

Design and Technical Description of Heat Interface Unit



GENERAL INFORMATION

Dear Customer:

You have selected a high-quality Heat Interface Unit (HIU) for your domestic hot water (DHW) needs. The HIU should be used exclusively for DHW needs. 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.

GENERAL INFORMATION



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.

GENERAL INFORMATION



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

TABLE OF CONTENTS

1. Functional Description	6
2. Design and Technical Description of the HIU and Its Components	7
2.1. Differential Pressure Control Valve	8
2.2. Copper Brazed Heat Exchanger.....	9
2.3. Thermostatic Control Valve.....	11
2.4. Water Hammer	11
2.5 Re-Circulation Component.....	12
2.6. EPP Cover.....	13
2.7. Mounting Plate with Ball Valves and Flushing By-pass	13
3. Heat Exchanger Additional Performance Figures	14

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-DHW (Figure 1).

The HIU-DHW is specifically designed for only instantaneous DHW preparation with thermostatic control. It has all necessary components (e.g. valves, heat exchangers, pipes, fitting and connections) to deliver convenient and efficient DHW. Optional components as Re-circulation Component enables HIU to deliver instantaneous DHW.

The HIU-DHW has 3 types based on the number of plates of its heat exchanger: 30, 40, or 70 plates. To connect the HIU-DHW with the piping system of apartments or houses, Mounting Plates With 6 Ball Valves are used. The Flushing By-pass component enables flushing and venting the system before commissioning. The HIU-DHW is covered with high quality EPP Covers.

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

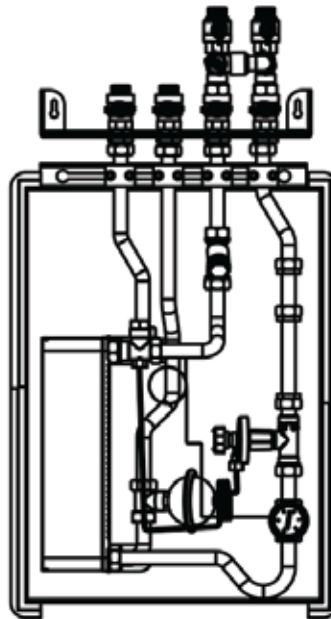


Figure 1. The front view of the HIU-DHW

2. Design and Technical Description of Modules and Its Elements

The HIU-DHW is comprised of 7 main components. The components of the HIU-DHW are secured on a galvanized steel plate. Each has a copper brazed heat exchanger (optionally isolated with EPP), thermostatic control valve, differential pressure control valve, air vent, water hammer, spacers for heat meter. The 18 mm diameter pipes of the HIU-DHW are made from AIS 316L stainless steel and have 9 mm isolation. Figure 2 describes the inlets and outlets of the HIU-DHW. Figure 3 shows the dimensions of the HIU-DHW.

