Installation and Operating Instructions

KTS Water Heater M
Figure 915 | 925

KTS Water Heater L
Figure 915 | 925

Figure 915 Copper-soldered stainless steel plate heat exchanger

Figure 925 Stainless steel plate heat exchanger EPDM sealed

Figure 960 ThermoTank PN 6

Figure 965 ThermoTank for integrating heating elements PN 6

Figure 970 ThermoTank PN 10

KEMPER

DRIVING PROGRESS

EN

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About this manual

Original operating instructions

Manufacturer's address
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About this manual
Read this manual carefully before starting installation, commissioning, operation and maintenance and follow the instructions! Always pass on the instructions to the current system operator and retain for future reference. Illustrations in this manual serve to aid basic understanding and may differ from the actual system configuration. This manual is protected by copyright. Copyright lies with the manufacturer.

Target group
This manual is intended for plumbing and electrical specialists who carry out the installation and commissioning of the water heater. It is also intended for the user of the controller software and the operator.

Personnel qualifications
Assembly and installation of the system may only be carried out by plumbing specialists who have been additionally trained in the field of electrical installation. They must be familiar with drinking water hygiene and be able to carry out standard-compliant maintenance work and lay and connect electrical cables. We particularly refer to VDE regulation 0100 and the regulations of the relevant local power utility.

Liability
The manufacturer assumes no warranty or liability in case of:
- failure to follow these instructions
- incorrect installation and/or use
- unauthorised modification of the product
- other improper methods of operation.

Safety information
Be sure to read and follow the safety instructions in this manual. Failure to follow the safety instructions can result in injury or even death and in damage to property.

The safety instructions are identified by symbols and are introduced by signal words that express the extent of the hazard. The following safety instructions are used in this manual:

Danger! Electricity!
Indicates hazards that may result in severe or fatal injury.

Warning!
Indicates hazards that may result in injury, material damage or contamination of drinking water.

Note!
Indicates hazards that can result in damage to the water heater or malfunctions.

Safety Information

Info
Indicates additional information and tips.

Important advice for the operator

General instructions water heater
To be able to complete the correct structure of the KTS system, you must follow the information on setting up and implementing and commissioning, in line with this Installation and Operating Manual. Kemper shall not give any guarantee for damage of any kind caused by non compliance with this technical document before or during commissioning.

Kemper points out that further installation and operating instructions (manuals) must be taken into account for the individual components of the KTS system.

Warning! Risk of cutting from metal parts, wall mount and plate heat exchanger!
Wear gloves during assembly and installation.

Warning! Risk of crushing when suspending the unit! Schedule at least two skilled workers for assembly. Lift the unit only at the sections intended for this purpose.

Warning! There is a risk of scalding with temporary commissioning or emergency operation of the units.

Note! To correctly maintain drinking water quality in planing and during operation of the system, please follow the notes in Chapter 6 (Hygiene).

Warning! There is a risk of scalding when draining the system.

Note! Maintenance and replacement of the quarter-turn stop valves every 4 years.

General instructions buffer tank
Fit the insulation of the heating buffer tank only after reading this Installation and Operating Manual.

Warning! Naked flames or welding work in the vicinity of the insulation are prohibited (risk of fire)!

Note! KEMPER recommends the installation/removal of the insulation be fitted only after the pipes have been installed!

Note! Number of people required for set up: two to three people, depending on the size of the heating buffer tank.

Note! Note the position of the FK-5 rack for height alignment.

Note! The pressure rating of the buffer tank refers to an overpressure.

Note! When draining the system, make sure there is adequate venting.

Note! Water quality in accordance with VDI 2035

Note! Damage to the pump or gravity brake caused by magnetite:
To protect the unit, we recommend the installation of magnetite/sludge separators.
When retrofitting existing systems, and in new systems, fit the magnetite separator in the flow between the heat source and the buffer tank. This protects the KEMPER water heater against existing and new deposits from the mains.
Magnetite separators work only if the regular maintenance and draining intervals are adhered to. Carry out the maintenance according to the applicable standards and guidelines. Otherwise, the magnetic sludge particles can collect on the pump rotor. This severely reduces the pump's efficiency and greatly increases electricity consumption. There may also be long-term damage to the KEMPER ThermoSystem.

Intended use
The water heater may be used only to heat drinking water or non-potable water under the application limits specified below. It is intended for use in commercial or private facilities (e.g. hospital schools, nurseries, kindergartens, private small systems, department stores, holiday homes, hotels etc.). Any other use is considered contrary to the intended use and is therefore forbidden. Only use water or a water-glycol mixture with max. 35% glycol content as coolant. Use the water heater only in enclosed spaces in buildings with ambient air and without aggressive gases and liquids.

Use the system:
- in perfect condition
- as intended.

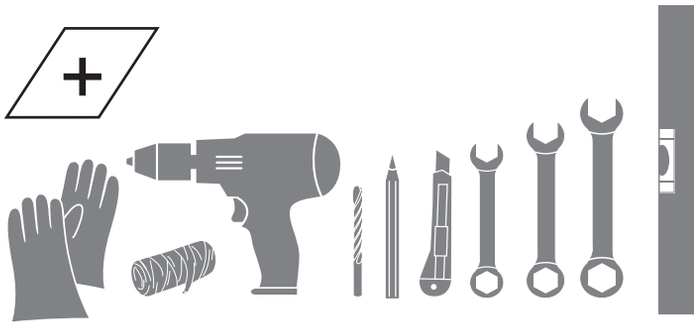
Misuse
The water heaters must not be supplied by a thrust pump in the primary circuit without correct hydraulic separation. The units have internal pumps and must be able to autonomously draw the volumetric flow required to heat the drinking water from a non-pressurised area.

Disposal
Local regulations on waste recycling and disposal must be followed. The product must not be disposed of with household waste but must be disposed of properly.

EN

Applicable Standards

DIN 1988-100
DIN 1988-200
UBA BWGL Metalle + DVGW W 551-8
DIN EN 806
DIN EN 1717
DIN EN 12831-3
DIN 4708
VDI 6003



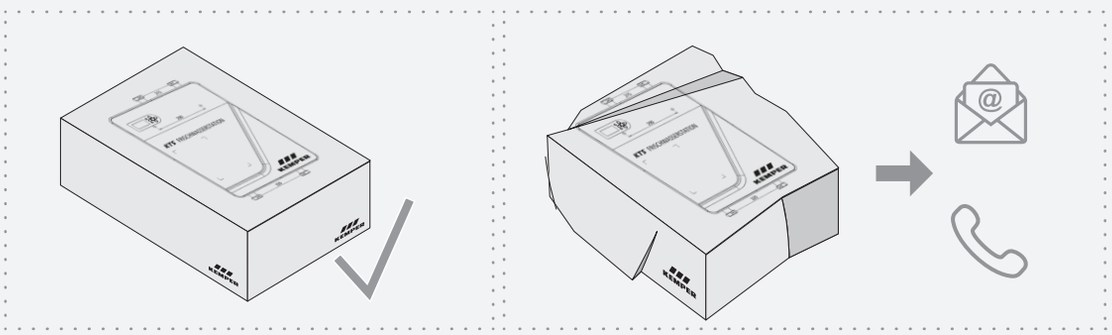
Info!
The components of the KTS unit that come into contact with drinking water meet the drinking water hygiene requirements under Article 14/ 15 / 16 of the German Drinking Water Ordinance 2023 for components in contact with drinking water.
The metals, plastics and elastomers used meet the requirements of the current German Federal Environment Agency (UBA) principles of assessment for metals, plastics and elastomers.

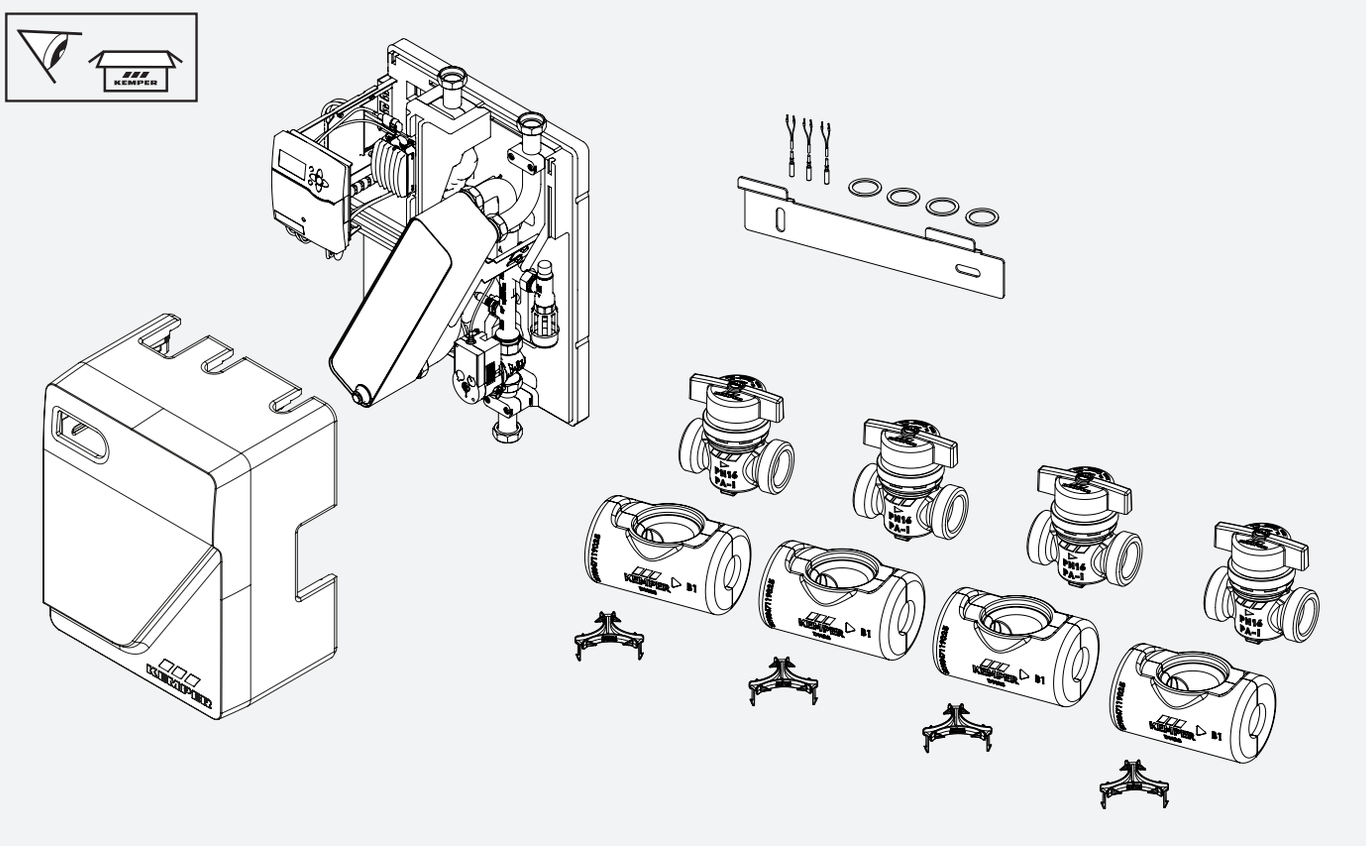
Abbreviations Index

HZ-VL	Heating flow
HZ-RL	Heating return
TW-Eintritt	Cold water inlet temperature
PWC	Potable water cold / Cold water
PWH	Potable water hot / Hot water
PWH-C	Potable water hot - circulation / hot water return
TWW outlet	hot water outlet temperature
TW inlet	Cold water inlet temperature
External PWC	Additional sensor cold-water supply pipe
External circ.	Additional sensor circulation inlet temperature
TWE	Water heater
Water heater	Module for heating water
Plate Heat	Plate heat exchanger
Pt1000	Temperature sensor
KBus Kaskade	Bus connection between the cascade units
WVU	Water supply company
EVU	Energy supply company
a.a.R.d.T.	generally accepted codes of practice
Expansion vessel	Membrane expansion vessel
BMS	Building management system

1 About the KTS Water Heater

1.1 Water Heater Scope of Delivery and Accessories





Scope of delivery
Includes:

- Pt1000 temperature sensor with 7m cable length for assembly to the buffer tank
  ⇨ Cascade unit 1 and single units have two temperature sensors Pt1000 (TF04 and TF05)
- Mounting rail for wall installation
- 4 x EPDM gasket DN 32
- Fastening adhesive tape for attaching the temperature sensor to the ThermoTank
- 4 x KHS quarter turn stop valve DN 32, Figure 386 0G
- 4 x insulation shell for KHS quarter turn stop valve
- Pt1000 to detect the return temperature on heating side of the heater

Accessories

Designation	Part No.
BACnet gateway for Water Heater	9160202200
Temperature sensor set for Water Heater	9160202100
KHS Flush Point 230 V, Figure 684 04	6840401500
Sampling valve made of gunmetal, Figure 187 00	1870000600

Application Limit KTS Water Heater

Align the application limits of the KTS Water Heater with the current drinking water analysis of your regional water supplier. Use of the KTS outside the permitted limits is not permitted and results in a loss of entitlement to the manufacturer's guarantee.

The plate heat exchanger are made of stamped stainless steel plates with the material number: 1,4404 or SA240 316L.
The fittings used are made of gunmetal, stainless steel, grey cast iron or brass.
The difference between the water heaters at Figure 915 and Figure 925 is in the materials used to seal the plate heat exchanger.

Plate heat exchanger Figure 915 | 925 is made of the same basic material (stainless steel 1.4404).
Connection system:
- Copper solder for Figure 915
- Stainless steel for Figure 925

Materials
Drinking water side:
- Gunmetal and stainless steel

Heating side:
- Stainless steel, brass and cast iron

Note! Non-compliance with the limits for water quality results in the loss of the guarantee.

Adhere to the following drinking water parameter when using the plate heat exchanger for Figure 915 | 925:

Application limits plate heat exchanger			
Parameter designation	**Unit**	**Water heater Figure 915, copper-soldered**	**Water heater Figure 925, stainless steel**
ph-value	-	7 - 9	6 - 10
Saturation index SI (delta pH-value)	-	-0,2 < 0 < +0,2	-
Total hardness	[°dH]	6 - 15	
Conductivity	[µS/cm]	10 - 500	-
Filterable substances	[mg/l]	< 30	
Chloride	[mg/l]	See diagram on the next page	
Free chlorine	[mg/l]	< 0,5	
Hydrogen sulphide (H_2S)	[mg/l]	< 0,05	-
Ammonia (NH_3 / NH_4^+)	[mg/l]	< 2	-
Sulphate	[mg/l]	< 100	< 400
Hydrogen carbonate	[mg/l]	< 300	-
Hydrogen carbonate sulphate	[mg/l]	> 1	-
Sulphide	[mg/l]	< 1	< 7
Nitrate	[mg/l]	< 100	-
Nitrite	[mg/l]	< 0,1	-
Iron, dissolved	[mg/l]	< 0,2	-
Manganese	[mg/l]	< 0,1	-
Free aggressive carbon dioxide	[mg/l]	< 20	-

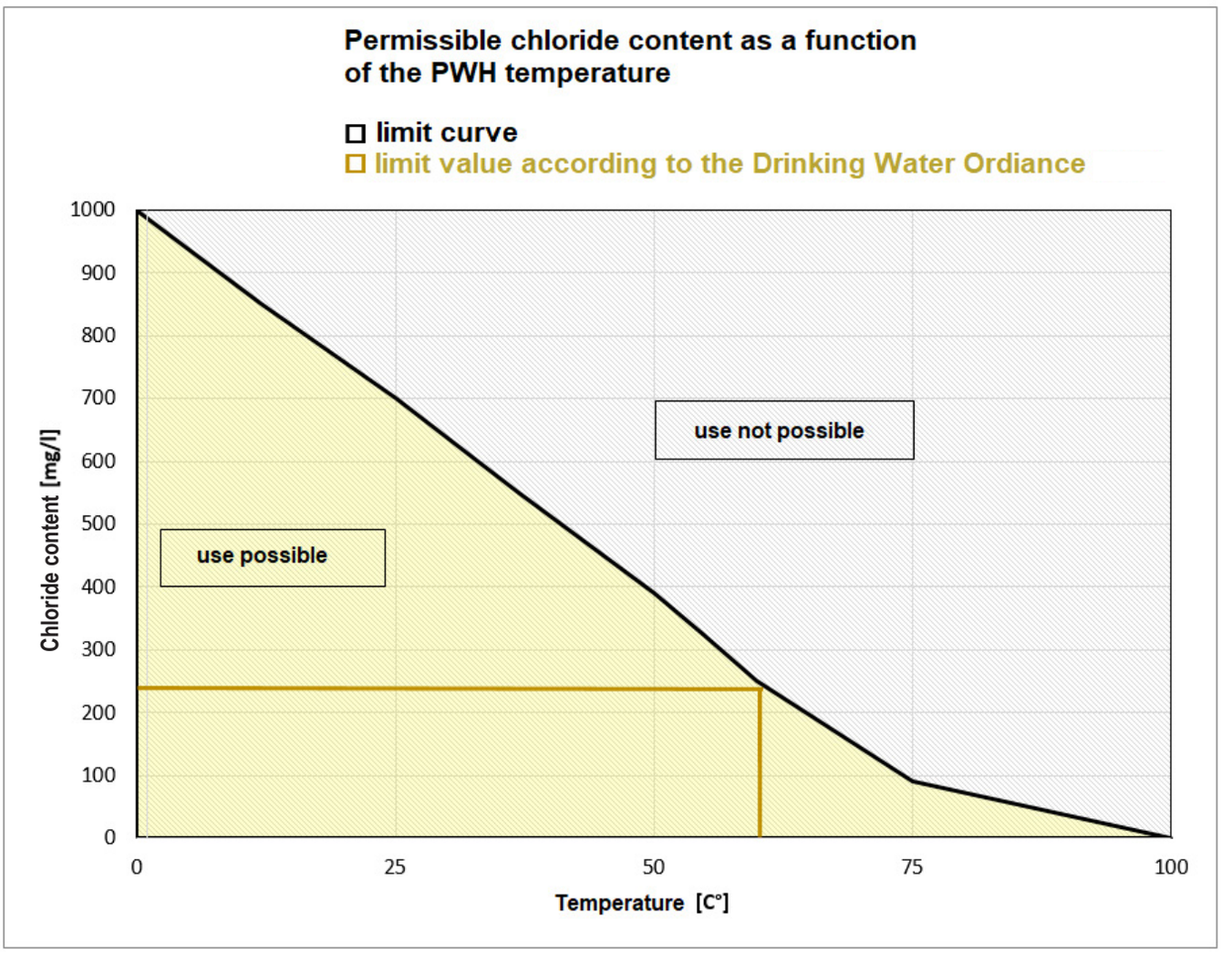
Legend: (-) no specification
Note: When using a water treatment system, bear in mind the limits for drinking water according to the currently valid Drinking Water Directive; for heating, comply with VDI 2035!

Total hardness:
If the total hardness if outside the stated range (<6 °dH or >15 °dH), we recommend water treatment according to DIN 1988-200 table 6.

Note! KEMPER points out that the drinking water parameters from the Table 'Application limits plate heat exchanger' must be maintained for operation of the KTS Water Heater.

Note! In the case of deviations from the application limits in the above-mentioned table, contact the manufacturer.

