

Design and Technical Description of Heat Interface Unit Indirect



GENERAL INFORMATION

Dear Customer:

You have selected a high-quality Heat Interface Unit (HIU) for your heating and domestic hot water (DHW) needs. The HIU should be used exclusively for radiator/floor heating and DHW preparation. Any other or further usage will be considered as improper usage. The manufacturer is not liable for damage or faults resulting from such improper usage.

Please read this manual carefully to avoid injury to people and damage to the product, and keep the manual in a safe place for future reference for the duration of owning the product. The manufacturer is not liable for damage or faults that result from non-compliance with the manual.

The operator is responsible to operate the HIU properly. To operate HIU properly and efficiently, the operator must have read and comprehended the manual and other specific operating instructions thoroughly, reached country-specific legal age, and make sure the HIU is regularly maintained.



The basic installation instructions, operating conditions, and safety requirements are as follows:



1. Authorized personnel only. The installation, start-up, maintenance work, and repairs must be performed by qualified and authorized personnel only.



2. Installation. The installation of the HIU must be performed by qualified and authorized personnel only. The system should be installed in a frost-free room. The temperature and humidity should not exceed 50 °C and 60% respectively. Under no circumstances, these values or any other values specified in this manual should not be exceeded. The HIU should be easily accessible in case of an emergency. Please check the HIU for completeness to make sure that it has not been damaged during transport. Before water is added to the system, make sure all the screw connections are tight, if necessary, loosened screw connections should be tightened. Do not use unauthorized components or replacement parts which may limit the function, safety and warranty of the product.



3. Observe applicable standards and regulations. The assembly and operation of the HIU must comply with the recognized standards, rules, requirements, and guidelines. Observe applicable UK standards and regulations.

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4. Warning of electric shock. The installation, commissioning, and repairs of the electrical connections of the HIU must be performed by qualified and authorized personnel only. Installation should be made by following the instructions provided by the manufacturer and in accordance with UK standards and regulations. In case of danger and accidents, if possible and not risky, interrupt power supply and separate the heating system from other energy sources and seek help from qualified and authorized personnel immediately. Possible modifications or alterations to the HIU and its electrical components are only permitted with written permission of the manufacturer. Violation to this may void the warranty and the manufacturer is not liable for damage resulting from misuse of the system.

Risk of fatal or serious injury. When operational, the HIU is connected to mains voltage. Do not touch electrical components with wet or damp body parts. Do not pull on electrical lines. Do not touch live parts. The system should be electrically disconnected for repairs. All repairs must be performed by qualified and authorized personnel only.



5. Quality and safety of drinking water. The HIU uses and comes in contact with drinking water. The planning and design of the drinking water system therefore must be in accordance with UK standards and regulations.

A water analysis is recommended for each installation. In the case of warranty claims, a water analysis is mandatory.

The system must be flushed and disinfected before commissioning with the flushing by-pass component and other necessary equipment.



6. Warning of high pressure and high temperature. The maximum operating temperature and pressure of the HIU are 90 °C and 16 bar respectively. Therefore, some surfaces or some components of the HIU can be very hot. Do not touch hot surfaces. Hot surface can cause skin burns. If you have to touch or be close proximity to the HIU, check surface temperature of the HIU with a proper equipment before touching any surfaces or part of the system. In case of leaks, close all shut-off valves, and seek help from qualified and authorized personnel immediately.



7. Storage. Do store the HIU and any of its components in a cool and dry place before installation.

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8. Disposal. Always follow local disposal regulations and seek expert advice.



9. Name plate of the HIU. This manual applies to various designs of the HIU. The type of the HIU is specified on the nameplate which can be seen on the base plate of the HIU. The nameplate contains the following information:

- Product Code
- Art. Number
- Primary Flow
- Max differential pressure
- Minimum Heating Inlet Temperature
- Production Date
- Contact Information of the Manufacturer

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1. Functional Description

YGHP Heating Interface Unit (HIU) product family is designed to satisfy a range of customer demands in terms of heating and domestic hot water (DHW). HIU provides complete solutions for apartments and houses to make radiator heating or underfloor heating and instantaneous DHW preparation with thermostatic control. This document describes a specific model of HIU, namely HIU-Indirect (Figure 1).