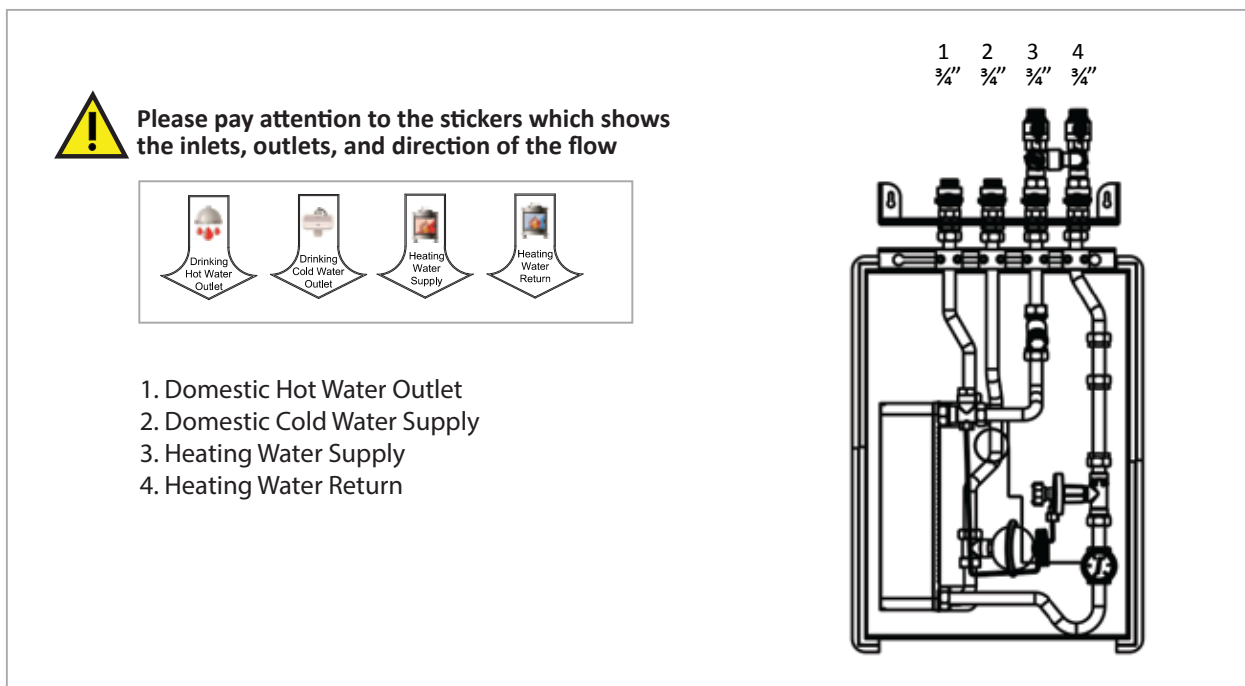


Figure 2. The inlets and outlets of the HIU-DHW



Figure 3. The dimensions of the HIU-DHW

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

Table 1. The types of the HIU-DHW

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-DHW 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-DHW

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	440 x 600 x 196 mm
Connections	G ¾" union nut, flat seal
HEATING CIRCUIT	
Minimum differential pressure	0.6 bar
Maximum differential pressure	2.0 bar
Temperature sensor for heat meter	M10x1
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-DHW 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-DHW, 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.

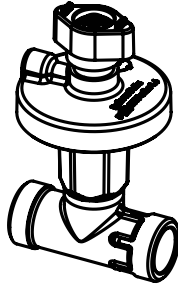


Figure 4. The DN20 20-65 kPa differential pressure control valve

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. Copper Brazed Heat Exchanger