Application Limit KTS Water Heater

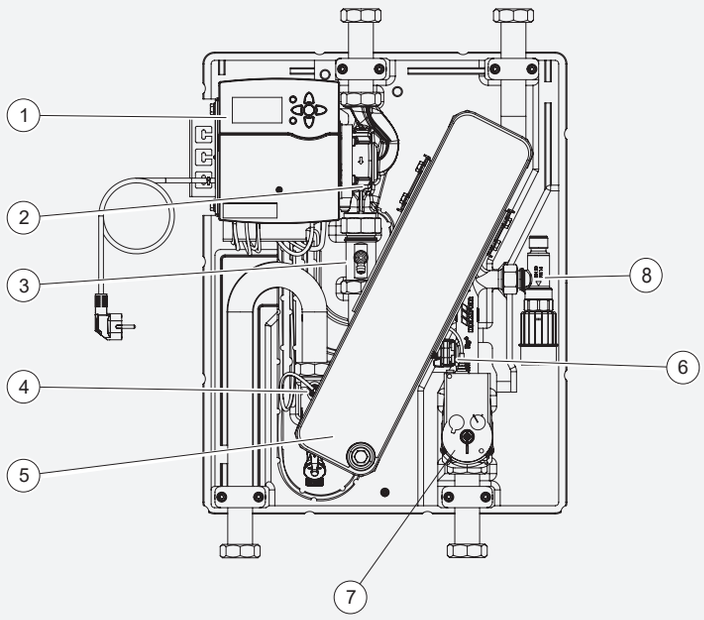


Permitted chloride content depending on the temperature for the material 1.4404 / SA240 316L of the plate heat exchanger.

Warning! Before conducting any disinfection in the drinking water system, contact the manufacturer KEMPER. The plate heat exchanger application limits for the disinfectant concerned can be found out from the manufacturer.

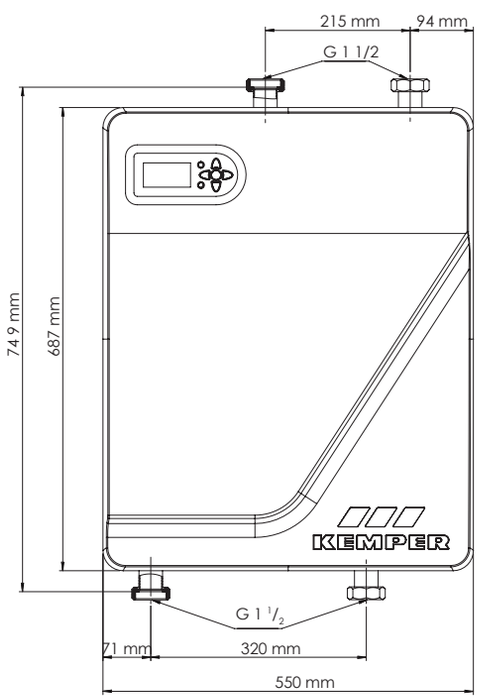
For damage subsequently detected after disinfection measures carried out on the KTS water heater, KEMPER will not accept any warranty.

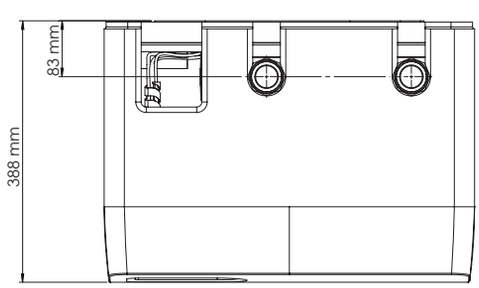
1.1.2 Structure and Components Water Heater



1	Control unit
2	Primary pump
3	Gravity brake
4	PWH temperature sensor
5	Plate heat exchanger
6	Volume flow sensor
7	Quarter turn stop valve with actuator **(only for cascade units)**
8	Pressure relief valve

1.1.3 Technical Data Water Heater





PWH temperature setting range	50 °C to 70 °C
Adjustment range thermal disinfection	70 °C to 90 °C
max. operating temperature primary side	95 °C
max. operating temperature secondary side	80 °C
Max. working pressure	1 Mpa

given abstraction rates at PWH = 60°C with PWC = 10°C and water temperature in buffer tank = 80°C

Water content per water heater	
Drinking water side	Heating side
2.48 l	2.23 l
3.53 l	3.28 l

Technical Data Water Heater

Part No.	Type	Cascade name	min. abstraction rate [l/min]	max. abstraction rate [l/min]	Capacity [kW]	Electrical power input [W]	Flow coefficient value primary circuit	Flow coefficient value secondary circuit	[kg]
9152010100	M Cu soldered	single unit	1,6	75	262	145	7,1	7	31,12
9152000200	M Cu soldered	2-stage cascade	1,6	150	524	290	14,2	13,6	65,14
9152000300	M Cu soldered	3-stage cascade	1,6	225	786	435	21,3	20,4	97,71
9152000400	M Cu soldered	4-stage cascade	1,6	300	1048	580	28,4	27,2	130,28
9152000500	M Cu soldered	5-stage cascade	1,6	375	1310	725	35,5	34	162,85
9153010100	L Cu soldered	single unit	1,6	120	418	194	10,2	9,4	37,55
9153000200	L Cu soldered	2-stage cascade	1,6	240	836	388	20,4	18	78,00
9153000300	L Cu soldered	3-stage cascade	1,6	360	1254	582	30,6	27	117,00
9153000400	L Cu soldered	4-stage cascade	1,6	480	1672	776	40,8	36	156,00
9153000500	L Cu soldered	5-stage cascade	1,6	600	2090	970	51	45	195,00
9252010100	M stainless steel	single unit	1,6	75	262	145	7,1	7	32,73
9252000200	M stainless steel	2-stage cascade	1,6	150	524	290	14,2	13,6	68,36
9252000300	M stainless steel	3-stage cascade	1,6	225	786	435	21,3	20,4	102,54
9252000400	M stainless steel	4-stage cascade	1,6	300	1048	580	28,4	27,2	136,72
9252000500	M stainless steel	5-stage cascade	1,6	375	1310	725	35,5	34	170,90
9253010100	L stainless steel	single unit	1,6	120	418	194	10,2	9,4	38,73
9253000200	L stainless steel	2-stage cascade	1,6	240	836	388	20,4	18	80,36
9253000300	L stainless steel	3-stage cascade	1,6	360	1254	582	30,6	27	120,54
9253000400	L stainless steel	4-stage cascade	1,6	480	1672	776	40,8	36	160,72
9253000500	L stainless steel	5-stage cascade	1,6	600	2090	970	51	45	200,90

1.2 Buffer Tank Scope of Delivery and Accessories

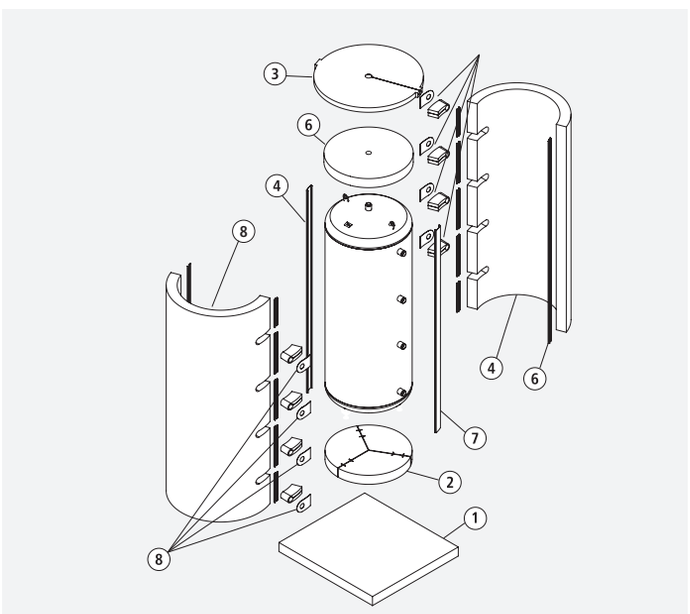
Scope of delivery
Includes:

- KTS ThermoTank with integrated baffle plates
- KTS ThermoTank insulation, building material class B1
- Tightening strap for four-part insulation (Fig. 960 0 2000)

Accessories

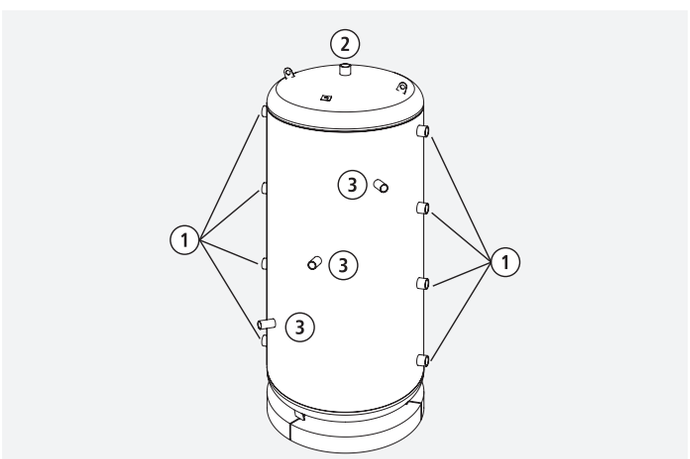
Designation	Part No.
Connection set PLUS for ThermoTank, when using a 2-way valve, Figure 955 05	
T500 S	9550501000
T850 S | T1000 S	9550502000
T1500 S | T2000 S	9550503000
Connection set PLUS for ThermoTank, when using without 2-way valve, Figure 955 06	
T500 S	9550601000
T850 S | T1000 S	9550602000
T1500 S | T2000 S	9550603000
KTS 3-directional reversing valve for water heaters, DN 32 to DN 50, Figure 916 020	
FPT 1 1/4" DN 32	9160203200
FPT 1 1/2" DN 40	9160204000
FPT 2" DN 50	9160205000
KTS 3-directional reversing value for water heaters, DN 65 | DN 80, Figure 916 020	
with flange connection DN 65	9160206500
with flange connection DN 80	9160208000

1.2.1 Structure and Components



1	Base plate
2	Bottom insulation
3	Top insulation
4	Insulation shell
5	Front cover rail
6	Hook rail
7	Cover for hook rail
8	Adhesive rosettes in poly bag
	Packaging cardboard for insulation

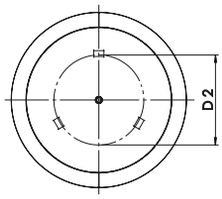
Note! The insulation of the 2,000 l ThermoTank (T2000) is made of four parts. Use the supplied tightening strap!

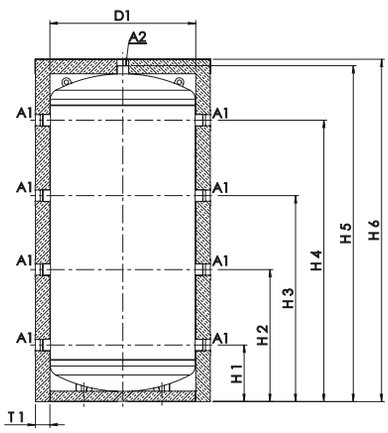


1	Water heater connection return and heat source connections
2	Water heater flow connection
3	Connections for electric heating elements (only for Figure 965)

Connections of the buffer tank 960 | 965 | 970

Technical Data Buffer Tank



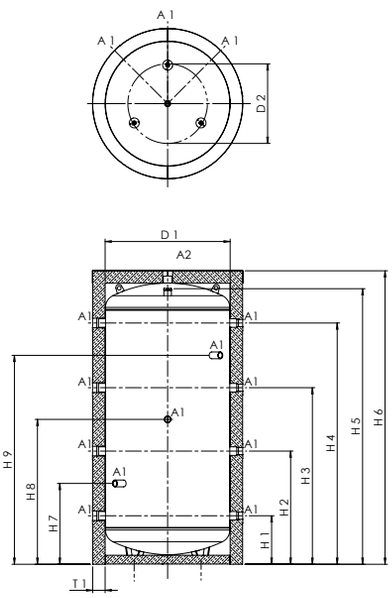


ThermoTank PN 6 Figure 960 **ThermoTank PN 10** Figure 970	**Unit**	**T500 S**	**T850 S**	**T1000 S**	**T1001 S**	**T1500 S**	**T2000 S**
Volume	[l]	500	850	1000	1000	1500	2000
Diameter D1	[mm]	650	750	790	850	1000	1100
Diameter base ring D2	[mm]	550	650	700	750	900	1000
Height H1	[mm]	277	298	301	308	351	368
Height H2	[mm]	627	818	821	743	871	888
Height H3	[mm]	977	1328	1331	1173	1381	1398
Height H4	[mm]	1327	1848	1851	1608	1901	1918
Total height H5	[mm]	1618	2163	2164	1949	2274	2296
Height H6	[mm]	1670	2215	2215	2000	2340	2360
Tilted size	[mm]	1700	2250	2250	2050	2400	2450
Connection size A1		Rp 1 1/2	Rp 1 1/2	Rp 1 1/2	Rp 1 1/2	Rp 2	Rp 2
Connection size A2		Rp 1 1/4	Rp 1 1/2	Rp 1 1/2	Rp 1 1/2	Rp 2	Rp 2
Insulation layer thickness T1	[mm]	100	100	100	100	120	125
Weight* Figure 960	[kg]	144	222	214	222	337	427
Weight* Figure 970	[kg]	133	210	216	224	361	426

*including insolation

ThermoTank dimensions

Technical Data Buffer Tank with Additional Sleeves for Incorporating up to Three Heat Rods



ThermoTank PN 6 Figure 965	**Unit**	**T500 S**	**T1000 S**
Volume	[l]	500	1000
Diameter D1	[mm]	650	790
Diameter base ring	[mm]	550	700
Height H1	[mm]	277	301
Height H2	[mm]	627	821
Height H3	[mm]	977	1331
Height H4	[mm]	1327	1851
Height H5	[mm]	1618	2168
Height H6	[mm]	1670	2220
Height H7	[mm]	452	561
Height H8	[mm]	802	1076
Height H9	[mm]	1152	1591
Tilted size	[mm]	1700	2250
Connection size A1		Rp 1 1/2	Rp 1 1/2
Connection size A2		Rp 1 1/4	Rp 1 1/2
Insulation layer thickness T1	[mm]	100	100
Weight*	[kg]	144	214

*inclusive Insolation

ThermoTank dimension with additional sleeves

1.2.4 Technical Data Buffer Tank Insulation T500 S

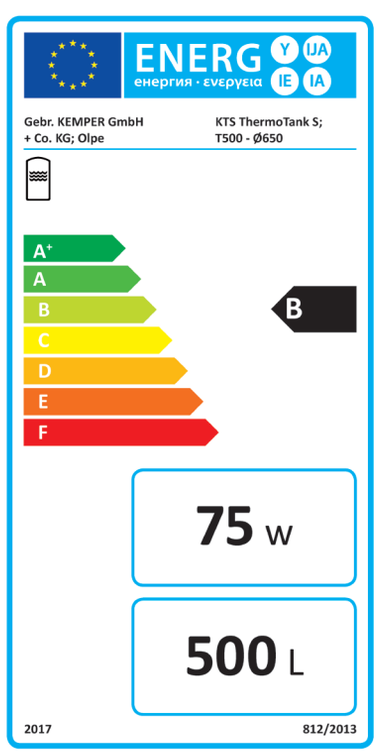
Designation	Detail | Unit
Material	Polyester fabric fleece
Density	18.5 kg/m³
λ value	0.0316 W/mK
Building material class	Fleece B1 Surface B2
Surface	Polystyrene
Colour	Anthracite

1.2.5 Ecodesign Directive 2009/125/EC

According to EU Regulation 814/2013 the KEMPER ThermoSystem KTS must have a product data sheet, which reflects the standstill heat losses of the ThermoTank (tanks between 500 l and 2000 l).

Supplier's name	Gebr. Kemper GmbH + Co. KG					
Supplier's model identification	T500 S	T850 S	T1000 S	T1001 S	T1500 S	T2000 S
Model energy efficiency class	B	C	C	C	C	C
Heat losses in Watt [W]	75	101	110	118	143	160
Tank volume in litres [l]	500	850	1000	1000	1500	2000

According to EU Regulation 812/2013 the KEMPER ThermoSystem KTS must have a product label, which reflects the standstill heat losses of the ThermoTank (tanks between 500 l and 2000 l).



ErP label

2 Assembly

2.1 Work Preparation

Choose the installation location of the KTS system so that the heating buffer tank is in the immediate vicinity of the water heaters to be installed or that it is set up according to the spacing calculated in the implementation planning. Specify the transportation routes for installing and dismantling KTS components in advance and keep them clear during operation.

Info!
Check the components supplied in line with the scope of delivery.

Info!
Adhere to the distance from other trades.

Note! The KTS system must be easily accessible at all times for subsequent maintenance and repair work.

2.2 Installation Location and Taking Account of Interference Dimensions

Choose the installation location at a central location as far as possible so that the hot water lines are distributed evenly throughout the building. In this way, hot-water and circulation pipes can be shortened.
Also, choose a distance from the heating buffer tank to the heat generator/heat transfer station that is as short as possible. If this is not possible, check using an overflow valve in combination with a 2-way valve in front of the heating buffer tank. This can prevent excessively long pipes loading the heating buffer tank with cooled heating water for a short time.

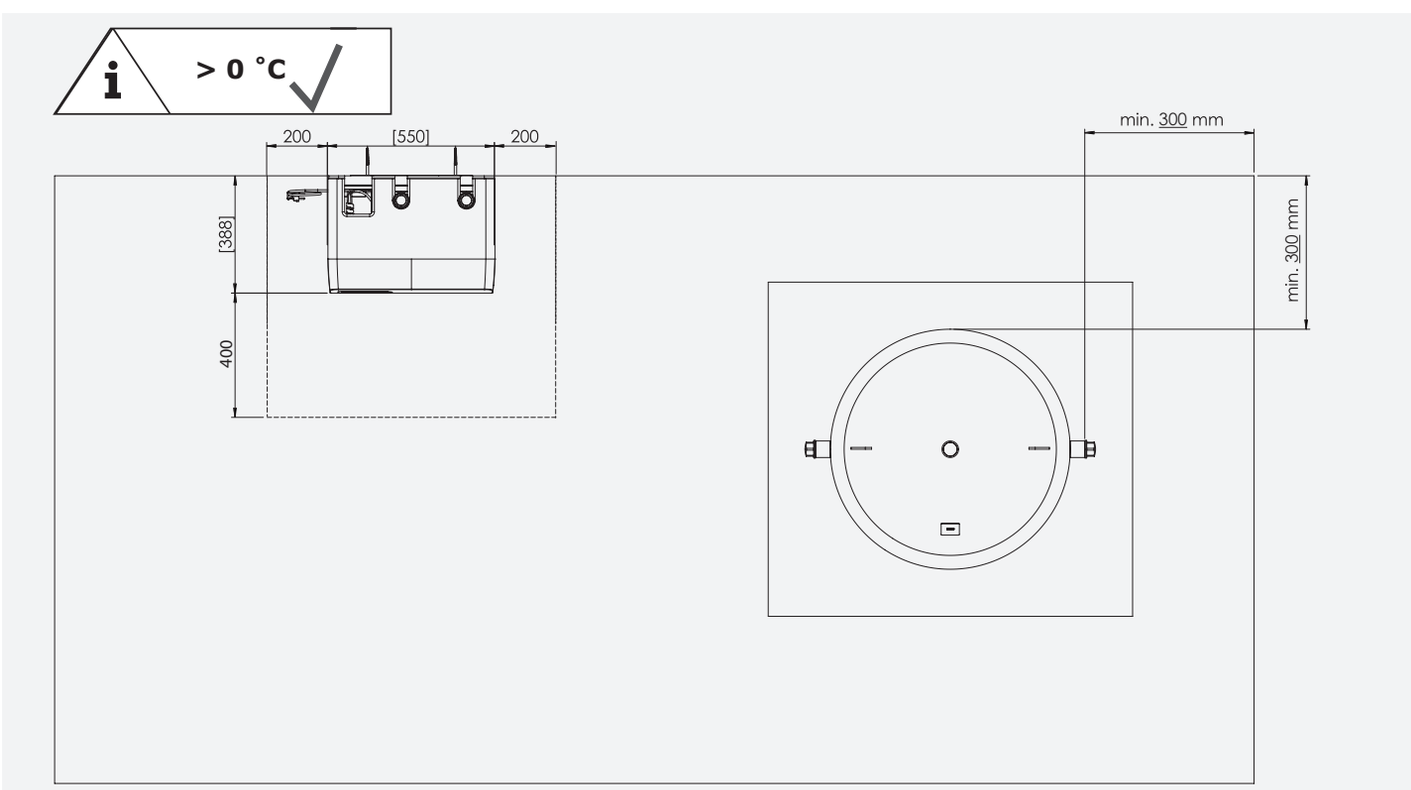
Info! Pay attention to the dimensions of the door openings and the tilted dimension at the installation location to position the buffer tank at the desired installation location.