The HIU-Indirect is specifically designed for either radiator or floor heating and instantaneous DHW preparation with thermostatic control. It has all necessary components (e.g. valves, heat exchangers (DHW heat exchanger and heating circuit heat exchanger), pump, expansion vessel, pipes, fitting and connections) to deliver convenient and efficient DHW and heating. Optional components as Re-circulation Component enables HIU to deliver instantaneous DHW, Hot Water Priority Component switches HIU to prioritize DHW supply, and Thermostatic Actuator enables HIU-Floor to open or close the heating circuit remotely.

The HIU-Indirect has 3 types based on the number of plates of its DHW heat exchanger: 30, 40, or 70 plates. To connect the HIU-Indirect with the piping system of apartments or houses, Mounting Plates With 8 Ball Valves are used. The Flushing By-pass component enables flushing and venting the system before commissioning. The HIU-Indirect is covered with high quality EPP Covers.

The detail information for components of HIU-Indirect are provided in the following sections.

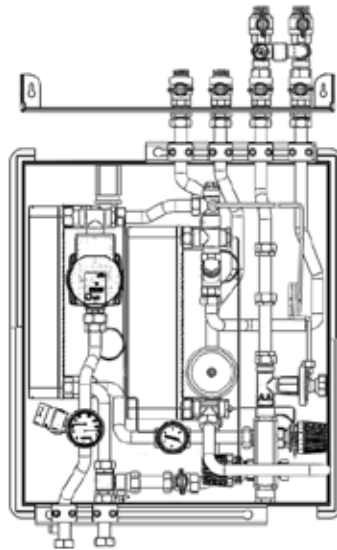


Figure 1. The front view of the HIU-Indirect

2.Design and Technical Description of the HIU and Its Components

The HIU-Indirect is comprised of 14 main components. The components of the HIU are secured on a galvanized steel plate. Each has a DHW brazed plate heat exchanger (optionally isolated with EPP), thermostatic control valve, differential pressure control valve, heating component, air vent, water hammer, spacer for heat meter. The 18 mm diameter pipes of the HIU are made from AIS 316L stainless steel and have 9 mm isolation. Figure 2 describes the inlets and outlets of the HIU-Indirect. Figure 3 shows the dimensions of the HIU-Indirect.