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

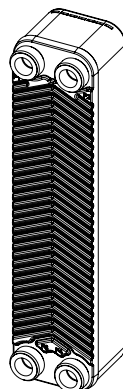


Figure 5. The copper brazed heat exchanger

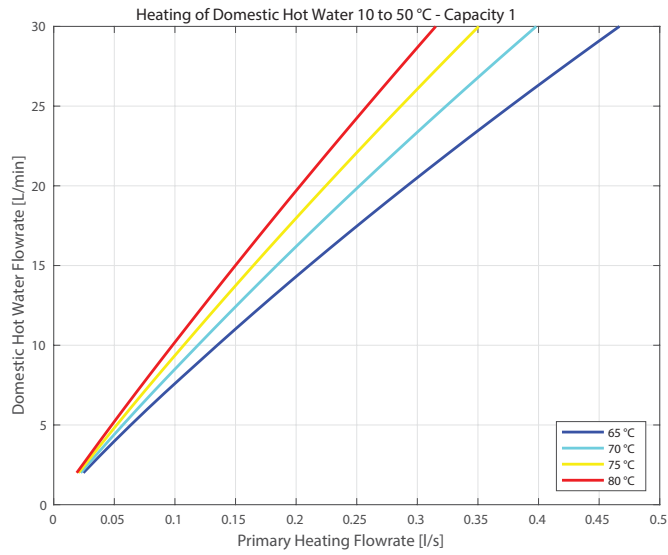


Figure 6. The performance of heat exchanger for Capacity 1

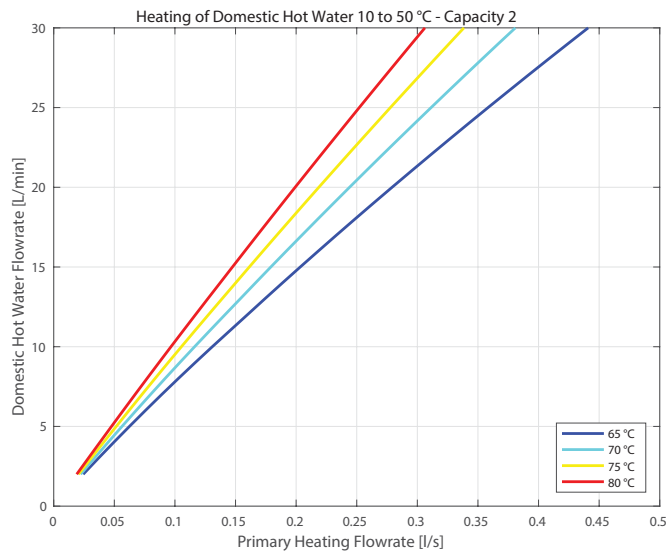


Figure 7. The performance of heat exchanger for Capacity 2

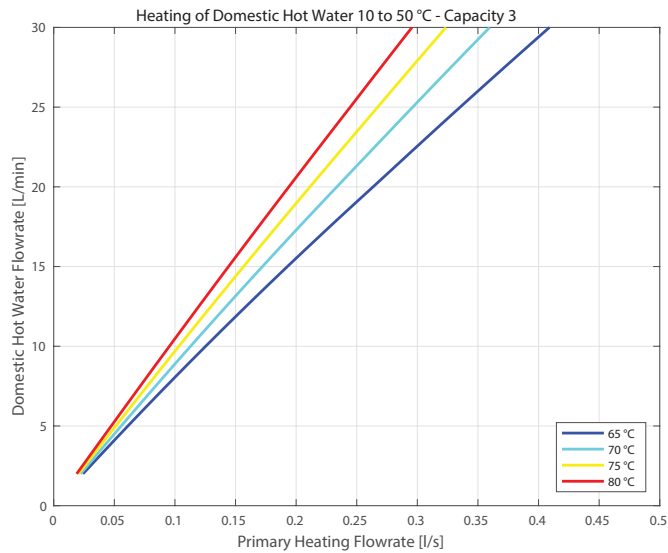


Figure 8. The performance of heat exchanger for Capacity 3

2.3. Thermostatic control valve

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 5.

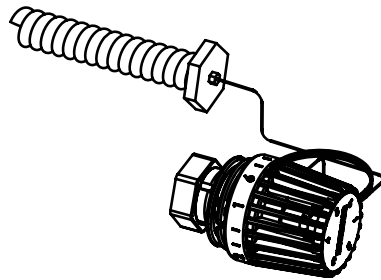


Figure 9. The thermostatic control valve

Table 5. The temperature settings of the thermostatic control valve

Setting	Temperature (°C)
1	25
2	35
3	45
4	55
5	65
6	75

2.4. Water Hammer

Water hammer (Figure 10) 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.

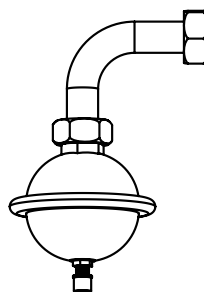


Figure 10. The water hammer

2.5. Re-circulation Component

Re-circulation Component (Figure 11) 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 6. In Figure 12, the pump curve (pump head vs flow rate characteristics) is given.

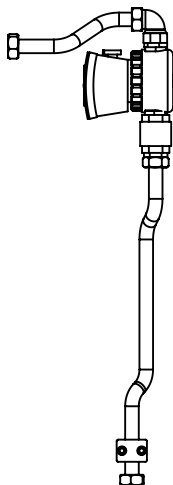


Figure 11. The Re-circulation Component

Table 6. 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

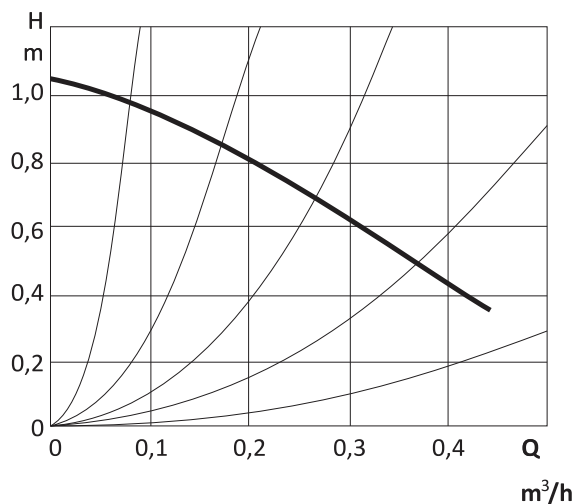


Figure 12. The pump curve of the re-circulation pump

2.6. EPP Cover

The HIU-DHW is covered either with EPP Covers which are made from high quality 50 g/L density EPP. The drawing of the EPP Cover is given in Figure 13.

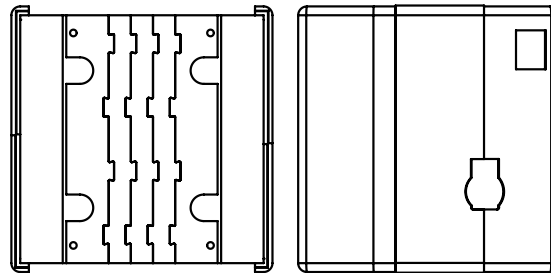


Figure 13. The drawing of the EPP Cover of HIU-DHW

2.7. Mounting Plate with Ball Valves and Flushing By-pass

To connect HIU and the piping system of apartment, Mounting Plates are used. These plates have 6 ball valves and a flushing by-pass. Each secured on a galvanized steel plate, ball valves are connected with G $\frac{3}{4}$ " 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 14.