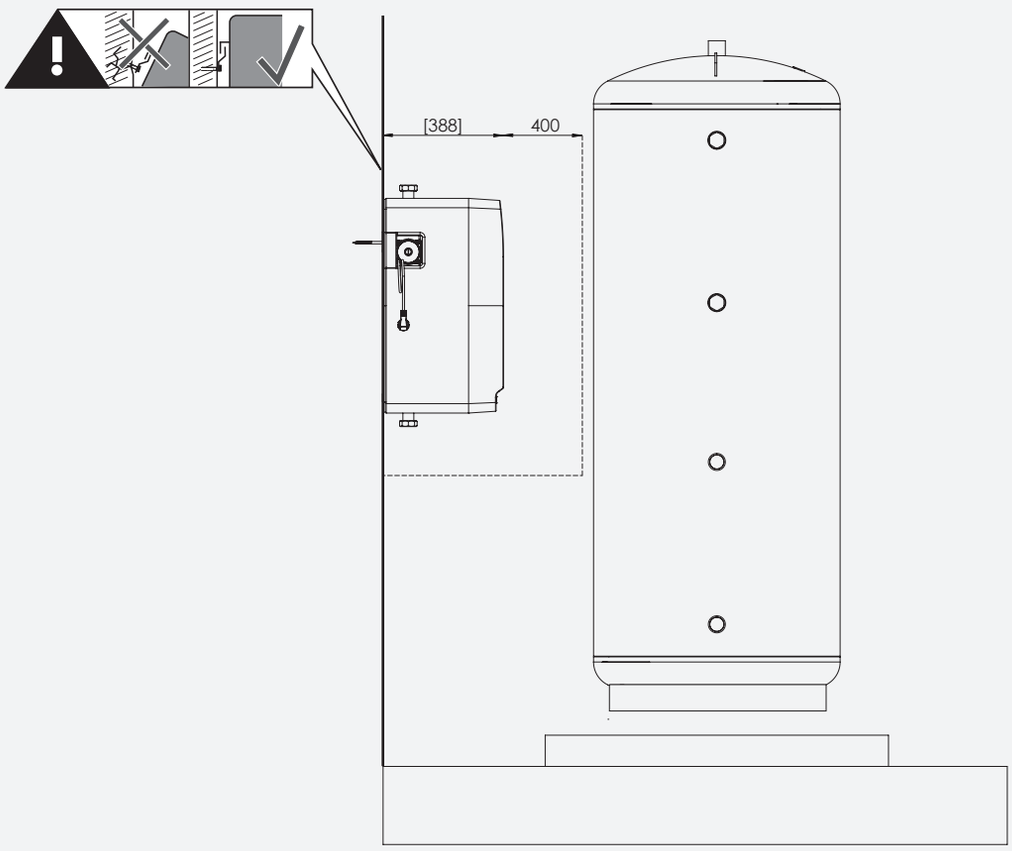
Info! For profile assembly, use the adjustable foot in the unit to level the water heater in a vertical position.

Note! Bear in mind the permitted floor load capacity at the buffer tank installation location.

Note! To achieve the best possible power delivery of the water heaters, keep the distance between the buffer tank and water heater as small as possible.

Note! As a guide, the distance between the heating buffer tank and water heater should not exceed a single pipe length of 20m.
If this is the case, please note Chapter 2.11 Primary-Side Connection between the Water Heater and the Hydraulic Separators.

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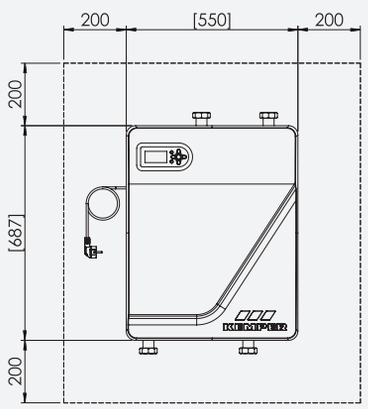
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[687]
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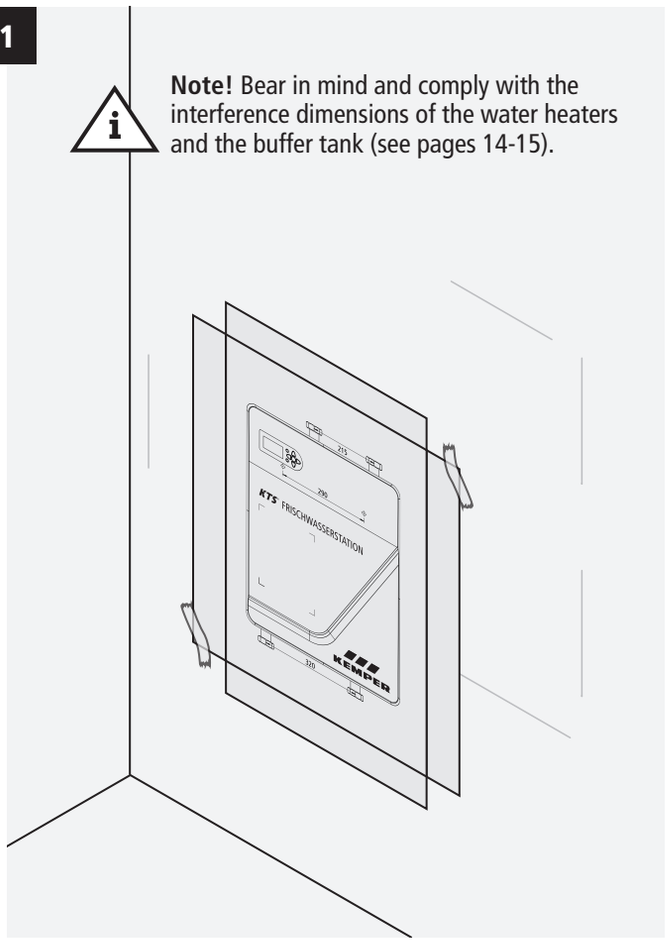
2.3 Installing the Water Heater on a Wall

1

Note! Bear in mind and comply with the interference dimensions of the water heaters and the buffer tank (see pages 14-15).



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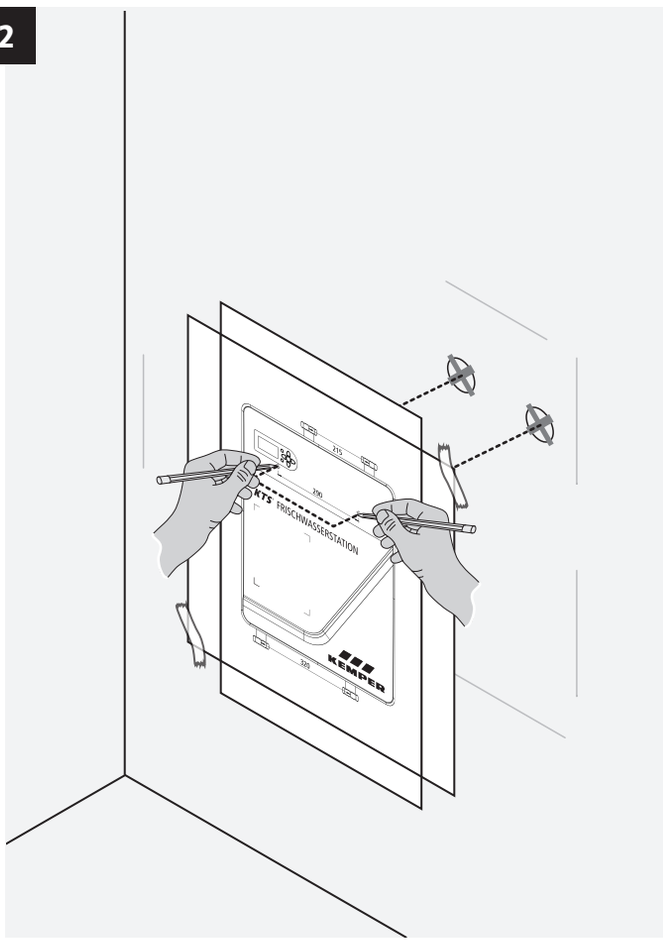

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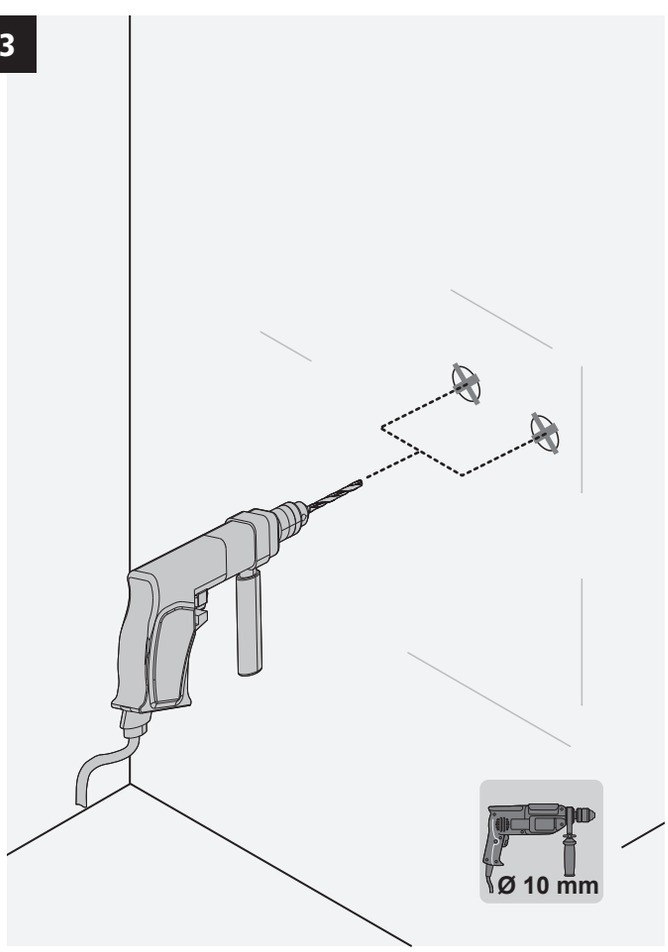
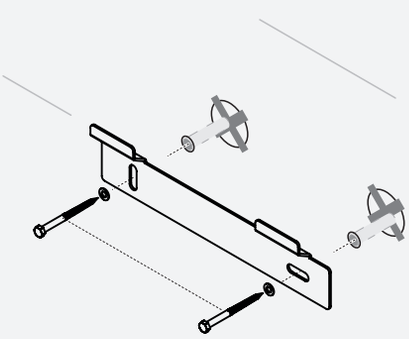


4

Note! Attach the suspension loads of the water heater only to the wall constructions, masonry and upright profiles.
Fixing profiles from other trades may not be used. Involve a structural engineer.



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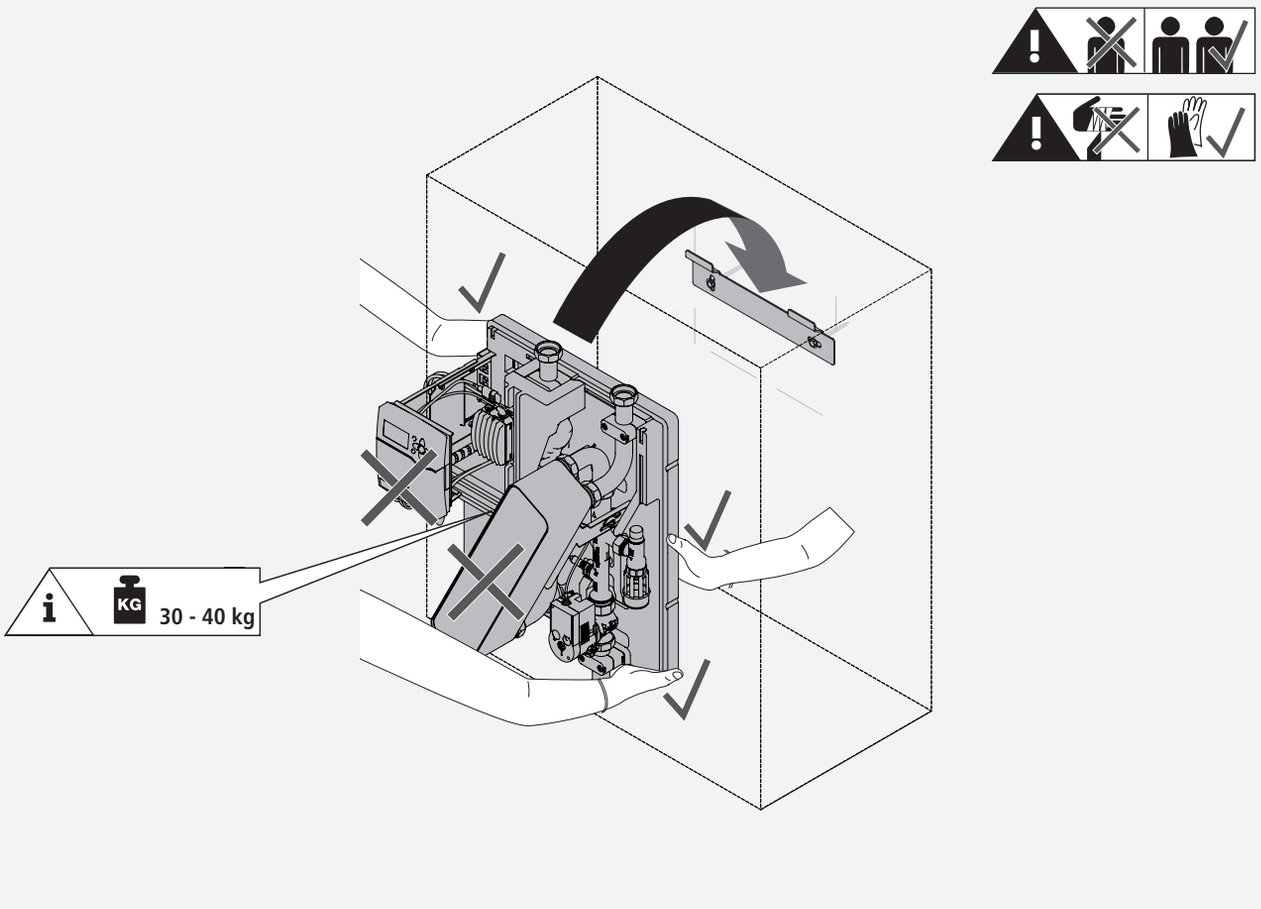

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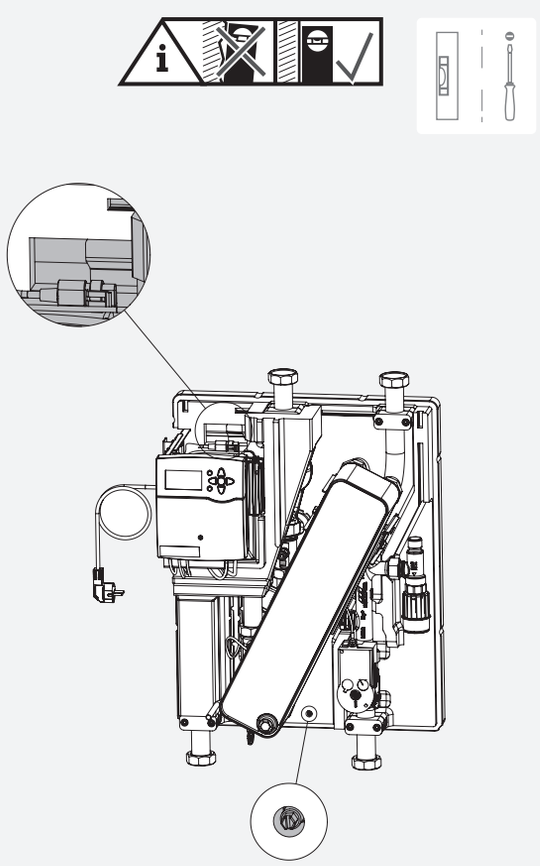
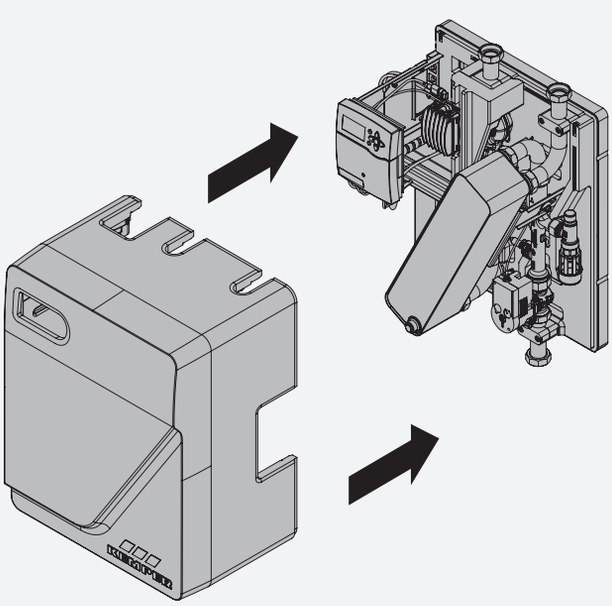


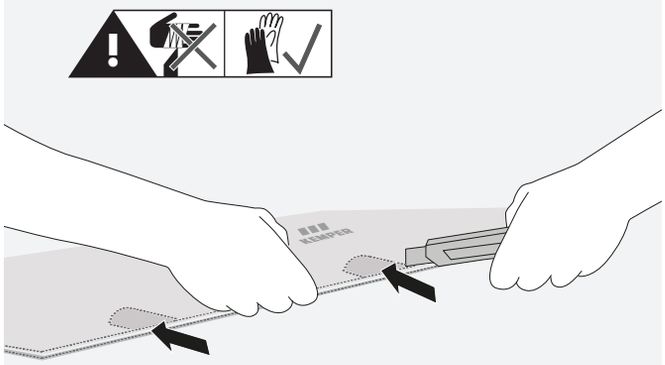
7



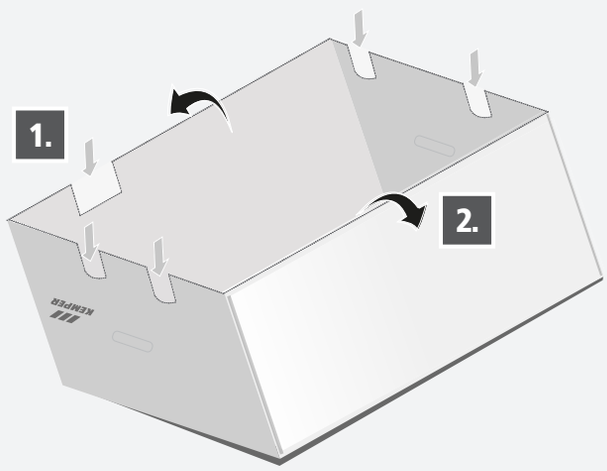
Installing the Dust Cover

1

Note! Case the water heater with the dust cover during a long construction period.



