the value, the lower the operating costs.	Underfloor heating: 18-19°C
R35	**Electric heater operating mode** 0- Off, electric heater does not work. 1- Installation, electric heater at the heat pump outlet. 2- Tank, heater in the domestic hot water heater. The choice of setting depends on the technical solution in the building. It is recommended to use an electric heater in the installation before the three-way valve switching the central heating/domestic hot water.	1

3. Service

P01	**Circulation pump operation mode for central heating** 0-Normal 1-Economy 2- Interval Selecting the operating mode for the central heating circulation pump 0- The circulation pump runs continuously, even after the compressor is turned off. 1- The circulation pump will turn off two minutes after the compressor turns off. 2- After the compressor is stopped, the circulation pump works intermittently, i.e. it works for P03 (i.e. 3 min) and does not work for P02 (i.e. 30 min). Influence of ambient temperature on the operation of the central heating circulation pump: When the ambient temperature is lower than (equal to) R40 (i.e. 2°C), the circulation pump operates according to the P01 settings. When the ambient temperature is higher than R40 (i.e. 2°C), the circulation pump works P01=1.	2
P02	**Internal circulation pump stop time** Time P02 in interval mode in which the circulation pump does not work.	30 minutes
P03	**Internal circulation pump operation time** Time P03 in interval mode in which the circulation pump operates.	3 minutes
P05	**Circulation pump operation mode for domestic hot water** 0-Normal 1-Economy 2- Interval Selecting the operating mode for the domestic hot water circulation pump 0- The circulation pump runs continuously, even after the compressor is turned off. 1- The circulation pump will turn off two minutes after the compressor turns off. 2- After the compressor is stopped, the circulation pump works intermittently, i.e. it works for P03 (i.e. 3 min) and does not work for P02 (i.e. 30 min). Influence of ambient temperature on the operation of the domestic hot water circulation pump: When the ambient temperature is lower than (equal to) R41 (i.e. 2°C), the circulation pump operates according to the P05 setting. When the ambient temperature is higher than R40 (i.e. 2°C), the circulation pump works P01=1.	2
G01	**Disinfection temperature of domestic hot water** Setting the disinfection temperature of domestic hot water. According to applicable regulations, the disinfection temperature should be at least 70°C and last at least 10 minutes. The following table presents the ranges of domestic hot water temperatures with their time-dependent impact on Legionella bacteria. 70°C: bacteria are immediately eliminated; 66°C: bacteria die within 2 minutes; 60°C: bacteria die within 32 minutes;	63°C
G02	**Duration of domestic hot water disinfection** Setting the duration of domestic hot water disinfection. Influence of time and temperature according to the information in point G01.	0 min
G03	**Disinfection start time** Setting the disinfection start time. During and after disinfection, pay special attention to the possible risk of scalding with hot water.	01:00
G04	**Interval between disinfection cycles** The time between the previous and subsequent domestic hot water disinfection cycle.	30 days
G05	**Thermal disinfection function for domestic hot water** 0- No 1- Yes Turning on or off disinfection of domestic hot water.	1

3. Service

3.7 Instructions for outside temperature compensation, the so-called heating curve

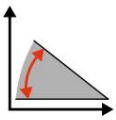
(supplement to page 51)

3.7.1 Explaining the purpose of the heating curve

The heating curve is the relationship between the temperature of the heating medium at the outlet in the heat pump and the outside temperature. The characteristics of each building are different, so it is important to select the appropriate heating curve for the conditions in which the heat pump works. The advantage of using such a solution over setting the temperature with a thermostat is energy savings and the ability to perfectly adjust the temperature inside the building to your own needs.

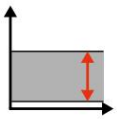
It is worth spending some time optimizing the heating curve settings, because it will automatically correct the temperature of the heating medium and, as the outside temperature changes, it will control the operation of the heat pump in such a way as to provide us with optimal thermal comfort while saving energy.

3.7.2 Slope and offset



Tilt

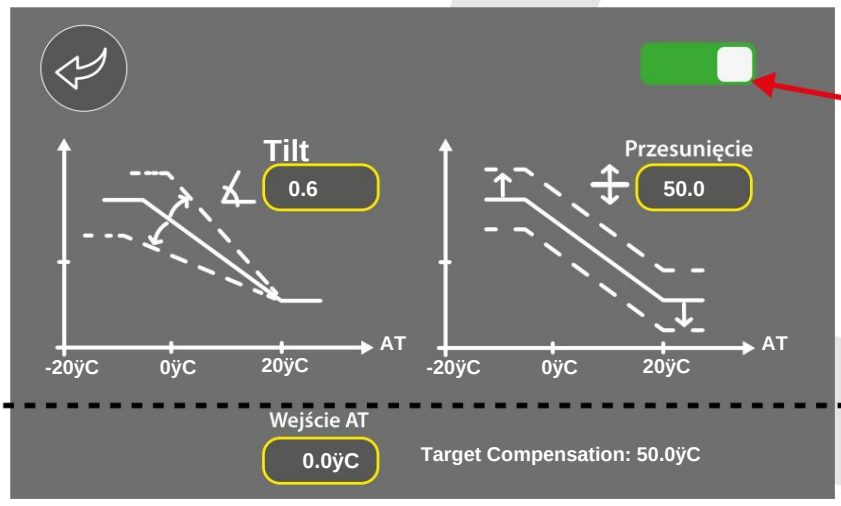
Value range: 0 - 3.5 (value 0 = slope 0°; value 3.5 = slope 45°). The slope value determines how the heating curve compensates for the drop in outside temperature. The greater the slope, the greater the compensation for the drop in outside temperature, the smaller the slope, the more gently we compensate for the drop in outside temperature.



Shift

Value range: 0 - 85. The offset value determines the overall level of heating by the heat pump over the entire range of outdoor temperatures. Increasing the offset increases the heating power and room temperature for the entire range of outdoor temperatures, decreasing the offset produces the opposite effect.

3.7.3. Heating curve window display



Make sure the heating curve function is turned on, as it is economical to use this function - the slider should be set to the right.

For the inquisitive

The lower part of the screen contains a calculator that allows you to calculate the water temperature at the pump outlet for the selected outside air temperature and the given slope and offset parameters.

AT input: in this field we enter the outside temperature value for which we want to check the temperature of the heating medium at the heat pump outlet.

Target compensation: The leaving water temperature will appear here.

Both above-mentioned fields **have no influence** on the operation of the pump.

3.7.4 Troubleshooting and Adjusting the Heating Curve Settings

Recommended initial settings

For underfloor heating
Slope = 0.4 / Offset = 32

For radiator heating
Slope = 0.6 / Offset = 43

1 Too cold during frost season:
increase the slope +0.1 and wait 2 days.

2 It's always too cold:
increase offset +1 and wait 2 days.

3 It's always too warm:
decrease offset -1 and wait 2 days.

4 Too warm during frosty weather:
reduce the slope to -0.1 and wait 2 days.

5 Optimal during frost, too cold outside frost period:
decrease the slope to -0.1 and **increase the offset to +1** and wait 2 days.

6 Optimal during frost, too warm outside the frost period:
increase the slope +0.1 and **decrease the offset -1** and wait 2 days.

In case of insufficient improvement, repeat the operation - this applies to each of the points, maintaining a 2-day break between further adjustments of the parameters.

User manual

Inverter air-to-water heat pump

EcoHeat Mono P6
EcoHeat Mono P10T
EcoHeat Mono P17T

Company headquarters

ul. Ludowa 24 C
71-700 Szczecin I Poland