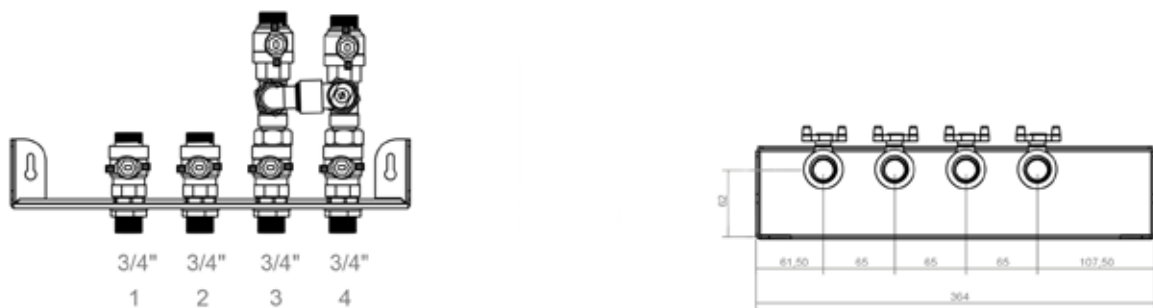
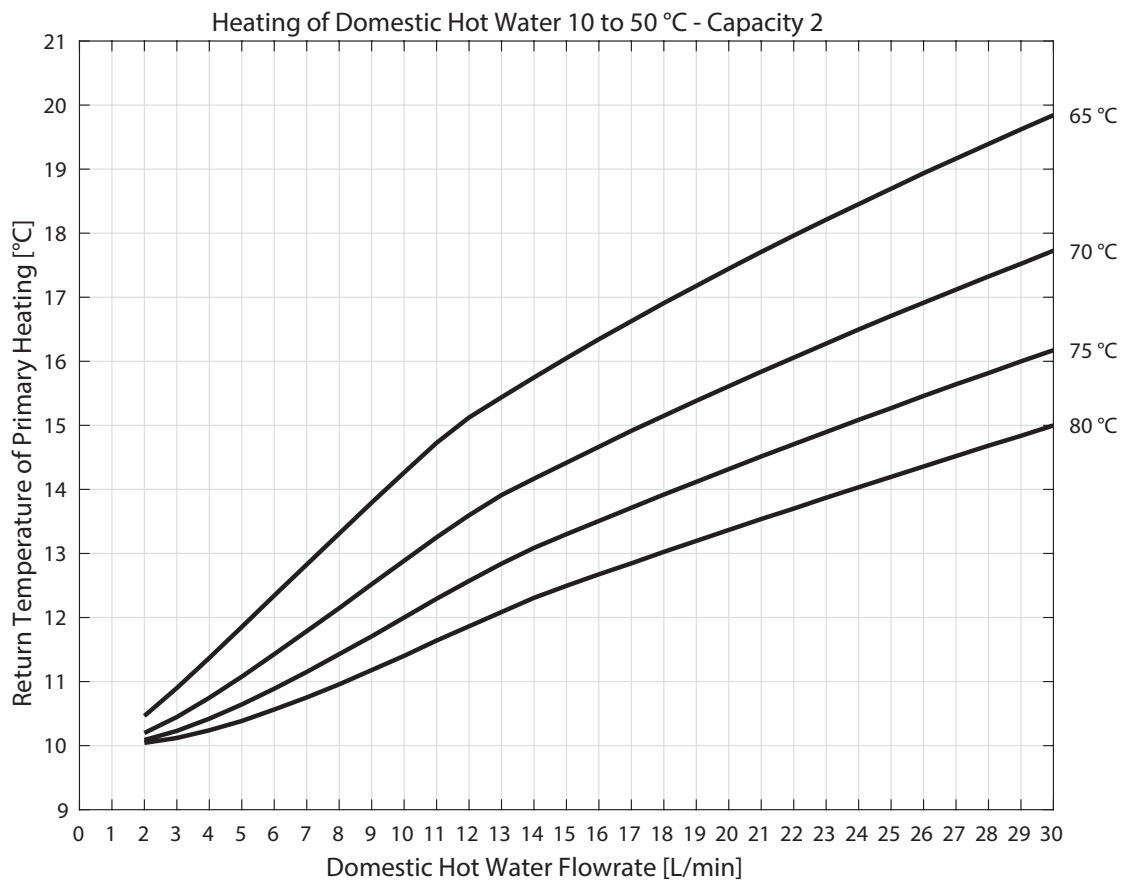