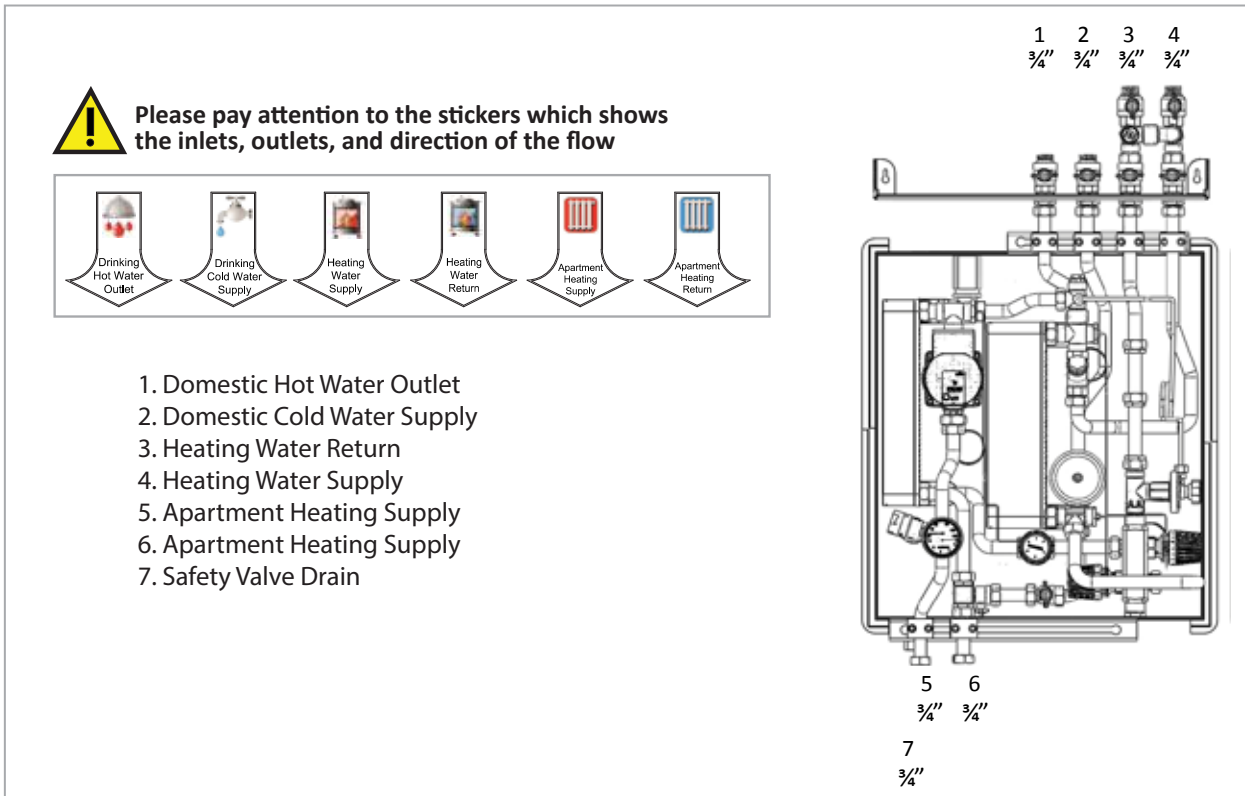


Figure 2. The inlets and outlets of the HIU-Indirect

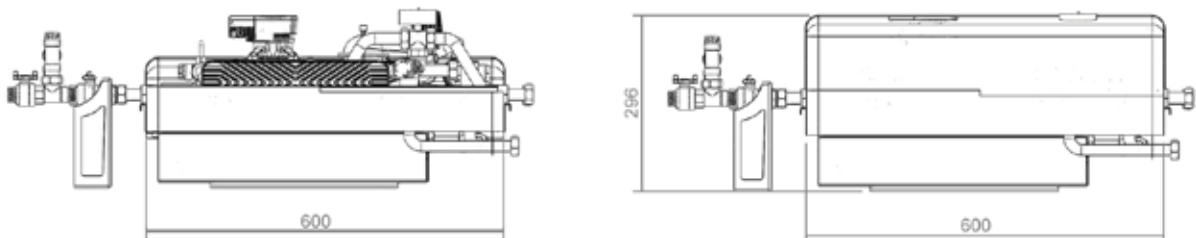


Figure 3. The dimensions of the HIU-Indirect

The HIU-Indirect has 3 types based on the number of plates of the DHW heat exchanger to accommodate hot water demand. The types of the HIU-Indirect are listed in the Table 1.

Table 1. The types of the HIU-Indirect

Capacity 1	
Number of heat exchanger plates	30
Art. -Nr.	
Capacity 2	
Number of heat exchanger plates	40
Art. -Nr.	
Capacity 3	
Number of heat exchanger plates	70
Art. -Nr.	

The technical data of the HIU-Indirect on the general aspects, materials, dimensions, heating circuit, domestic hot water, and electrical connections are presented in the Table 2.

Table 2. The technical data of the HIU-Indirect

GENERAL	
Nominal pressure	PN16
Maximum operating temperature	90 °C
MATERIALS	
Heat exchanger	Plates: 316 stainless steel
Pipes	18 mm AIS 316L stainless steel
Fittings	Brass CW617N
Seals	Aramid Fiber, Mineral Fibre with NBR
Thermal insulation	EPP
DIMENSIONS	
Width x Height x Depth	540 x 600 x 296 mm
Connections	G ¾" union nut, flat seal
DOMESTIC HOT WATER	
Medium	Drinking water
Maximum cold-water pressure	4.0 bar
Working range of thermostatic valve	20 °C to 70 °C
ELECTRICAL CONNECTIONS	
Main voltage	230 V AC ± 10%
Power frequency	50 to 60 Hz
Operating voltage	5 V AC ± 10%
Input	0.15 to 3 W
Protection	IP44

2.1. Differential Pressure Control Valve

Each HIU-Indirect is equipped with a differential pressure control valve (Figure 4) which balances system to react pressure variations in variable flow systems. In hydronic heating systems with HIU, differential pressure control valve prevents high pressure difference on HIU by providing necessary conditions to achieve the desired flow distribution in the system. Differential pressure control valve balances all components of the HIU system. In the HIU, differential pressure control valve with size of DN20, Kvs of 2.5 m³/h, ΔP Setting Range of 20-65 kPa, and Nominal Pipe Size of ¾" is used. The technical specifications of the pressure control valve are given in Table 3.