2



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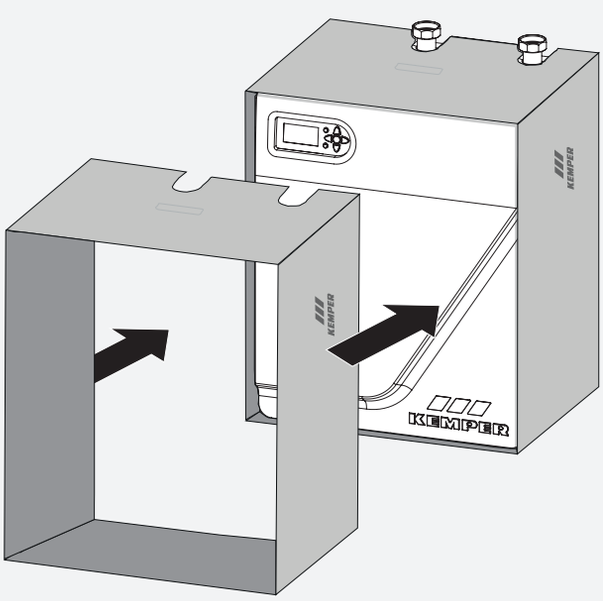
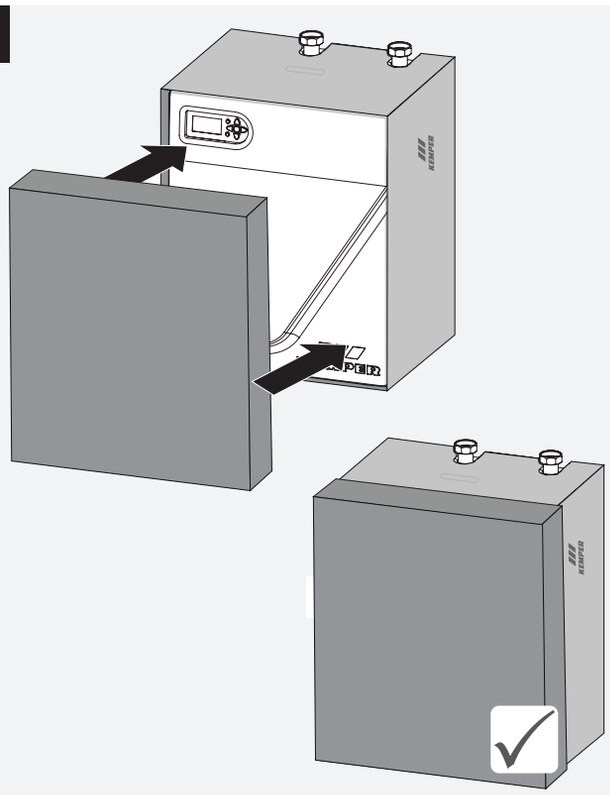
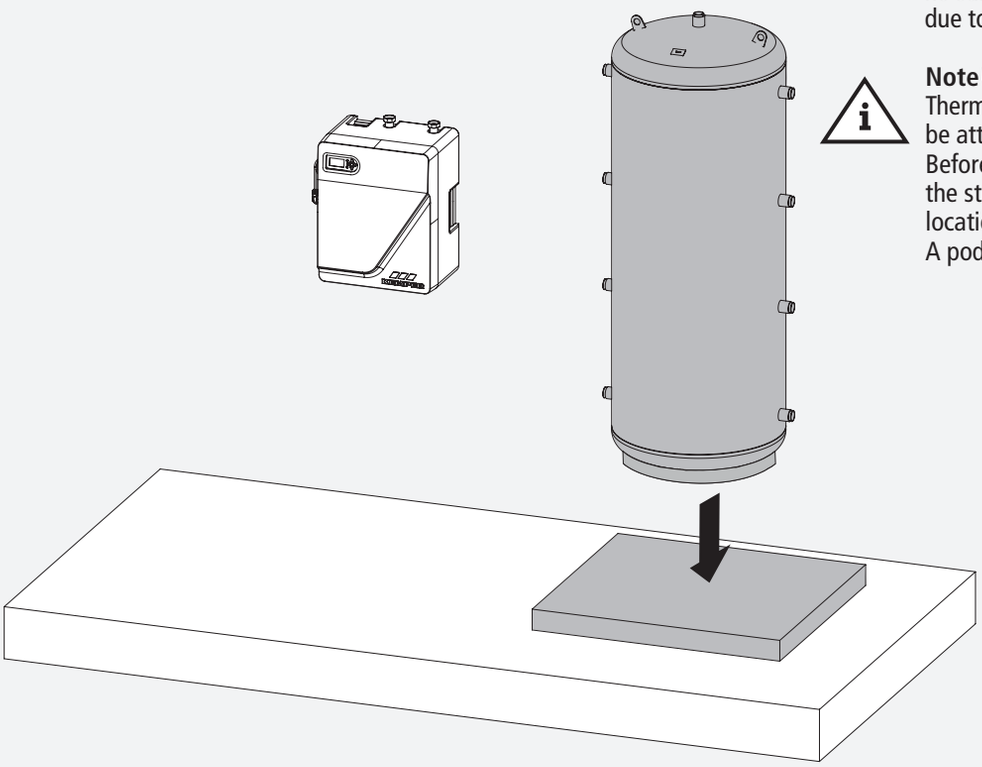


4



Warning! Remove the dust cover before commissioning and regular operation of the water heater!

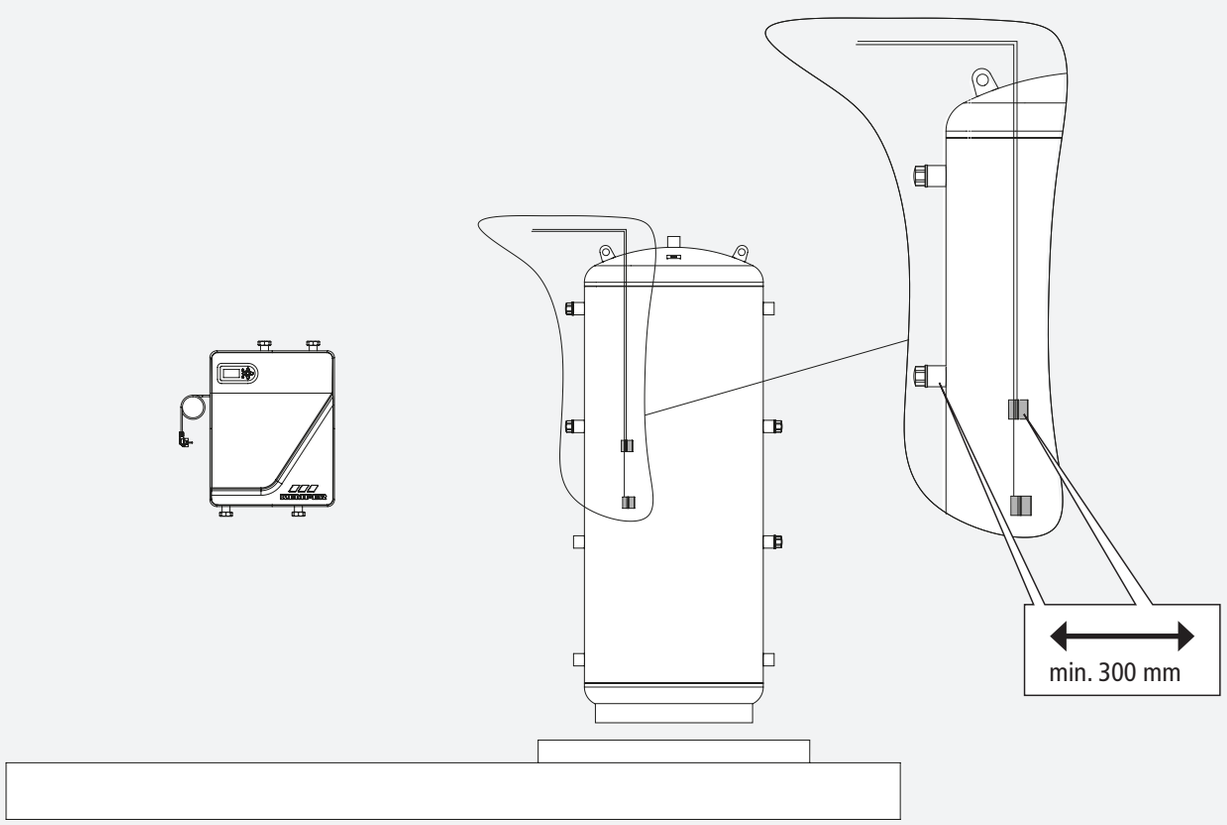
1



Note ! For the 500 and 850 litre ThermoTanks S, the installation floor may need to be levelled since no subsequent adjustment is possible due to the foot rim.

Note! It is essential to install feet to the ThermoTank so that the insulation can then be attached with a perfect fit!
Before assembling the ThermoTank, check the structural design of the installation location.
A podium may need to be provided.

2

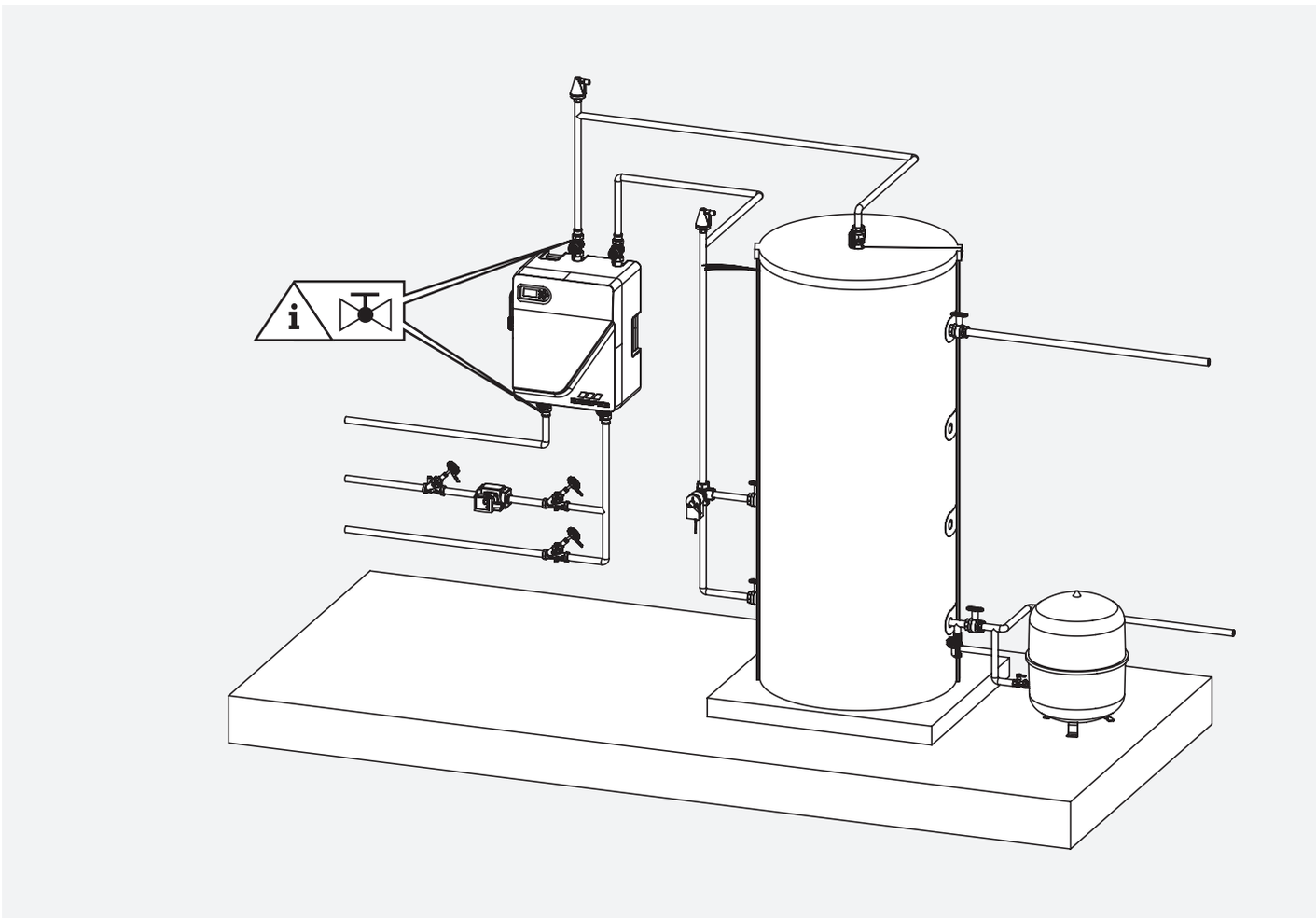


2.6 Pipework Single Unit (Hydraulic Installation)

Install the pipework on the heating and drinking water side according to the hydraulics diagram.
This is drawn up and issued by the Dendrit calculation program when the system is being calculated. If the diagram is not available, request it, with the relevant dimensions, from the specialist planner/plumber responsible.
If this is not possible, in the diagrams (representation single unit) you will find an example of the hydraulic circuit of a single unit.

It is essential that you take account of the stated nominal pipe diameters from the hydraulics diagram.

- For maintenance purposes, provide shut-off devices on the water heater and the ThermoTank.
- To avoid functional disruption caused by air pockets fit venting and draining devices, as shown.



Pipework single unit

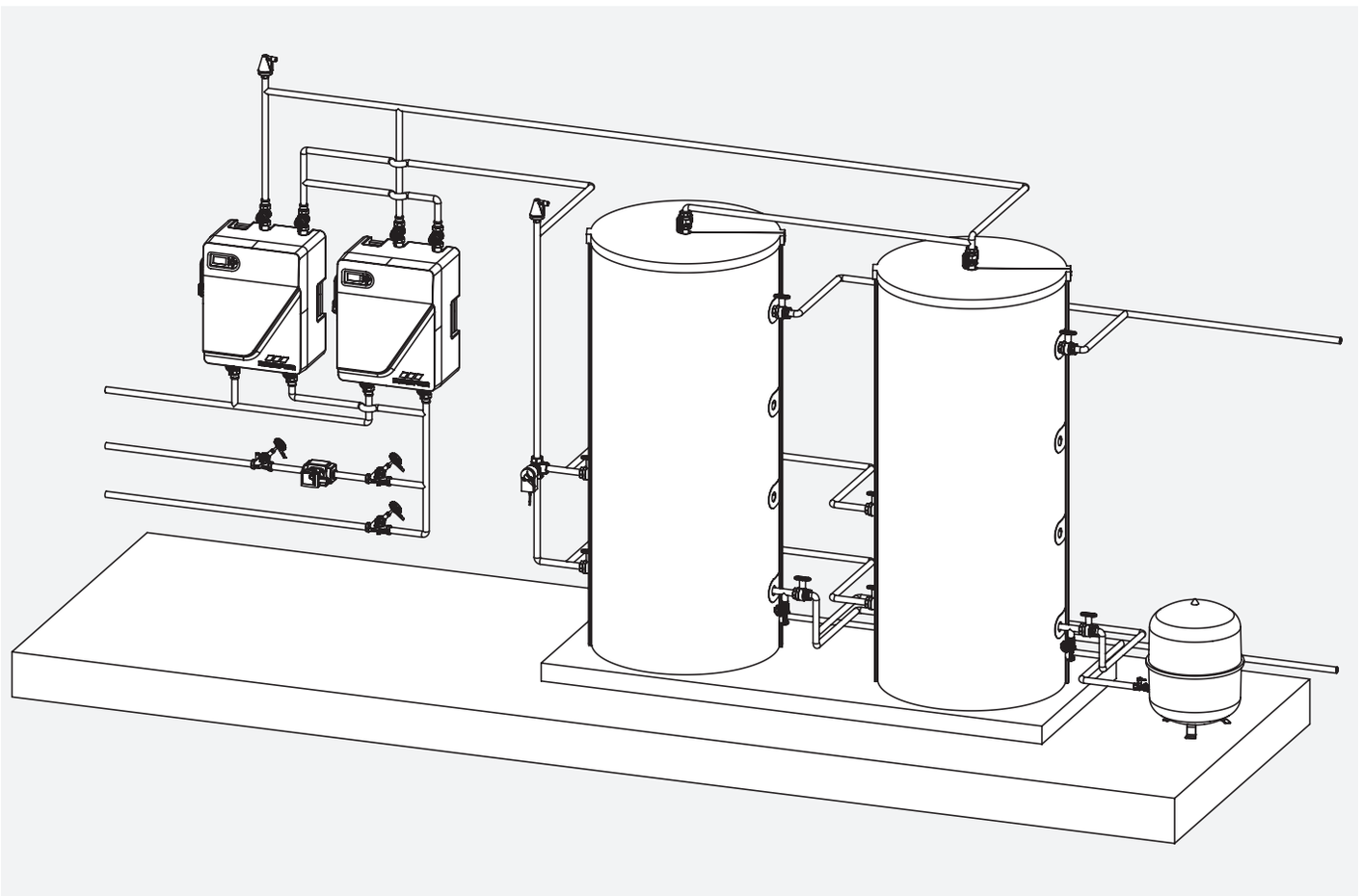
Info! Pay attention to the torque when tightening the KHS valves so that the internal components don't twist!

2.6 Pipework Cascade (Hydraulic Installation)

Install the pipework on the heating and drinking water side according to the hydraulics diagram.
This is drawn up and issued by the Dendrit calculation program when the system is being calculated. If the diagram is not available, request it, with the relevant dimensions, from the specialist planner/plumber responsible.
If this is not possible, in the diagrams (representation of the complete unit as cascade units) you will find an example of the hydraulic circuit of cascade units.

It is essential that you take account of the stated nominal pipe diameters from the hydraulics diagram.

- For maintenance purposes, shut-off devices should be provided on the water heater and the ThermoTank.
- To avoid functional disruption caused by air pockets fit venting and draining devices, as shown.
- Carry out the hydraulic balancing on the heating and drinking water side via the pipework using the reverse return principle (Tichelmann). This applies both between the water heaters on the drinking water and heating side and between the Thermo-Tank to the heater and on the heating side.

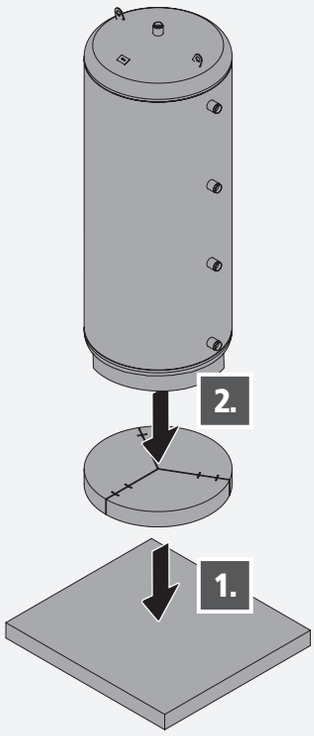


Representation of the complete unit as cascade units

Info! Pay attention to the torque when tightening the KHS valves so that the internal components don't twist!