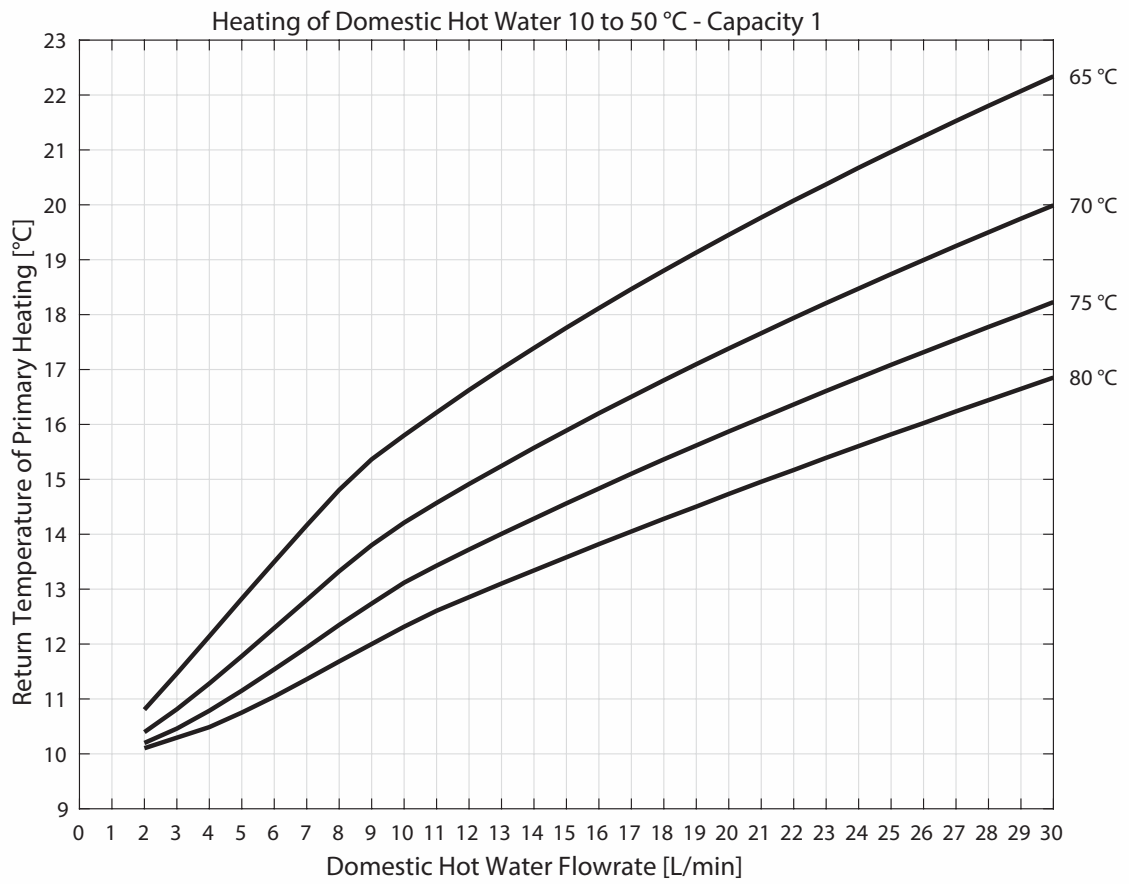
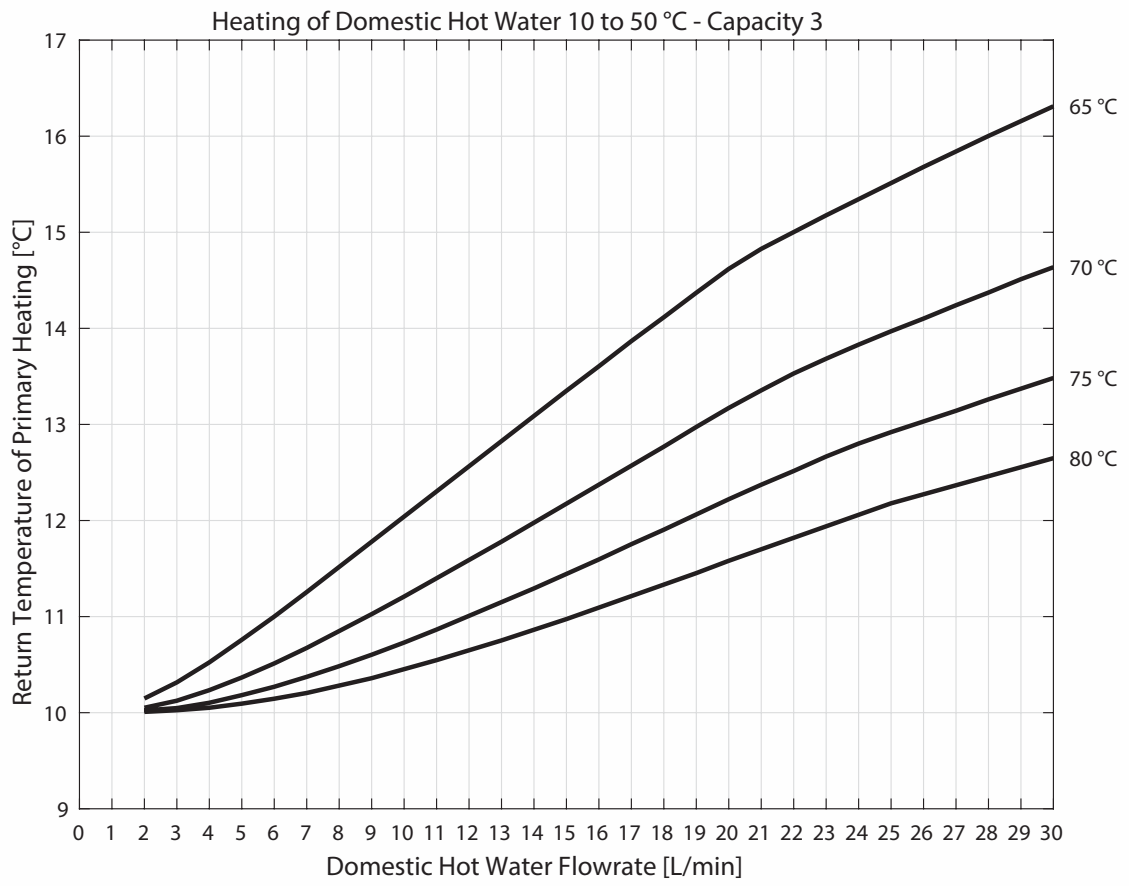