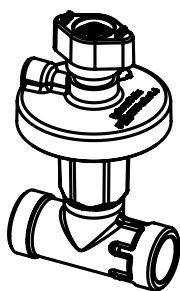


Figure 4. The DN20 20-65 kPa differential pressure control valve

Table 3. The technical specifications of the DN20 20-65 kPa differential pressure control valve

Maximum temperature	120 °C (135 °C temporarily)
Minimum temperature	-20 °C
Maximum differential pressure	250 kPa
Maximum pressure	25 bar
Differential pressure setting range	20-65 kPa
Accuracy	±25%
Marking on valve	DN, PN, flow arrow, DR, Kvs, and Differential pressure setting range
Connection	Female thread ISO 7/1 parallel
Material of valve housing, seat, cone, and internal mechanical parts	DR Brass CW602N
Material of spring	Stainless steel
Material of sealings and diaphragm	EPDM
Material of isolation knob	PPS

2.2. DHW Brazed Plate Heat Exchanger

Each HIU-Indirect is equipped with a DHW brazed plate heat exchanger (Figure 5) to transfer heat from heating supply to HIU for DHW preparation. In the HIU-Indirect, the DHW heat exchanger has optimized asymmetric plate geometries that combine extraordinary thermal efficiency with a low pressure drop and low return temperatures. The performance data of the DHW heat exchanger are given in Figure 6 (Capacity 1), Figure 7 (Capacity 2), and Figure 8 (Capacity 3).