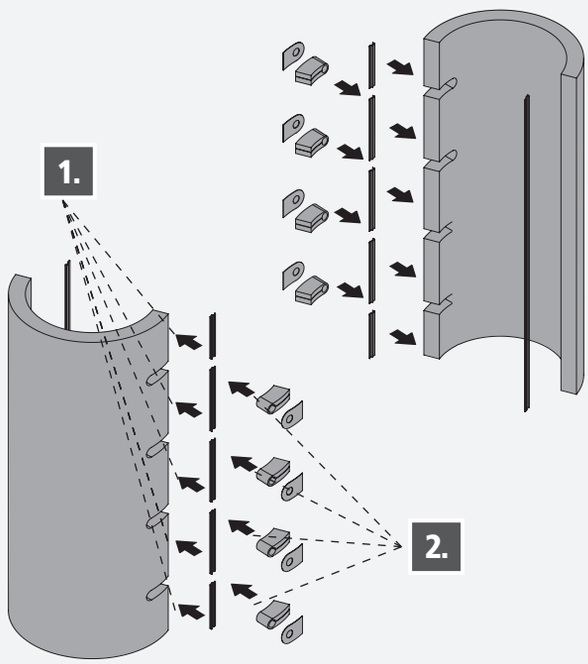
Insulating the Buffer Tank

1

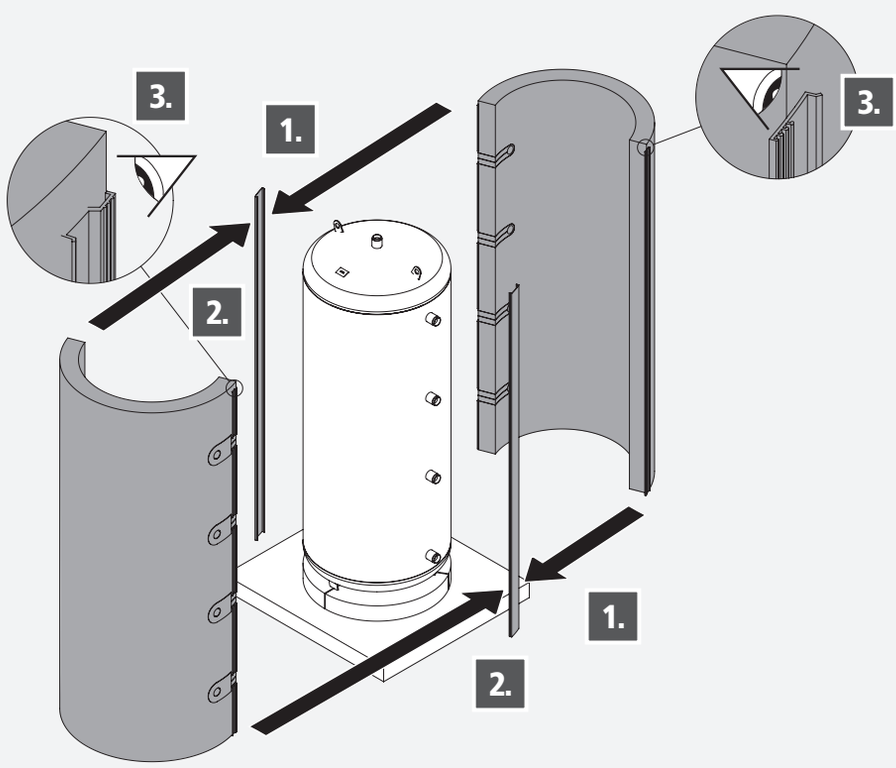


Note!
For the 500 and 850 litre ThermoTanks S lay the installation floor under the tank. Subsequent installation is not possible due to the foot rim.

2



3



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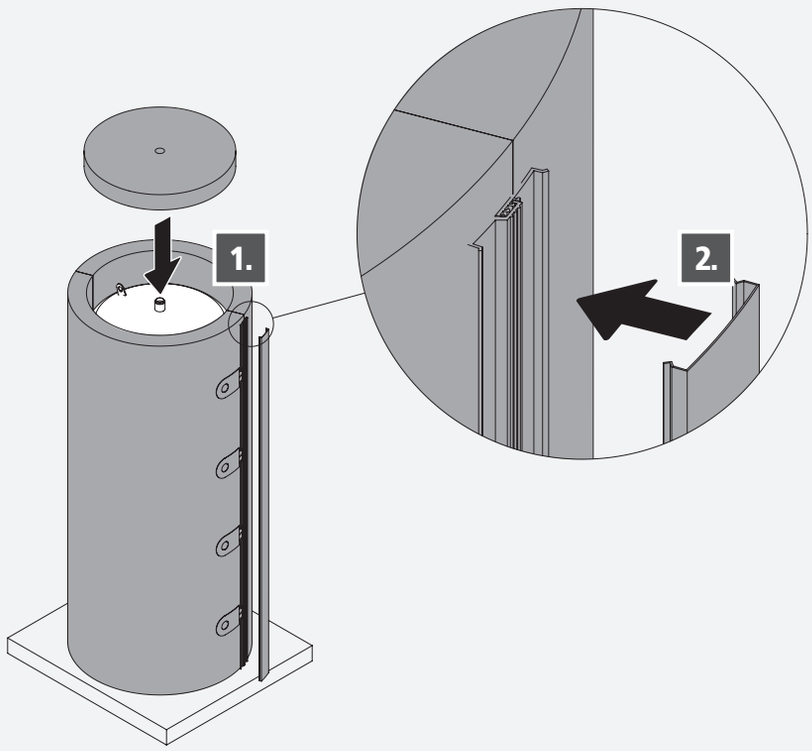

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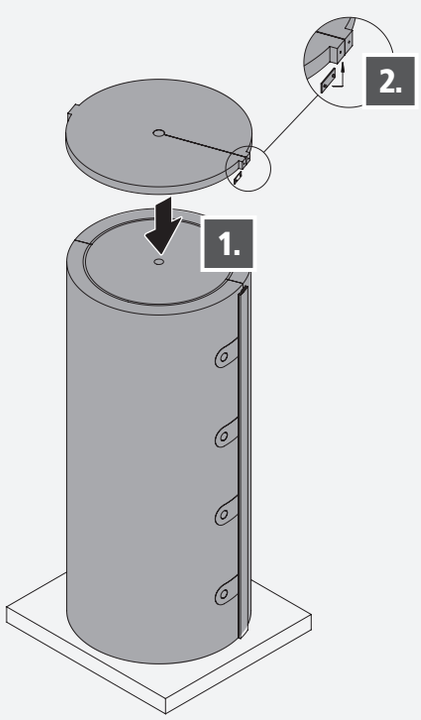

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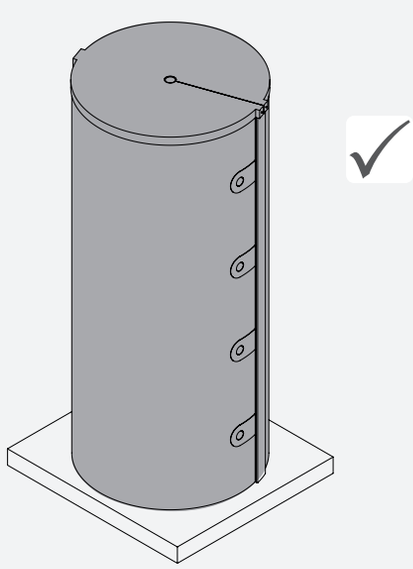
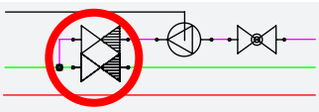


2.8 Secondary Connection (Drinking Water Side)

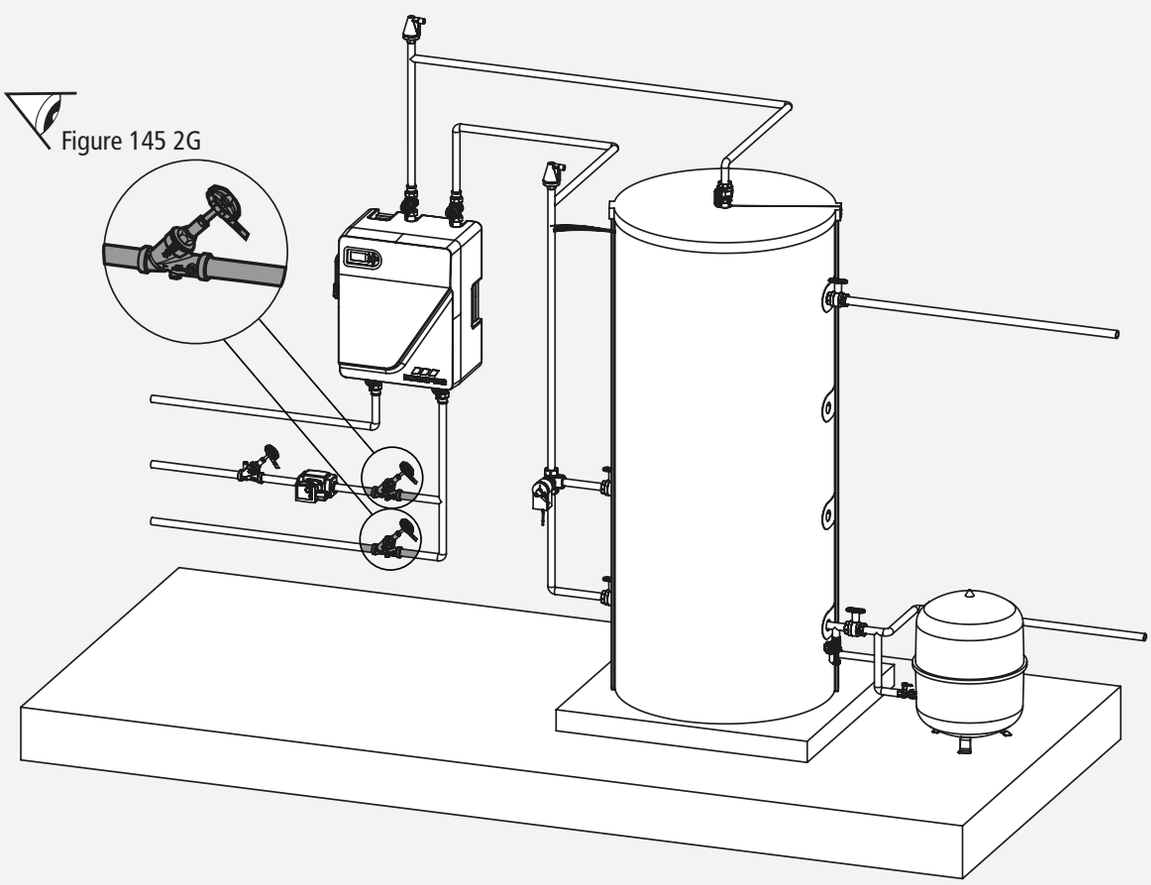
Plan and carry out the PWC connection in line with the generally accepted codes of practice. For maintenance and repair purposes, provide stop valves on the water heaters. Secure the PWC connection with an anti-pollution check valve in line with the requirements of DIN 1988-100.
This anti-pollution check valve can be realised optimally by a stop valve with an integral anti-pollution check valve Figure 145 2G in a suitable size.



Picture of the anti-pollution check valve in the PWC/PWH-C pipe

According to the generally accepted codes of practice, you must adhere to a PWH temperature of ≥ 60 °C at the PWH outlet of the drinking water heater. In the circulating water system, a temperature drop of 5K must not be exceeded. When designing the necessary head of the circulation pump and the size of the hot water pipes, you must take account of the pressure loss of the water heater modules (take note of the pressure loss diagrams). Immediately before connecting the circulation pipe to the cold-water pipe, insert an anti-pollution check valve optimally using a stop valve with an integral anti-pollution check valve Figure 145 2G, as shown above. Pressure fluctuations in the pipeline are to be expected in the PWH/PWH-C system due to the temperature fluctuations.

Figure 145 2G



2.8 Secondary Connection (Drinking Water Side)

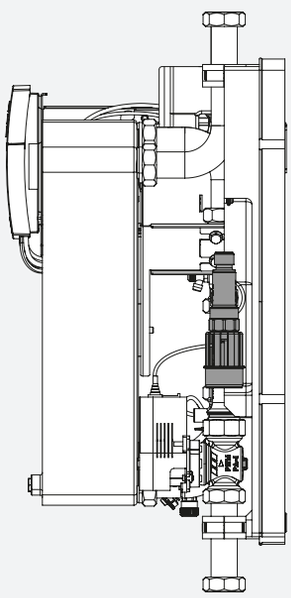
To prevent pressure fluctuations caused by heat expansion, a fixed pressure-relief valve has been provided in the unit. Connect to the waste water system according to the generally accepted codes of practice.

Installation guidelines pressure-relief valve:

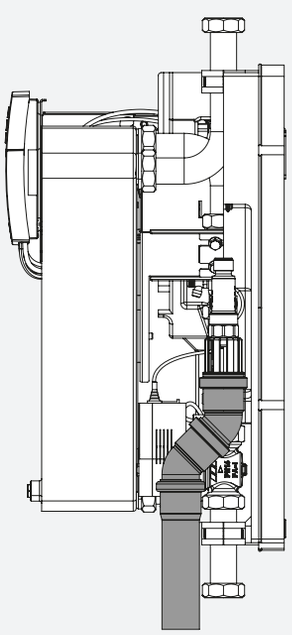
- Install the discharge pipe to be connected on an incline.
- The maximum pressure in the drinking water pipe cold must be at least 20% below the nominal set pressure of the pressure-relief valve.
- The installation setup from KEMPER (see Figure 1a+1b) is recommended.
- Dimension the waste water connection to be sufficiently large according to DIN EN 12056 and DIN 1986-100. Accept the volume flow that can be arise at the pressure-relief valve through the connection pipe.
- The pressure relief valve must not be closed on the outlet side

Info!
In the case of connection to the sewer system, provide an anti-siphon trap.

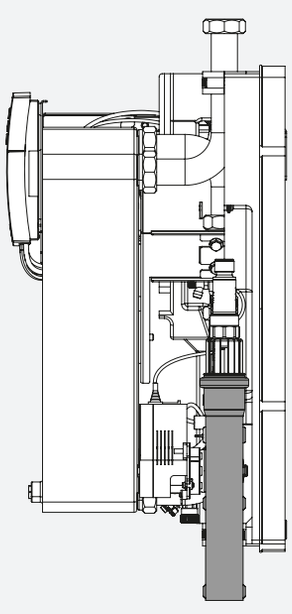
1



a



b



2.9 Primary-Side Connection between the Water Heater and the Buffer Tank

Note! Attach ventilation features in the intake and return.

Primary connection (heating side)
When sizing, take account of the pipe length of the connecting pipe between the buffer tank and the water heaters. During installation, adhere to these lengths with binding effect. If the calculated pipe lengths are exceeded, there is a reduction in the transfer output to the water heaters.
Also make sure that the water heater is at a distance of (as a guide-line) 20m single pipe length (40m total) from the buffer tank. If this cannot be implemented, provide a hydraulic separator.
If this is necessary, you will find all the information you need in Chapter 2.11 below (p. 27).

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2.10 Installation of the 3-directional reversing valve

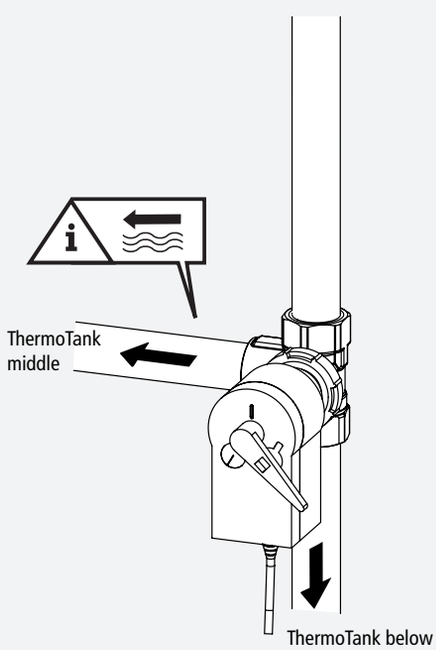
The temperature controlled KTS 3-way valve is used in combination with the KTS Water Heater and the ThermoTank.

The job of the valve is to redirect the return water coming from the water heater to the lower or middle connection of the ThermoTank, depending on the pre-set temperature.

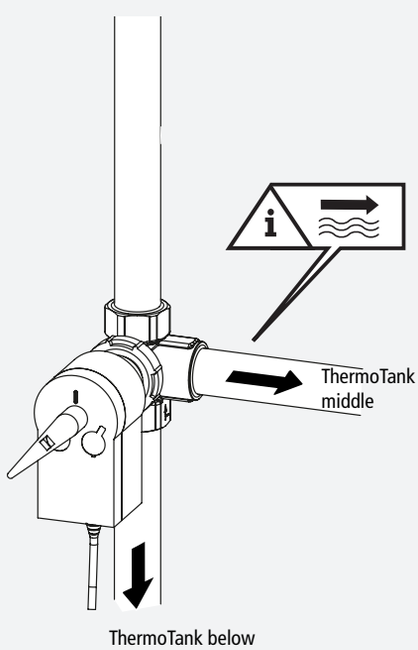
The purpose is to promote the development of low-temperature layers in the bottom section of the ThermoTank.

If the return temperatures are higher, e.g., in circulation mode, the return water is redirected to one of the middle connections.

Installation situation left



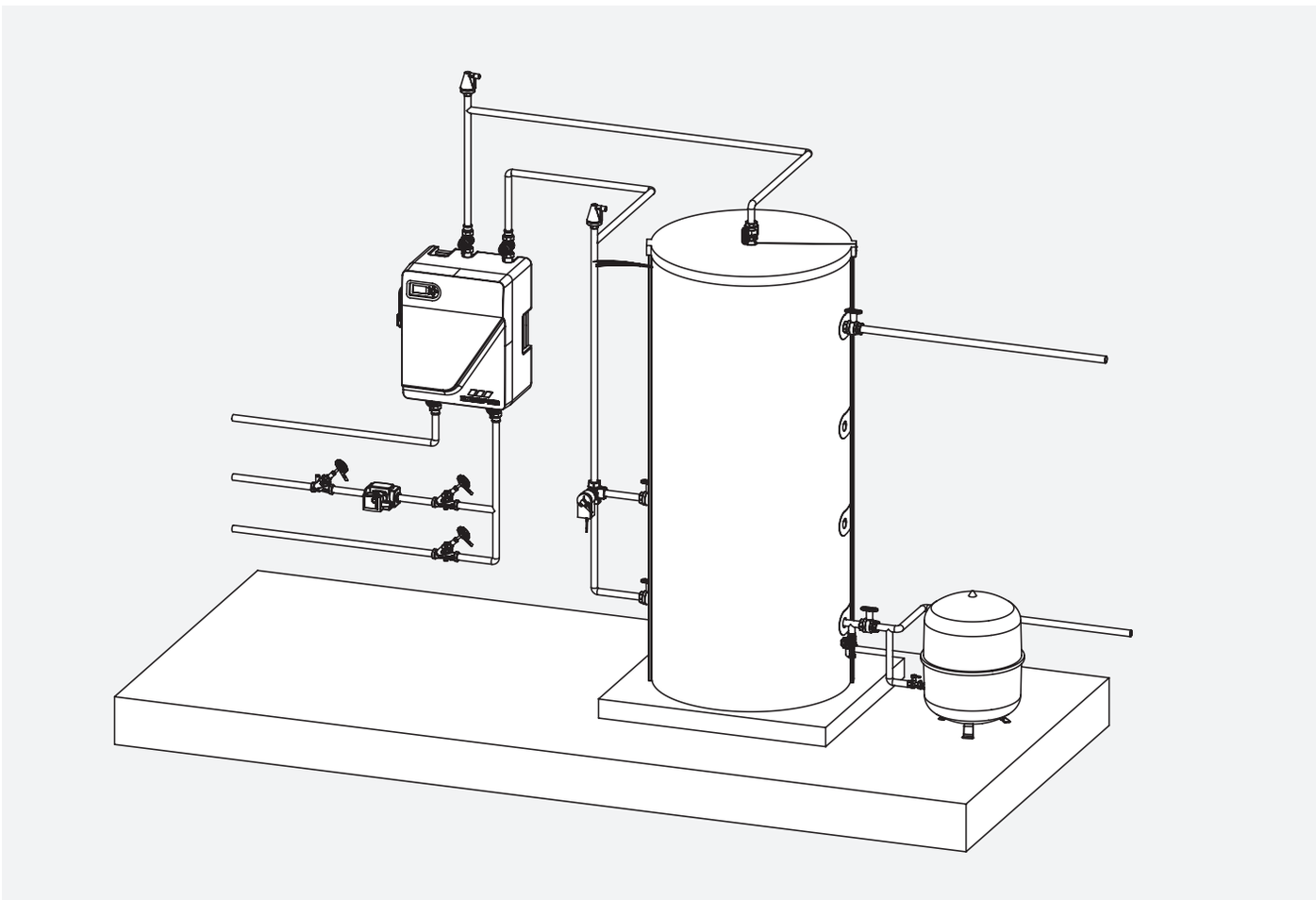
Installation situation right



2.11 Primary-Side Connection between the Buffer Tank and the Heat Generator

Note! Provide air vents in the flow and return.