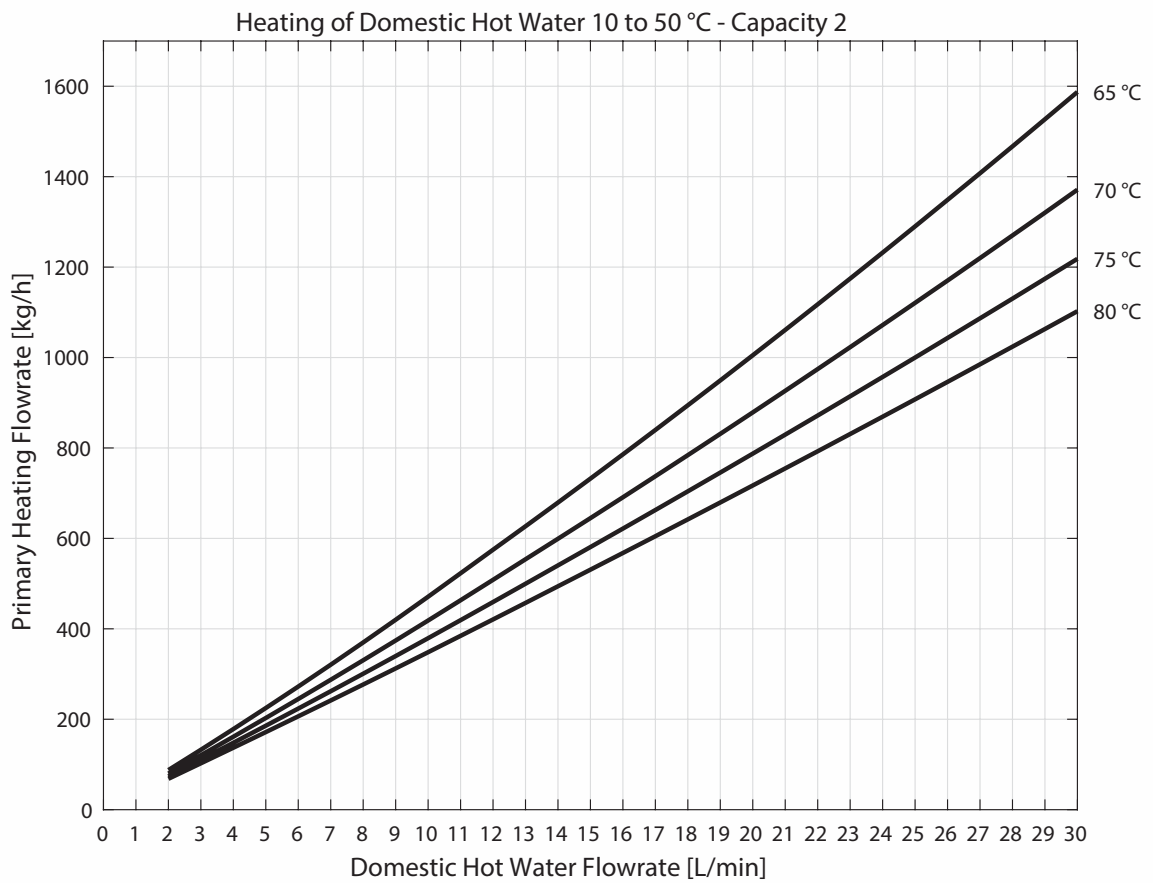