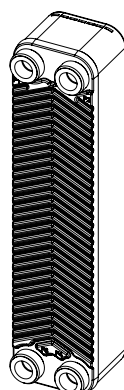


Figure 5. The brazed plate heat exchanger

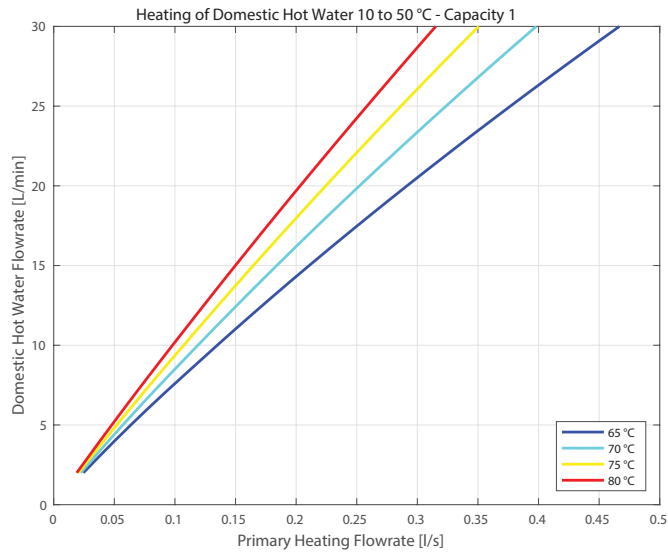


Figure 6. The performance of DHW heat exchanger for Capacity 1

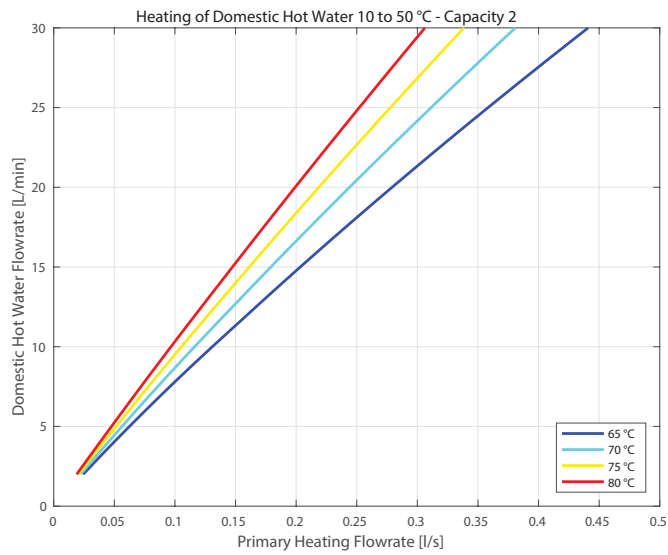


Figure 7. The performance of DHW heat exchanger for Capacity 2

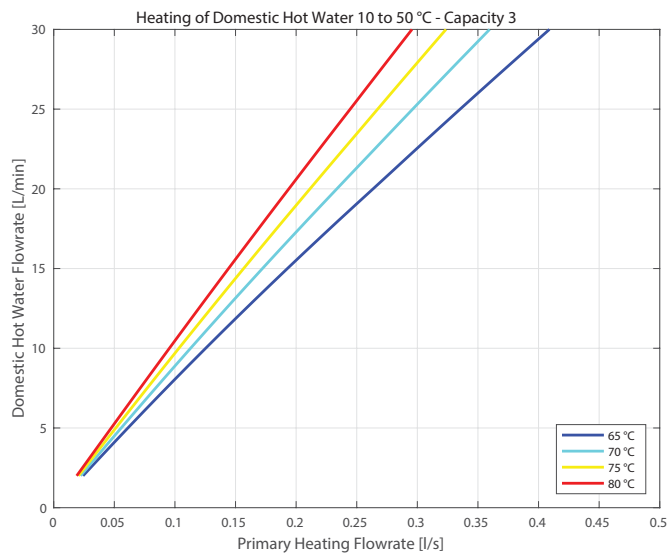


Figure 8. The performance of DHW heat exchanger for Capacity 3

2.3. DHW Thermostatic control valve

DHW Thermostatic control valve (Figure 9) is a simple yet reliable device for accurate temperature control that works without power supply and active control. These valves can ensure virtually constant temperatures. The thermostatic control valves are optimized for minimal idle consumption. The temperature settings (intended as a guide) are given in Table 4.

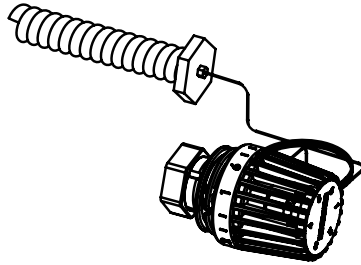


Figure 9. The DHW thermostatic control valve

Table 4. The temperature settings of the thermostatic control valve

Setting	Temperature (°C)
1	20
2	30
3	45
4	55
5	65
6	75

2.4. DHW Thermostatic control valve

The HIU-Indirect is designed in a way that it can provide either radiator or floor heating with a thermostatic valve range change. If radiator heating is preferred, Radiator Heating Component would enable radiator heating functionality with a range of 40-90 °C. Alternatively, if floor heating is preferred, Floor Heating Component would enable floor heating functionality with a range of 20-70 °C. Each Heating Component has a heating brazed plate heat exchanger, safety valve, combined thermometer/pressure gauge, expansion vessel, electronically-controlled circulation pump, heating thermostatic control valve, 18 mm AIS 316L stainless steel pipes with 9 mm isolation, and brass fittings and connections.

2.4.1. Heating Brazed Plate Heat Exchanger

Heating brazed plate heat exchanger is used to isolate (from the primary heat supply) the heating circuit.

2.4.2. Safety Valve

The Safety Valve (Figure 10) serves as a fail-safe to protect against overpressure in the HIU. When the system pressure of the HIU exceeds 2.5 bar (factory adjusted opening pressure), it automatically releases water from the draining outlet. The system pressure of the HIU can be monitored by the Combined Thermometer/Pressure Gauge. The safety valve is made from brass and according to the standards established by DIN 4751-3 and EN 12828 regulations. The technical specifications of the Safety Valve are provided in the Table 5.

Table 5. The technical specifications of the Safety Valve

Connection	MS Rp½ x Rp¼
Operating temperature range	-20 / +95 °C
Opening pressure	2.5 bar
Dimensions (W x H x D)	35 x 60 x 45 mm
Housing	Brass
Cap	PA6, red

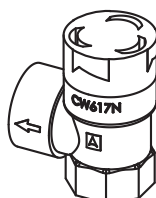


Figure 10. The safety valve

2.4.3. Combined Thermometer/Pressure Gauge

The Combined Thermometer/Pressure Gauge (Figure 11) enables the operator to observe the heating circuit temperature and system pressure in a single gauge with at a single measuring point. It has a bimetal measuring system for temperature measurement and a Bourdon tube measuring system for simultaneous pressure measurement. Both values are measured and displayed by a single gauge. A self-closing mounting valve enables the gauge to be replaced without the need to drain the system. The technical specifications of the Combined Thermometer/Pressure Gauge are provided in the Table 6.