To compensate for the volume changes on the heating side in the heating or cooling phase, protect the buffer tank with an expansion vessel. Size the expansion vessel according to the generally accepted codes of practice for every building project according to EN 12828. KEMPER recommends that the expansion vessel be directly connected to the buffer tank.
If the job is a refurbishment and an expansion vessel is already installed in the system on site, recalculate it to the correct size. If the job is a new-build, take account of the volume of the heating buffer and the pipes between the buffer and the water heaters.



Recommended position of the expansion vessel

If the heat demand to the water heater is to be recorded, optimally install the heat meter just before the heater buffer tank.

Warning! Please do not install the heat meter between the buffer tank and the water heater because they cause very high pressure loss. If this has not been taken into account during design, there is a risk that the system will not have the designed output. Lack of supply may be the result.
For the maximum distance between the buffer tank and heat source, take account of the notes in Chapter 2.2 Installation Location (page 14).

2.12 Primary-Side Connection with 2-Way Valve or Pump

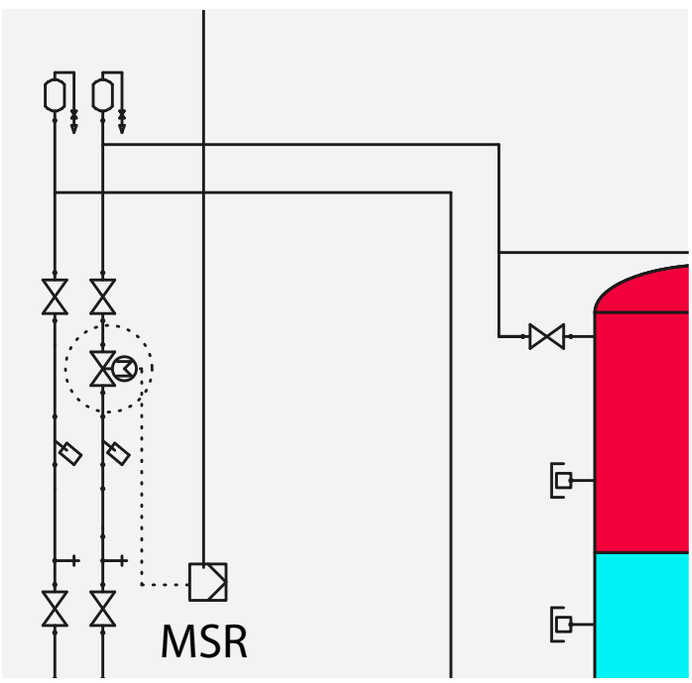
You have two options for charging the buffer tank:

Setup 1
Charging the buffer tank with a two-way valve

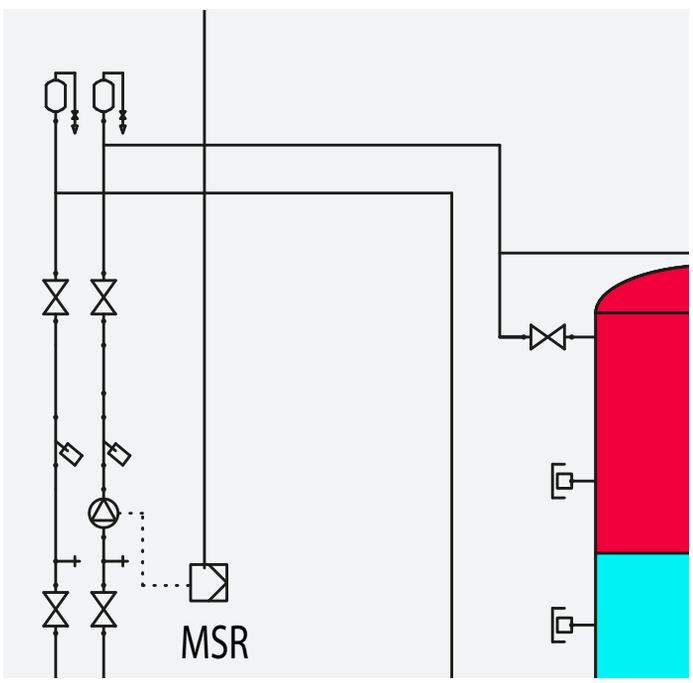
This setup is used if you want to supply the buffer tank via a pressurised line.
The valve can be controlled using two different setups: Using dry contacts from the controller (relay R5 in cascade unit 1) or by the BMS, because the command is passed on to the BMS via the RS 485 interface.

Setup 2
Charging the buffer tank using a heating circuit pump

This setup is used if you want to supply the buffer tank via a non-pressurised line or a non-pressurised manifold. To prevent thermal circulation due to the density difference, place a gravity brake behind the heating circuit pump. The pump can be controlled using two different setups: Using dry contacts (Setup 1) from the controller (relay R5 in cascade unit 1) or by the BMS (Setup 2), because the command is passed on to the BMS via the RS 485 interface.



Setup 1

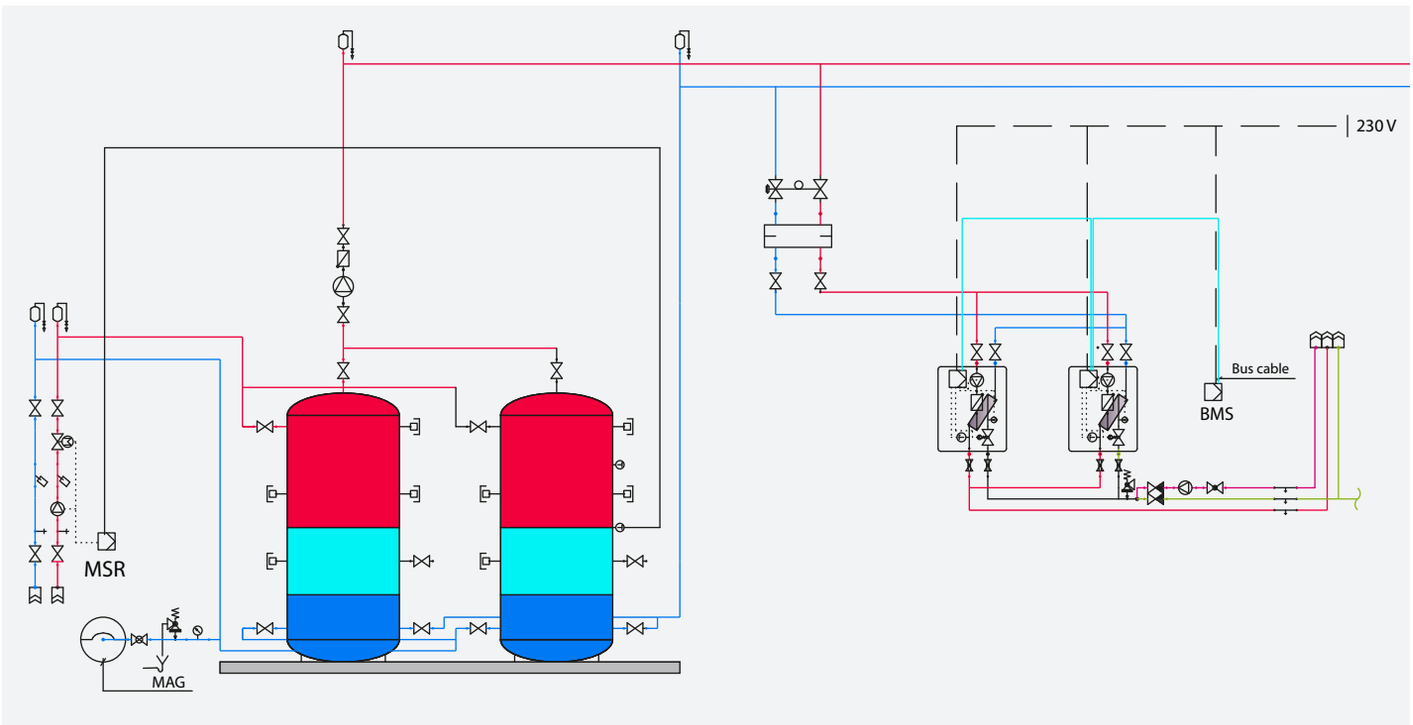


Setup 2

Info! Buffer tank charging can also be controlled externally. In this case, the calculated flow temperature and the calculated heat capacity must be provided by the positioning of the external sensors.

2.13 Primary-Side Connection between the Water Heater and the Hydraulic Separators

If the system is operated without a buffer tank, connect a hydraulic separator in front of the water heater because the boxes have to pull the required flow from a non-pressurised area.
The hydraulic separators are designed to the calculated primary circuit volume flow and must be constantly kept at temperature. You will find this in the Dendrit KTS calculation results.
We also point out that the temperatures in the return pipe in circulation mode of the systems will rise if a hydraulic separator is used. To counteract this, hydraulic balancing below the separators is recommended.
To prevent constant overflowing of the complete flow rate over the hydraulic separators and thus to reduce the return temperatures, it is recommended to adjust the hydraulic separators.



3 Electrical Installation

Note! There is a 6.3 A fine wire fuse in the controller.

The controller is pre-assembled electrically. On site, connect the dry contact and heat source control and the optional accessories.
Also, connect the controller by bus cable in a cascade circuit.

Note! Before connecting the water heater to the main power supply, first of all complete electrical installation between the units.

Danger! Risk to life from electric shock on conducting parts and connections. An electrical connection that has not been fitted properly can impair the operational safety of the units and lead to damage to people and property!

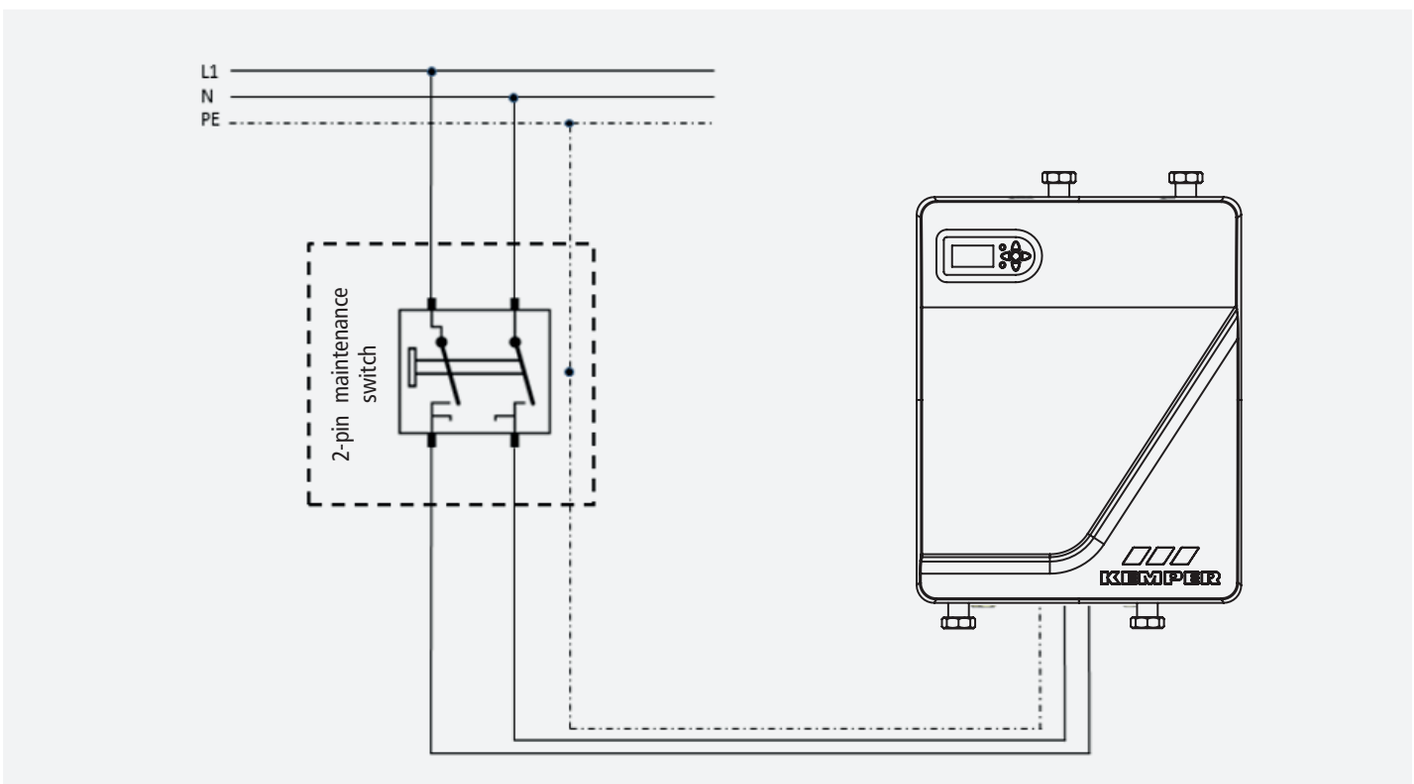
Danger! Before working at the control box, always switch off the power supply to the units and secure it against it being switched on again without authorisation!

3.1 Power supply

DThe connection to the main grid (230 V AC/50 Hz) must be carried out by a skilled electrician in accordance with the relevant local power utility and electrical guidelines. Equipotential bonding in accordance with VDE 100-410 and VDE 100-540 must be provided for the mains supply.The water heaters are supplied with a pre-fitted safety plug according to CEE/7/7.

To permanently connect the water heater electrically, you can replace the plug connection by a two-pole disconnecting switch in the mains connection.

Note!
Check the power supply.



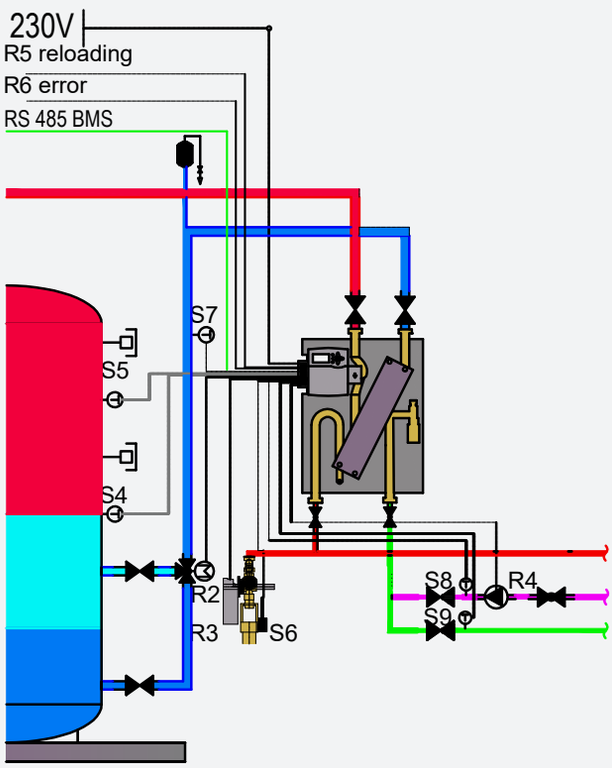
Permanent connection of the water heaters

3.2 Terminal Assignment Single Unit

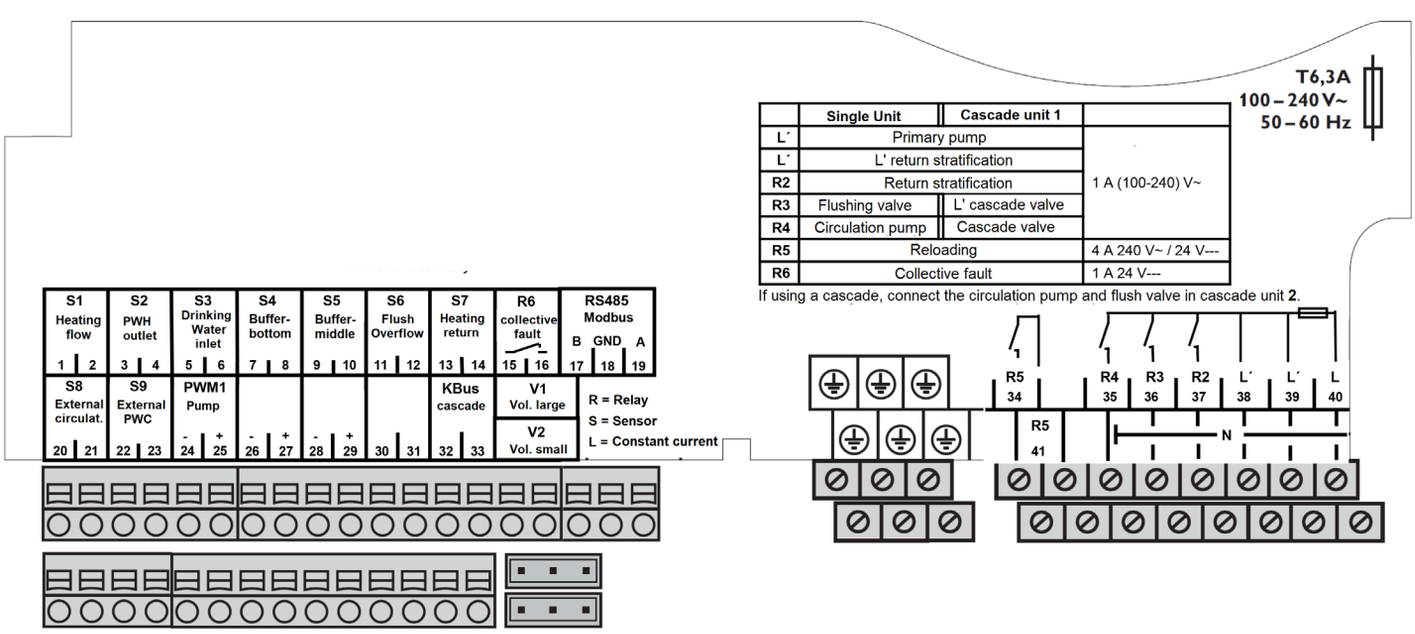
Note! Next to the water heater type plate, there is an overview diagram of the electrical installation..

The terminal assignment of the single unit can be carried out according to the following diagram and the table below.