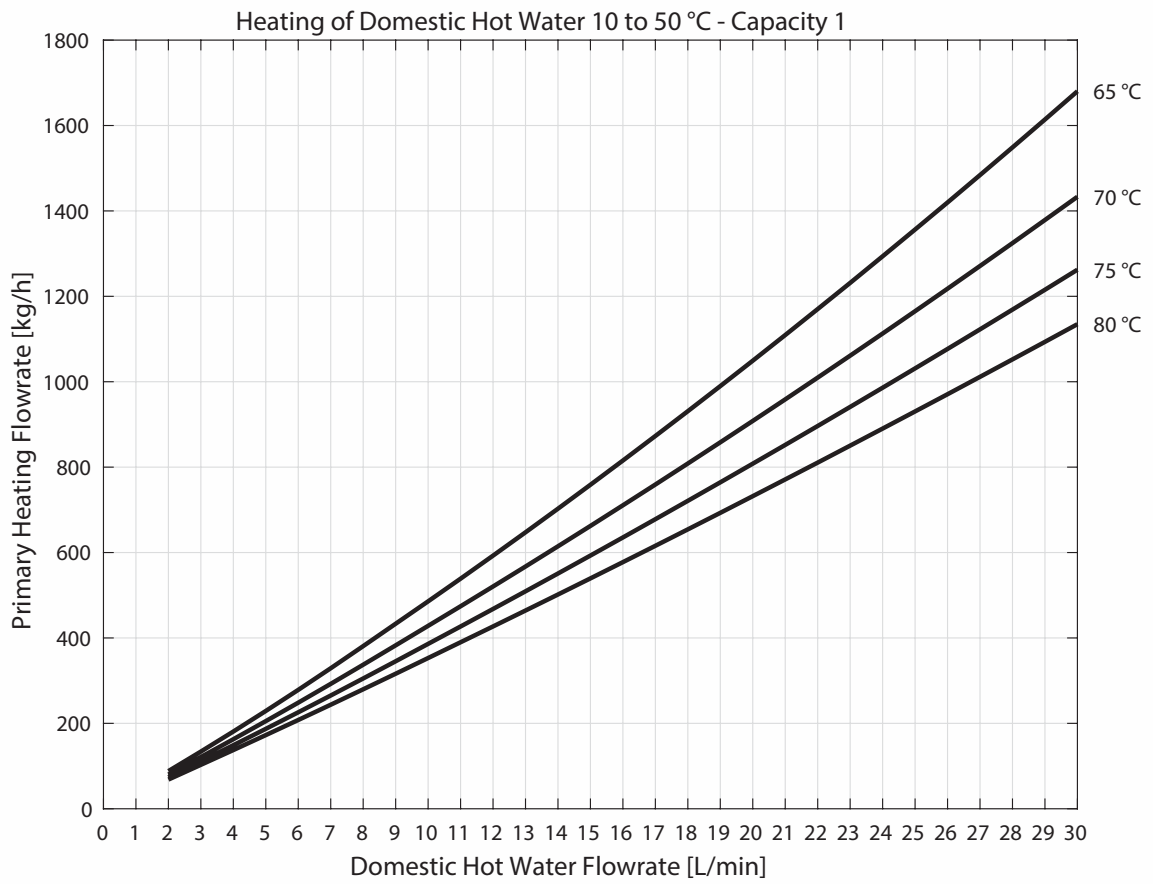
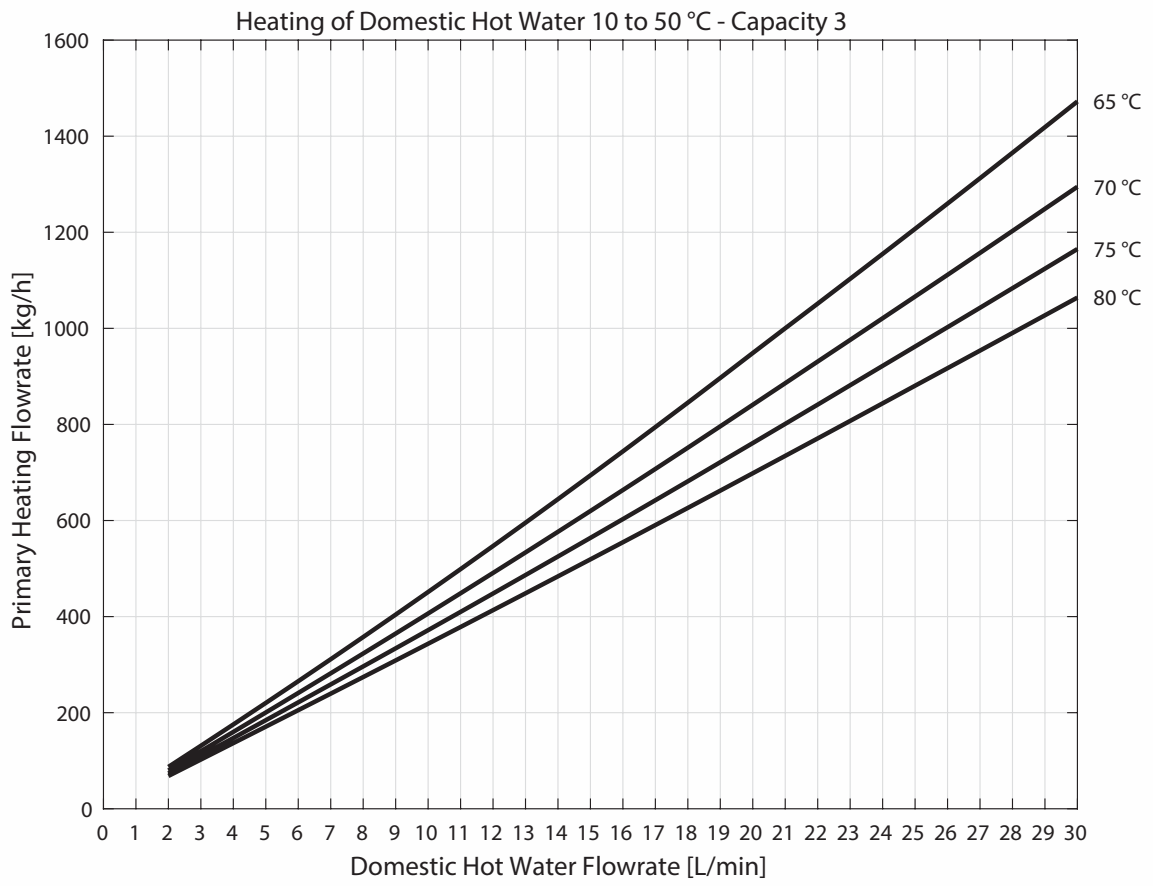