Table 6. The technical specifications of the Combined Thermometer/Pressure Gauge

Type	D1
Nominal size	80
Working ranges	Thermometer: HIU: 20/120 °C Ambient max: 60 °C Pressure gauge: 0/10 bar and 0/60 mWC Static load: 7.5 bar Dynamic load: 6.7 bar Short term: 10 bar (full scale value)
Temperature performance	Pressure gauge: Indication error when the temperature of the measuring system deviates from the normal temperature of 20 °C: rising temperature approx. ±0.4 %/10 K falling temperature approx. ±0.4 %/10 K of the full scale value
Accuracy class of Pressure gauge	2.5 (EN 837-1/6)
Degree of protection	IP 32 (EN 60529)
Connection	Brass, bottom or centre back G¼B with mounting valve G¼ to R½
Measuring element	Temperature: Bimetal element Pressure: Bourdon tube, copper alloy
Dial	Plastic white Dial marking black with red/blue circular arcs
Pointer	Thermometer: plastic, red Pressure gauge: plastic, black
Housing	D1 – plastic (ABS), highly impact resistant
Window	Clip-in plastic with adjustable red mark

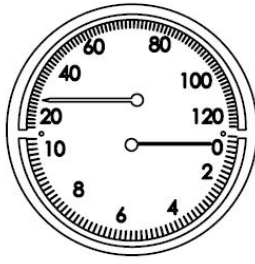


Figure 11. The Combined Thermometer/Pressure Gauge

2.4.4. Expansion Vessel

The HIU-Indirect is equipped with an Expansion Vessel (Figure 12) to maintain constant pressure in the heating circuit. The Expansion Vessel is made from rubber diaphragm fixed membrane and according to the standards established by PED 2014/68/UE and DIN EN 13831 regulations. The technical specifications of the Expansion Vessel are provided in the Table 7.

Table 7. The technical specifications of the Expansion Vessel

Capacity	8 liters
Dimensions (W x H x D)	350 x 440 x 73 mm
Water entry connection	M 3/8" Gas
Standard pre-loading pressure	1.5 bar
Maximum working pressure	3.0 bar
Working temperature	-10 / +90 °C
External finishing colour	Red

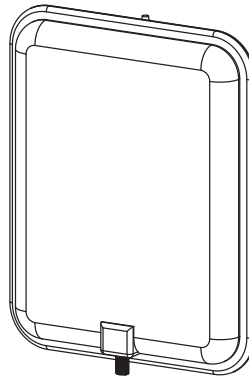


Figure 12. The Filling Component

2.4.5. Electronically Controlled Circulation Pump

Each Floor Heating Component has an electronically-controlled circulation pump (DN 15 size and 7 m hydraulic performance) which is exclusively designed for circulating for heating systems with constantly changing volume flows. The technical data of the pump is presented in Table 8. In Figure 13, pump curve (pump head vs flow rate characteristics) is given.

Table 8. The technical data of Electronically-Controlled Circulation Pump

Fluid temperature	0 °C to +95 °C
Ambient temperature	0 °C to +70 °C
SC, self-controlled, green push button	$\Delta p-v$, $\Delta p-c$, constant speed (manual air venting and manual dejamming function)
External control	iPWM1 signal, LIN bus
Hydraulic performance	7 m
Size	DN 15
EEl	≤ 0.20

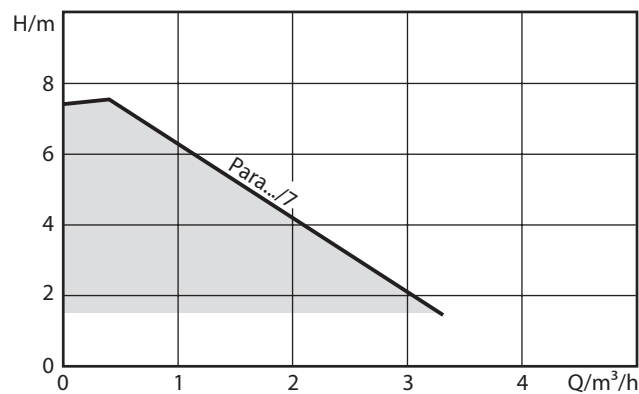


Figure 13. The pump curve of the Electronically-Controlled Circulation pump

2.4.6. Heating Thermostatic Control Valve

Heating Thermostatic Control Valve enables operator to control the water temperature in the heating circuit. It is a self-reacting valve with no electric supply. The range of the heating thermostatic valve depends on the heating system choice (radiator or underfloor).