Example Diagram Single Unit

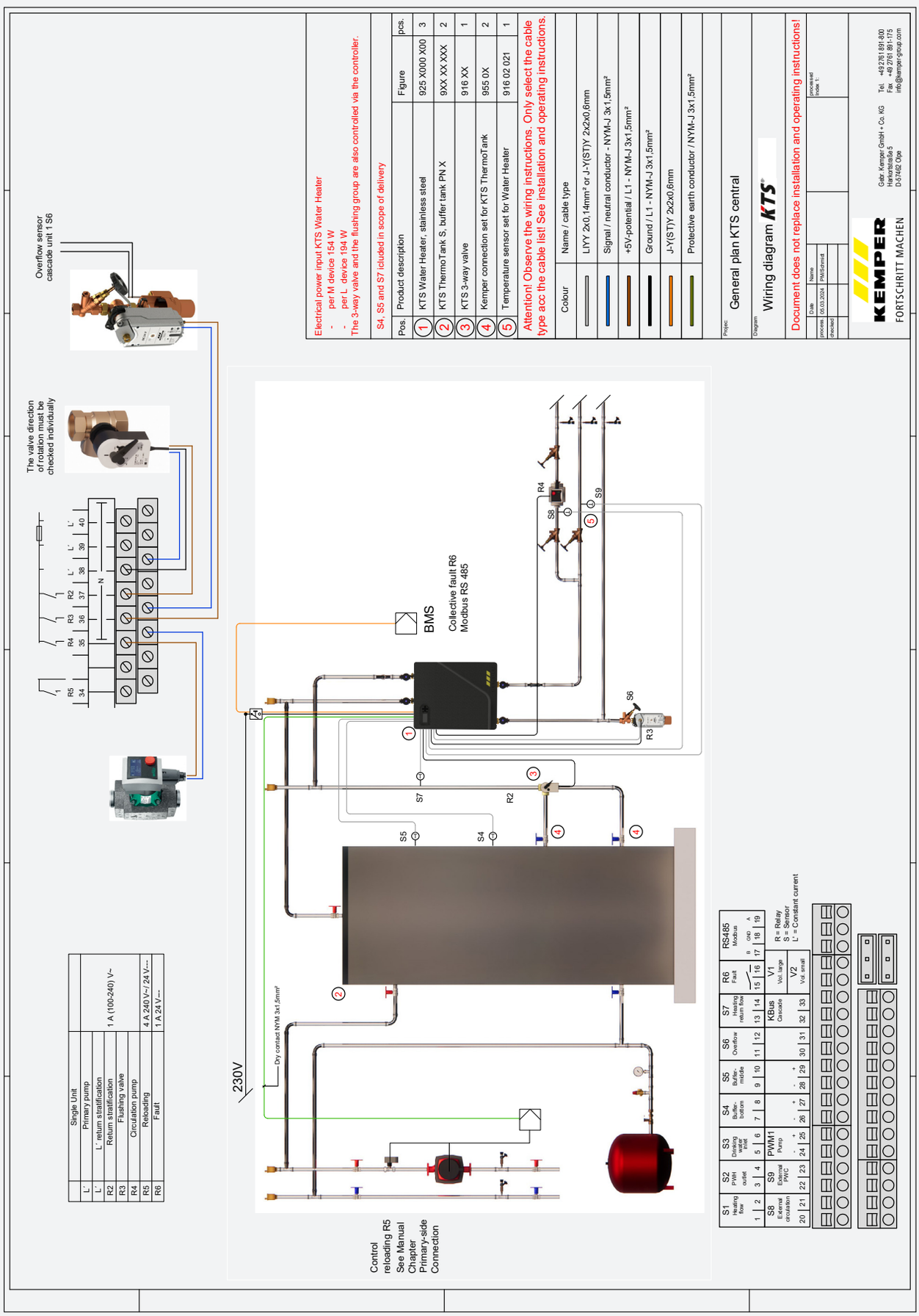


Overview of the Actuators and Sensors Single Unit



3.2 Terminal Assignment Single Unit

	Sensor/Actuator	Terminal	
S4	Temperature sensor buffer bottom	7-8	Included in scope of delivery
S5	Temperature sensor buffer middle	9-10	Included in scope of delivery
S6	Overflow sensor flush point	11-12	Optional accessory
S8	Temperature sensor hot water circulation inlet	20-21	Optional accessory
S9	Temperature sensor cold-water supply pipe	22-23	Optional accessory
L'	Constant current KTS 3-directional reversing valve	38	Optional accessory
R2	Switched phase 3-directional reversing valve	37	Optional accessory
R3	Switched phase flush valve	36	Optional accessory
R4	Switched phase circulation pump	35	On site
R5	Recharging requirement (pump/2-way valve)	34 normally closed contact (NCC) 41 potential connection	On site
R6	Collective fault	15 potential connection 16 normally closed contact (NC)	On site
KBus	Bus between the cascade units	32-33	On site
RS485	Modbus to BMS	17 B 18 GND 19 A	On site


Overflow sensor cascade unit ! S6
The valve direction of rotation must be checked individually
Single Unit
L'
Primary pump
L'
L' return stratification
R2
Return stratification
1 A (100-240) V~
R3
Flushing valve
R4
Circulation pump
R5
Reloading
4 A 240 V~/ 24 V---
R6
Fault
1 A 24 V---
230V
Dry contact NYM 3x1,5mm²
BMS
Collective fault R6
Modbus RS 485
S1 Heating flow
S2 PWM outlet
S3 Drinking water inlet
S4 Buffer-bottom
S5 Buffer-middle
S6 Overflow
S7 Heating return flow
KBus Cascade
R6 Fault
V1 Vol. large
V2 Vol. small
RS485 Modbus
S8 External circulation
S9 External PWC
PWM1 Pump
R = Relay
S = Sensor
L' = Constant current
Control reloading R5 See Manual Chapter Primary-side Connection
Electrical power input KTS Water Heater
- per M device 154 W
- per L device 194 W
The 3-way valve and the flushing group are also controlled via the controller.
S4, S5 and S7 icluded in scope of delivery
Pos. Product description Figure pcs.
1 KTS Water Heater, stainless steel 925 X000 X00 3
2 KTS ThermoTank S, buffer tank PN X 9XX XX XXX 2
3 KTS 3-way valve 916 XX 1
4 Kemper connection set for KTS ThermoTank 955 0X 2
5 Temperature sensor set for Water Heater 916 02 021 1
Attention! Observe the wiring instructions. Only select the cable type acc the cable list! See installation and operating instructions.
Colour Name / cable type
LiYY 2x0,14mm² or J-Y(ST)Y 2x2x0,6mm
Signal / neutral conductor - NYM-J 3x1,5mm²
+5V-potential / L1 - NYM-J 3x1,5mm²
Ground / L1 - NYM-J 3x1,5mm²
J-Y(ST)Y 2x2x0,6mm
Protective earth conductor / NYM-J 3x1,5mm²
Project: General plan KTS central
Diagram: Wiring diagram KTS
Document does not replace installation and operating instructions!
drawn 00.03.2024 PM/Schmid
checked
processed mark 1
KEMPER FORTSCHRITT MACHEN
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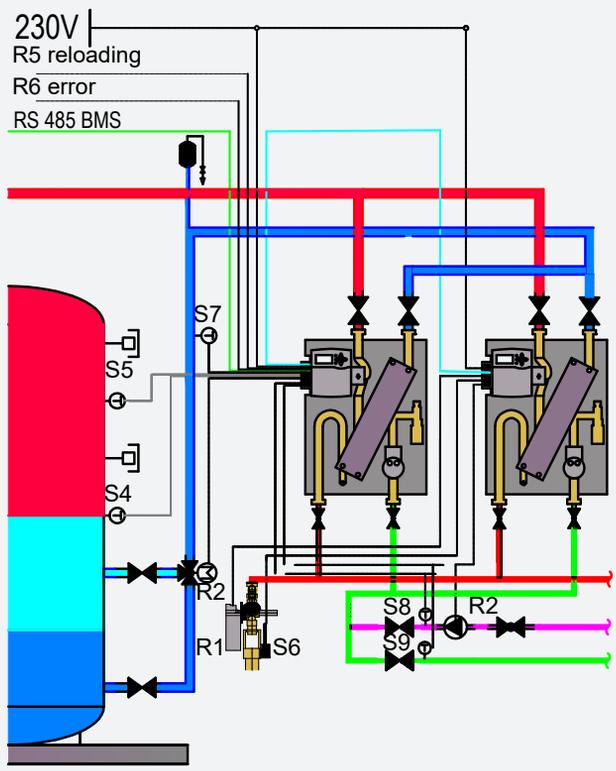
info@kemper-group.com

3.3 Terminal Assignment Cascade Unit 1

When cabling the sensors and actuators, it is essential to distinguish between a single unit and cascade units.
In a single unit, all of the actuators and sensors can be operated via the controller.

In cascade units, the cascade valve is also controlled via the controller of cascade unit 1. You therefore have to control the circulation pump, and the flush valve and the overflow sensor via the controller of cascade unit 2. The terminal assignment of cascade units can be carried out according to the following diagram and the table below.

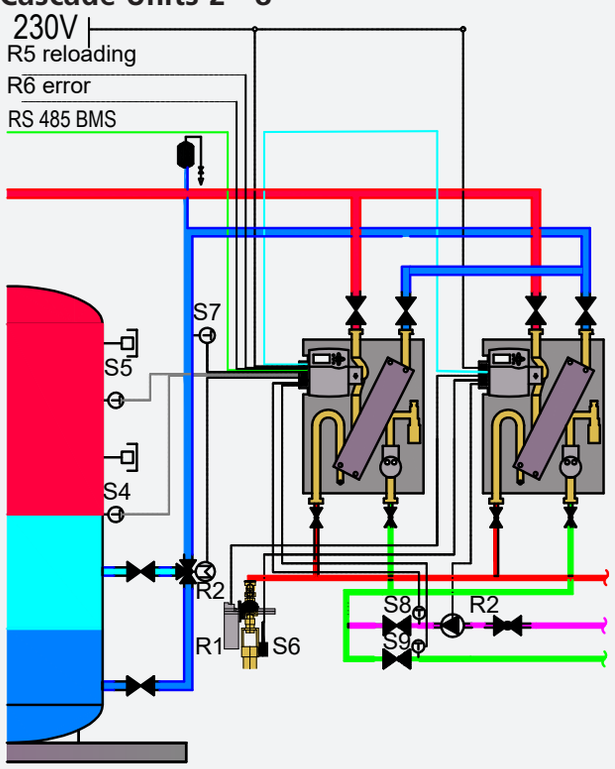
Example Diagram Cascade Operation Cascade Unit 1



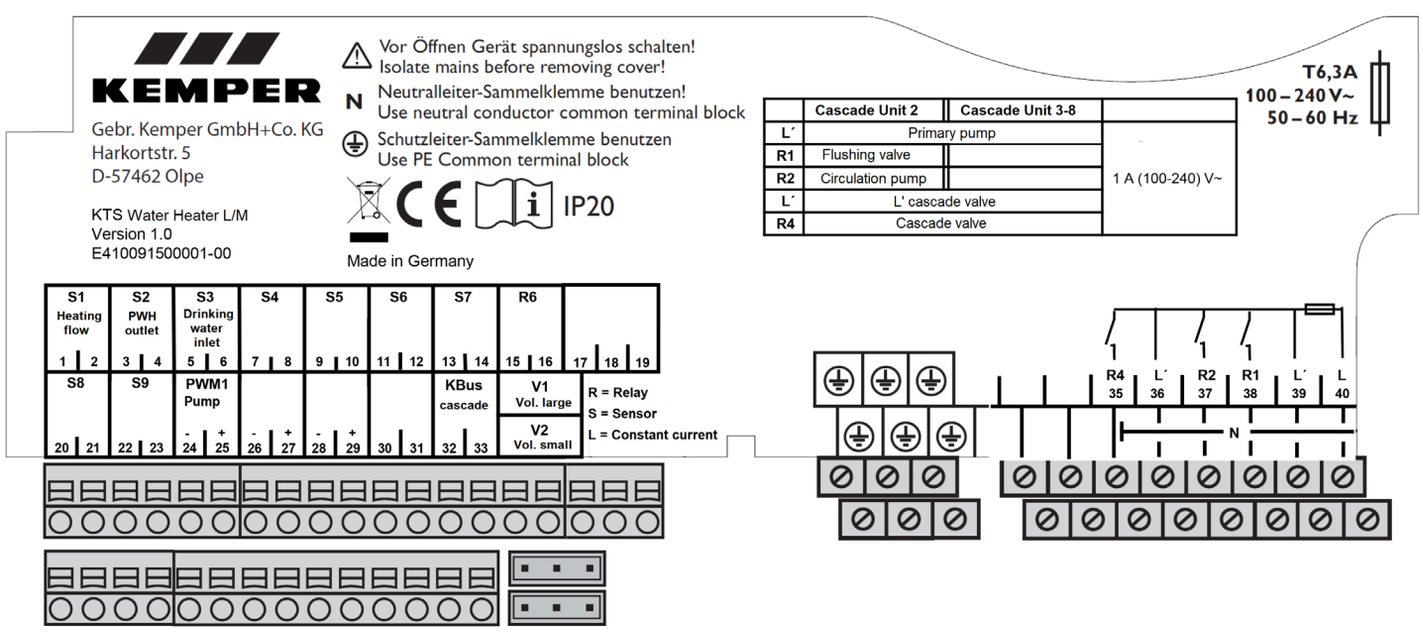
Overview of the Actuators and Sensors Cascade

	Sensor/Actuator	Terminal	
S4	Temperature sensor buffer bottom	7-8	Included in scope of delivery
S5	Temperature sensor buffer middle	9-10	Included in scope of delivery
S8	Temperature sensor hot water circulation inlet	20-21	Optional accessory
S9	Temperature sensor cold-water supply pipe	22-23	Optional accessory
L'	Constant current KTS 3-directional reversing valve	38	Optional accessory
R2	Switched phase 3-directional reversing valve	37	Optional accessory
R5	Recharging requirement (pump/2-directional valve)	34 normally closed contact (NCC) 41 potential connection	On site
R6	Collective fault	15 potential connection 16 normally closed contact (NCC)	On site
KBus	Bus between the cascade units	32-33	On site
RS485	Modbus to BMS	17 B 18 GND 19 A	On site

Example Diagram Cascade Operation Cascade Units 2 - 8

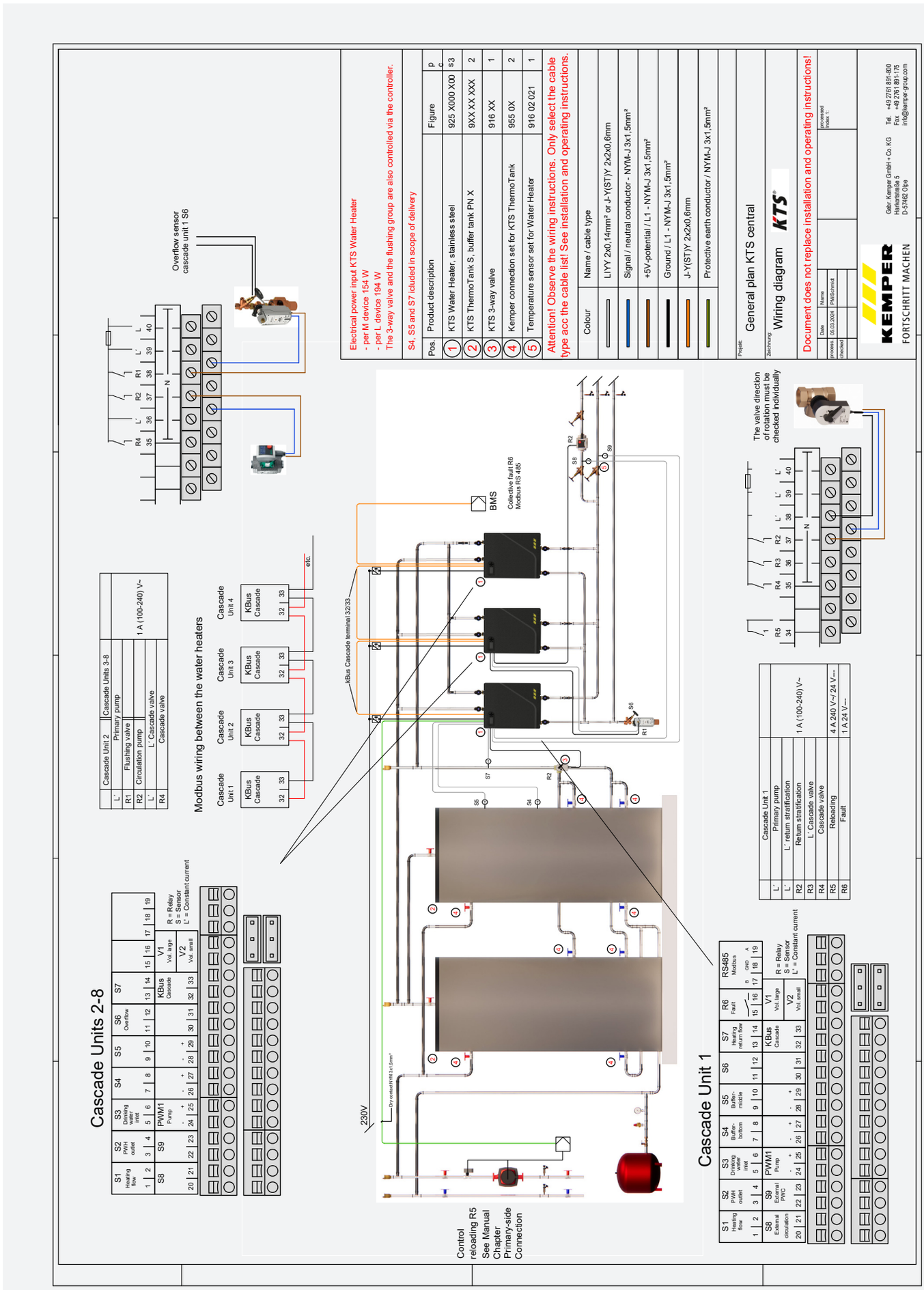


Overview of the Actuators and Sensors Cascade



	Sensor/Actuator	Terminal	
S6	Overflow sensor flush point	11-12	Optional accessory
R3	Switched phase flush valve	36	Optional accessory
R4	Switched phase hot water circulation pump	35	On site
KBus	Bus between the cascade units	32-33	On site

Terminal Assignment Cascade Units 2-8



Pos.	Product description	Figure	pc
1	KTS Water Heater, stainless steel	925 X000 X00	3
2	KTS ThermoTank S, buffer tank PN X	9XX XX XXX	2
3	KTS 3-way valve	916 XX	1
4	Kemper connection set for KTS ThermoTank	955 0X	2
5	Temperature sensor set for Water Heater	916 02 021	1

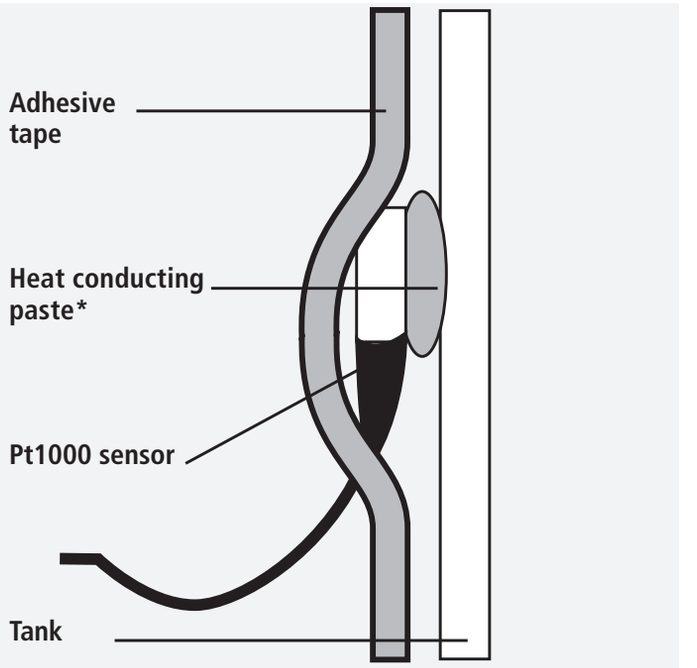
Colour	Name / cable type
	LIYY 2x0,14mm² or J-Y(ST)Y 2x2x0,6mm
	Signal / neutral conductor - NYM-J 3x1,5mm²
	+5V-potential / L1 - NYM-J 3x1,5mm²
	Ground / L1 - NYM-J 3x1,5mm²
	J-Y(ST)Y 2x2x0,6mm
	Protective earth conductor / NYM-J 3x1,5mm²

3.5 Positioning the Sensors on the Tank

Attach the temperature sensor to the tank with the help of heat conducting paste* and the adhesive tape supplied. The temperature sensor of the heating supply is in the water heater and does not have to be connected to the buffer tank.
As a starting point for assembly of sensors S04 and S05, take the height of the welded seam to the upper torispherical head. From there, measure the heights from the calculation results down. The calculation is made by the specialist planner or tradesman using Dendrit. The calculation results are provided during the design of the system and have to be passed on to those carry out the implementation. TF04 and TF05 are only on the cascade unit 1 water heater and on single units.
If the system is designed without a buffer tank, you don't need any more sensors.