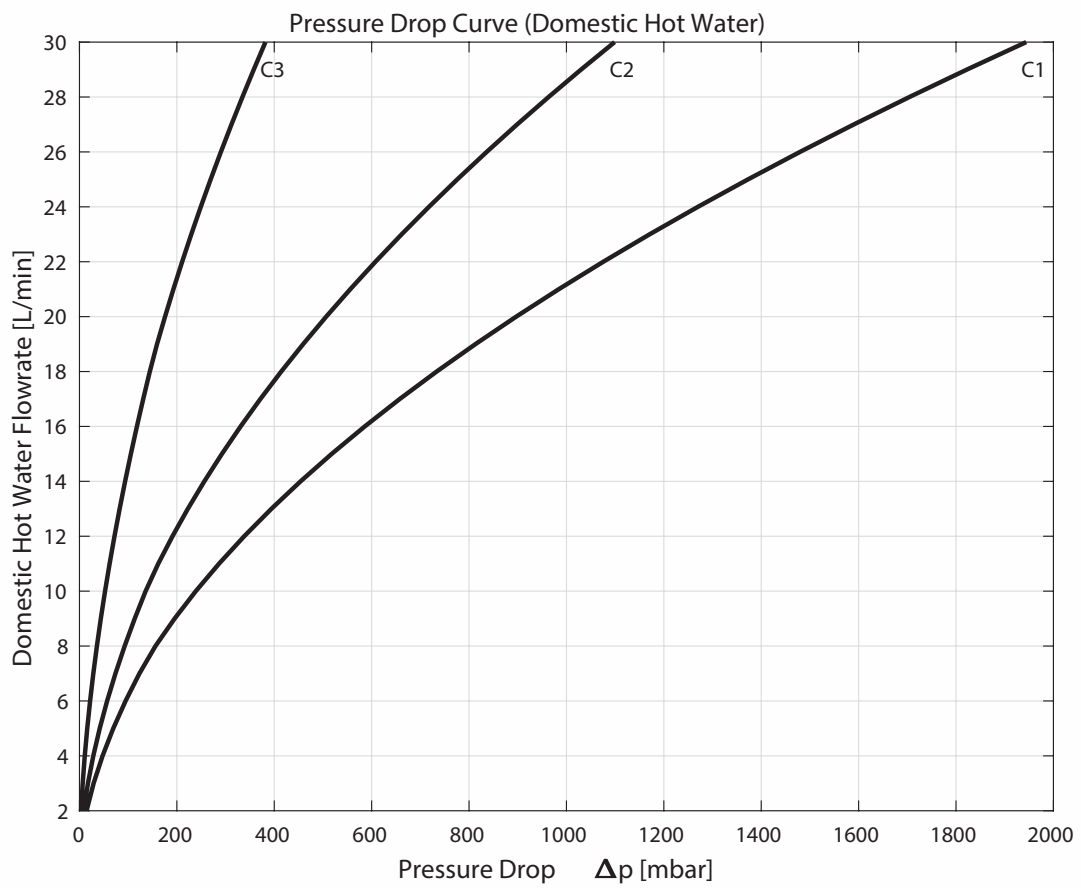
Figure 14. The drawing and dimensions of the Mounting Plate with Ball Valves and Flushing By-pass of HIU-DHW











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