2.5. Filling

The HIU-Indirect comes with a Filling (Figure 14) component which is used to fill the heating circuit with water. It should be manually connected to the ball valves of the HIU (marked with “A” and “B” stickers) to start the filling process. The heating circuit should be filled with water until 1.5-2.0 bar pressure read from the Combined Thermometer/Pressure Gauge. Then, those ball valves should be shut-off, and the Filling should be disconnected from the HIU. It is made up of AIS 316L stainless steel pipes with union nuts at both ends. The Filling is marked with “A” and “B” stickers at the ends to correctly connect to the HIU.

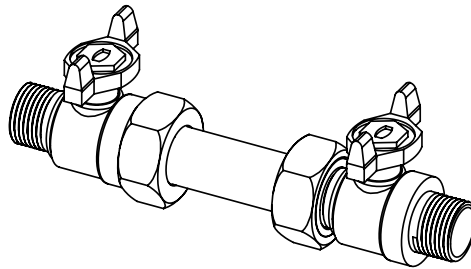


Figure 14. The Filling Component

2.6. Thermostatic Actuator

Thermostatic Actuator (Figure 15) enables HIU to open or close the heating circuit remotely. It receives electrical signals from room or timer thermostats or other home automation systems and convert those electrical signals into valve strokes to adjust the on or off condition of heating circuit. The technical specifications of Thermostatic Actuator are provided in the Table 9. Thermostatic Actuator is an optional component in the HIU-Indirect design.

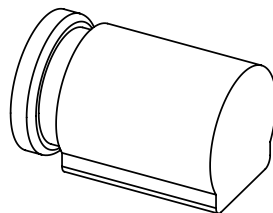


Figure 15. The Thermostatic Actuator

Table 9. The technical specifications of the Thermostatic Actuator

Operating mode	Closed when de-energized
Stroke	0/3.2 mm indication via cams on hood
Operating time	< 5 min
Operating temperature range	Ambient max. 60 °C
Supply voltage	AC 230 V, Power: 2W
Connection	Union nut: M30 x 1.5mm Closing dimension: 10.8 mm Cable length: 1m
Housing	Plastic Degree of protection: IP 54 (EN 60529)

2.7. Hot Water Priority Component

Hot Water Priority Component switch HIU to prioritize DHW supply. This component shut heating off when DHW is in use. It contains a thermostatic control head and a thermostatic control valve insert. It is a plug and play device ready to connect to the HIU. The drawing of the Hot Water Priority Component is given in Figure 16.

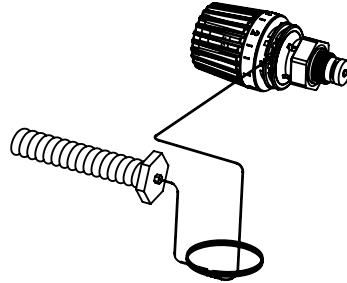


Figure 16. The drawing of the Hot Water Priority Component

2.8. Water Hammer

Water hammer (Figure 17) is a device to overpressure reducer in hot and cold sanitary water circuits. It is made from stainless steel AISI 304L and according to the standards established by PED 2014/68/UE and EN 13831 regulations.

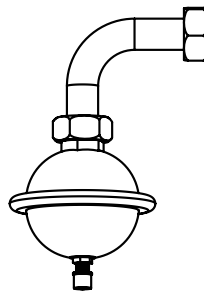


Figure 17. The water hammer

2.9. Re-circulation Component

Re-circulation Component (Figure 18) can be used to eliminate time or wasted water in DHW usage. The main element of the component is a re-circulation pump which circulates DHW for instantaneous availability. The other elements of the module are 18 mm AIS 316L stainless steel pipes with 9 mm isolation, brass fittings and connections, and a brass check valve. The technical data of the re-circulation pump is presented in Table 10. In Figure 19, the pump curve (pump head vs flow rate characteristics) is given. Re-circulation Component is an optional component in the HIU design.

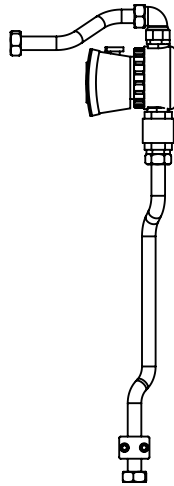


Figure 18. The Re-circulation Component

Table 10. The technical data of the re-circulation pump

Fluid temperature	Drinking water up to 20 °dH: max. +65°C, in short-time duty (2 h) up to +70°C
Mains connection	1~230 V, 50 Hz
Protection class	IP 42
Power	3-5 W
Maximum operating pressure	10 bar

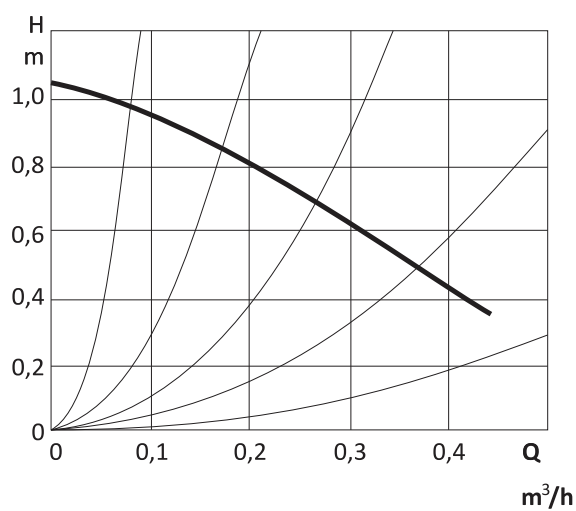


Figure 19. The pump curve of the re-circulation pump

2.10 EPP Cover

The HIU is covered with EPP Covers which are made from high quality 50 g/L density EPP. The drawing of the EPP Cover is given in Figure 20.

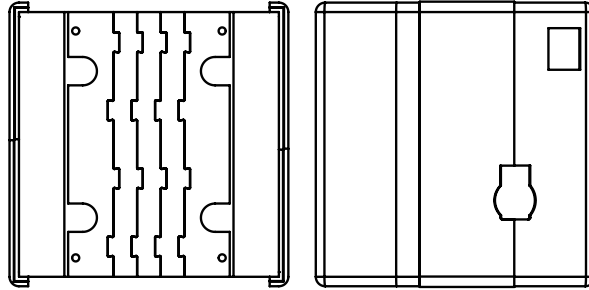


Figure 20. The drawing of the EPP Cover of the HIU-Indirect

2.11 Mounting Plate with Ball Valves and Flushing By-pass

To connect the HIU and the piping system of apartment, Mounting Plates are used. These plates have 8 ball valves and a flushing by-pass. Each secured on a galvanized steel plate, ball valves are connected with G 3/4" Male thread connections. Flushing By-pass enables flushing and venting the system before commissioning the HIU. The drawing and dimensions of the Mounting Plate with Ball Valves and Flushing By-pass are given in Figure 21.

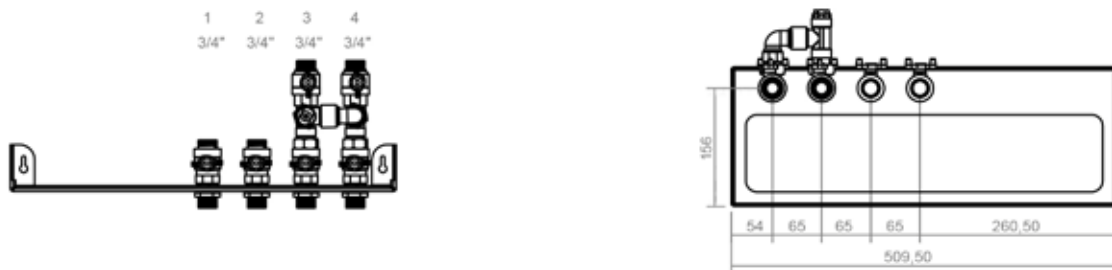


Figure 21. The drawing and dimensions of the Mounting Plate with Ball Valves and Flushing By-pass of HIU-Indirect

3. Heat Exchanger Additional Performance Figures