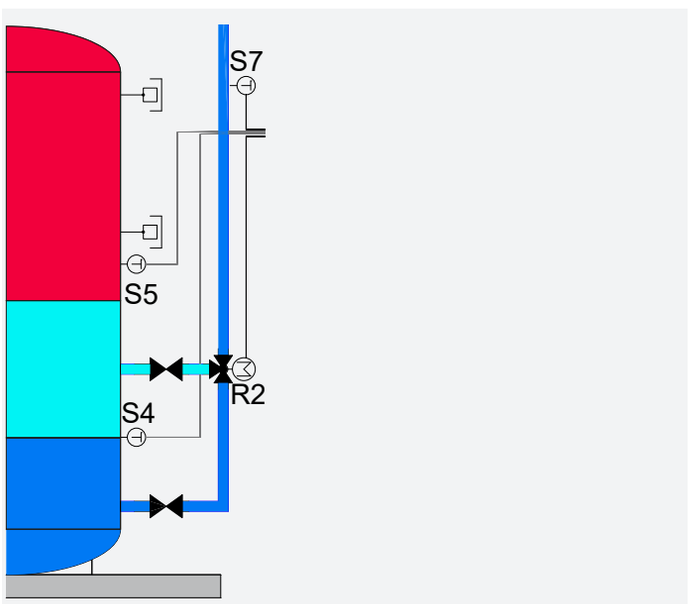
The consequences of incorrect sensor heights are listed below:

- Heat capacities are not right, which can result in a lack of supply
- The temperature stratification is disrupted.
- Late or early re-loading of the buffer tank
- The cycling time of the heat sources is to high
- Difference between switch-on and switch-off temperature (hysteresis)
- Too high return temperatures



*Heat conducting paste not included in the scope of delivery

In the Picture and Table below, you will find an example list of standard sensor heights in relation to installed tank size. Please note that the sensor heights listed below are valid only in combination with a KEMPER ThermoTank because they were calculated with the corresponding heat capacities, intake flow speeds and geometries of the ThermoTanks. Measure the height of the sensors from the top welding seam of the buffer tank.
The sensor heights must be calculated individually for buffer tanks from other manufacturers.



Sensor heights

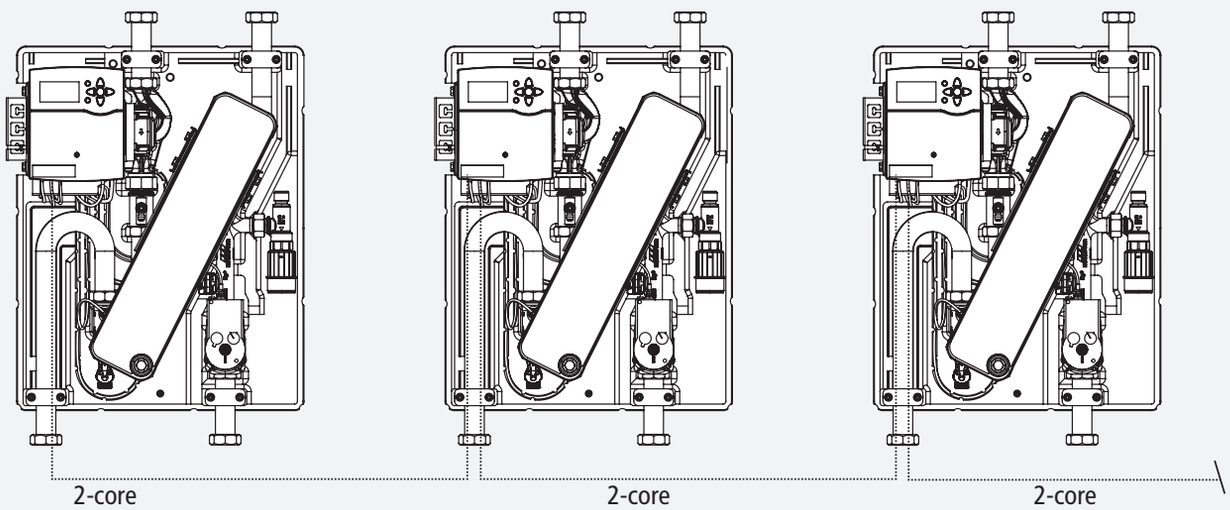
Buffer tank	S5	S4
500	554 mm	1041 mm
850	824 mm	1472 mm
1001	678 mm	1253 mm
1000	795 mm	1463 mm
1500	829 mm	1474 mm
2000	781 mm	1459 mm

4 Bus Installation

4.1 Bus Installation between the units

When connecting several water heaters in a cascade, you must connect the controllers to each other using a bus cable (J-Y(ST)Y 2x2x0.6 mm). In every controller, connect the cascade terminals 32 and 33.

The connection of the controllers is shown in a diagram below:

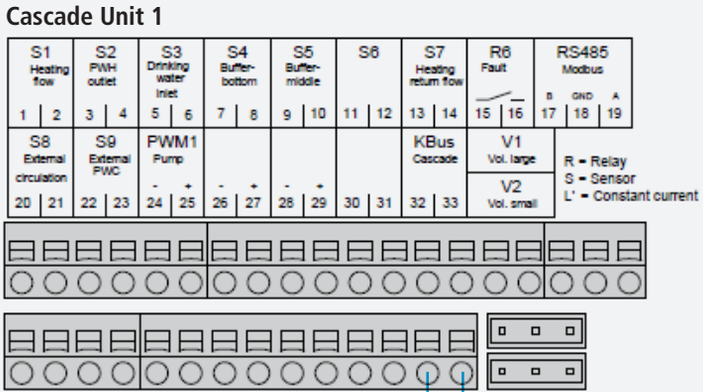


- Other slave units

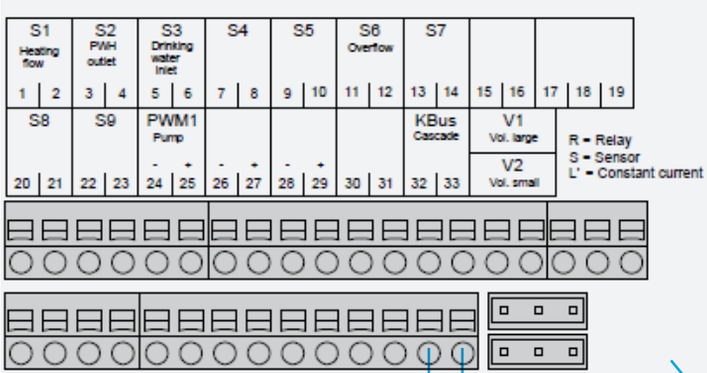
w

Electrical connection of the controllers in a cascade circuit

Cascade Unit 1



Cascade Units 2-8

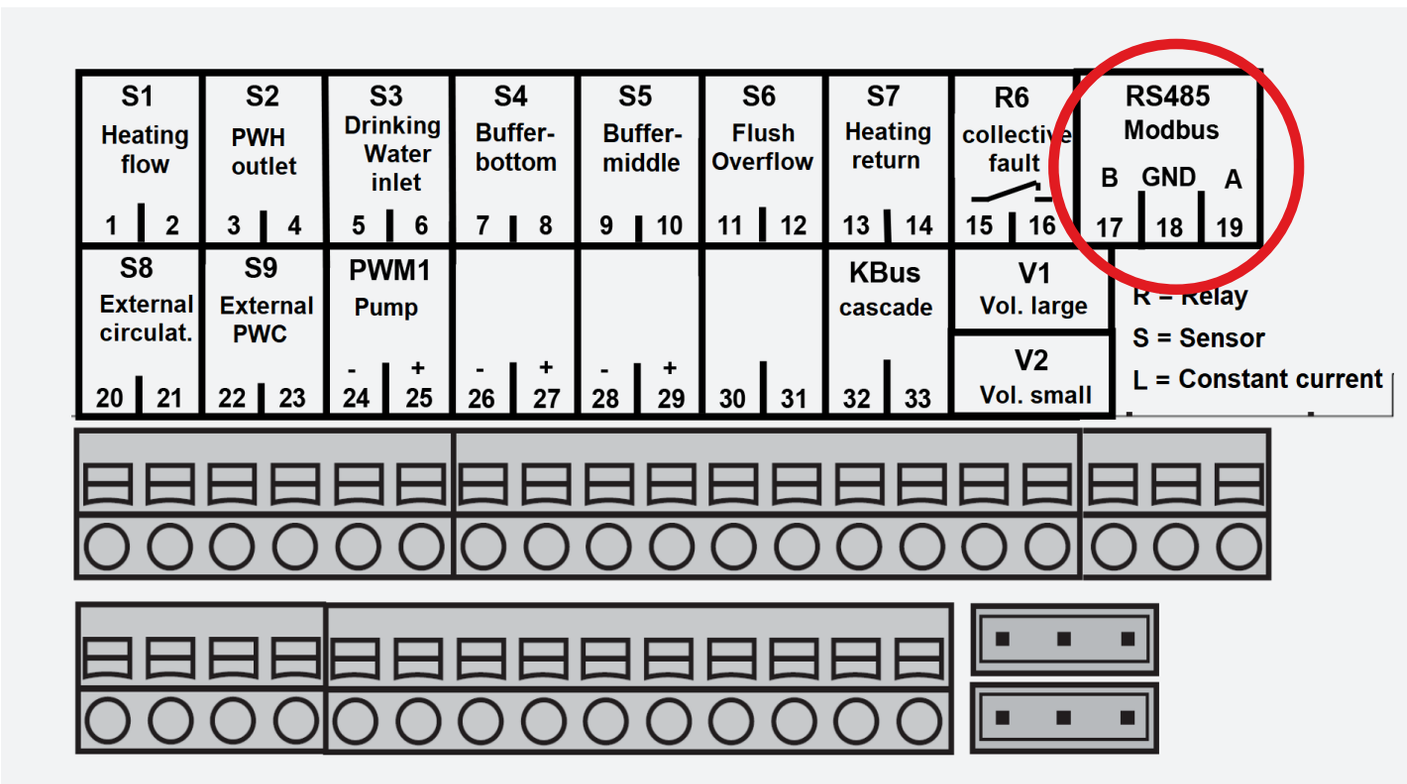


Other KTS units

4.2 Bus Installation to the BMS

The KTS units have a Modbus RS485 interface. This interface is used to tie controllable functions and readable information from the KTS flushing system into the building management system (BMS). You can connect the water heater to the BMS using terminals 17-19. You can find the data point list needed for this on the website, www.kemper-group.com, among the technical information in the ePaper Portal.

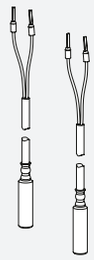
Physical interface	RS485
Protocol	ModBus RTU
Baud rate/databits/parity/stop bits	9600 / 8 / N / 1



Warning!
A permanent request for thermal disinfection and manual mode via the BMS leads to a risk of scalding.

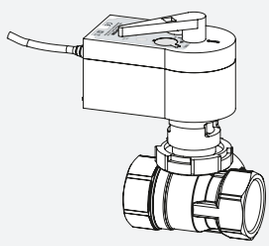
5 Optional Accessories

5.1 Additional Sensors, Figure 916 02 021



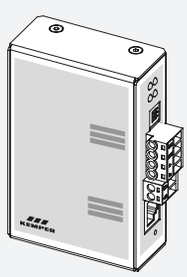
The optionally available sensor set (Fig. 916 02 022) enables all of the relevant temperatures in the system to be measured. Sensor S8 is attached to the hot water circulation , sensor S9 to the cold-water supply pipe and clamped to cascade unit 1 or the single unit. The temperature sensor of the hot water circulation connects to terminals 20-21, the temperature sensor of the cold-water pipe to terminals 22-23.
.

5.2 3-way valve, Figure 916



The temperature-controlled KTS 2-way valve is used to optimise the stratification within the ThermoTank. The different return temperatures of the respective operating
situations are taken into account (hot water consumption or circulation) and the temperatures in the lower part of the ThermoTank are kept low. In this way, a high efficiency of the heat source is achieved and the mixing of the heating medium is reduced to a minimum. The constantly high temperature level in the upper part of the ThermoTank increases the efficiency of the heat source.

5.3 BACnet Gateway, Figure 916 02 022

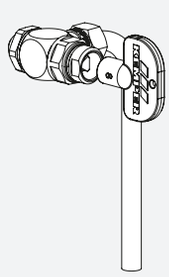


The BACnet Gateway (Fig. 916 02 022) acts as an interface extension for connecting the KTS system to the building management system via BACnet IP.

5.4 KHS Flush Point 230 V, Figure 684 04

During periods of non-usage (e.g. holidays or lockdown), the cold water in the pipes leading to the water heater often stagnates over several weeks, presenting a high potential risk to hygiene. If a KHS Flush Point is used, this risk can be eliminated by the water heater's controller by triggering automated flushes by the optional accessory (Fig. 684 04 015 00).

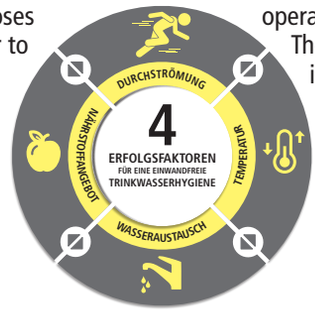
5.5 Gunmetal Sampling Valve Figure 187 00 006



As described in Chapter 6.6, it is possible to install a KEMPER sampling valve directly in the water heater. The sampling valve can be retrofitted simply and independent of location instead of draining.

6 Hygiene

he German Drinking Water Directive (TrinkwV) imposes an obligation on operators of buildings in particular to ensure hygienically perfect drinking water throughout the entire installation at all times. To meet this requirement, it is necessary to rule out the main sources of risk for a negative change in drinking water hygiene during design, installation and operation.



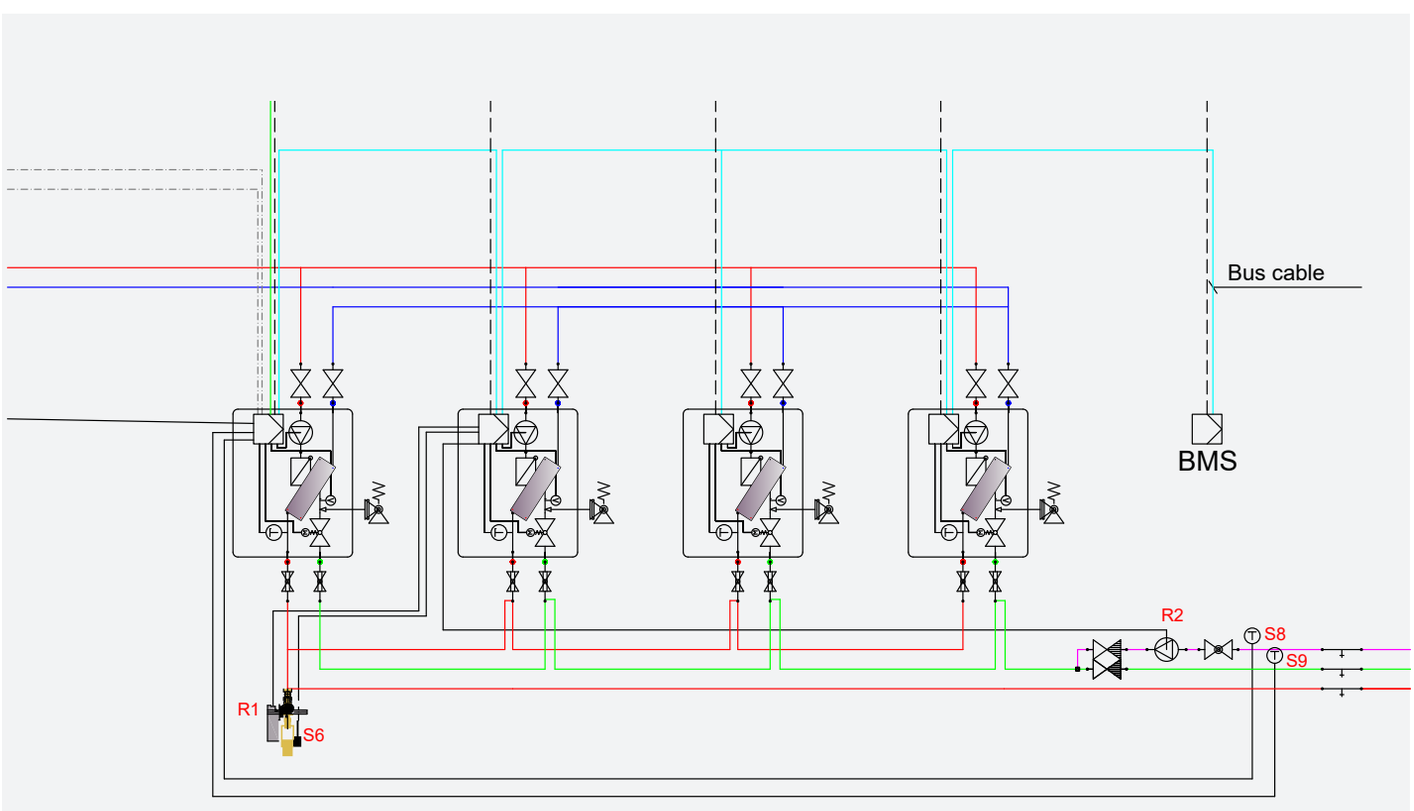
The KTS Water Heater minimises the growth of microorganisms, such as legionella, both in hot and cold mains water using various technologies.

6.1 Legionella

These rod-shaped bacteria occur in almost all freshwater systems and prefer to grow in luke warm temperature ranges. They therefore often find optimum growth conditions in domestic water installations. Legionella can get into people's lungs via aerosols, which occur when showering, for example, and there lead to a type of pneumonia (legionellosis) or a flu-like illness. Since the hygienic problems can be present both in cold water and in hot water, the following measures are recommended for the optimum prevention of legionella and other pathogens.

6.2 Water Exchange in the Feed Pipe to the Units

Legionella prefer to multiply in biofilms and single-cell life forms, such as amoebas, and are well adapted to conditions with low nutrient levels. Apart from nutrient supply, the main cause of bacteria growth is stagnation and thus a standstill of the drinking water. The drinking water hygiene in the cold-water pipe to the KTS units should therefore be ensured in times of non-use by means of flushing (complete water exchange), cooling or building measures, such as looped-through pipes. We therefore recommend the incorporation of a controllable KHS Flush Point (Figure 684 04), as shown below.



6.3 Flow Rate

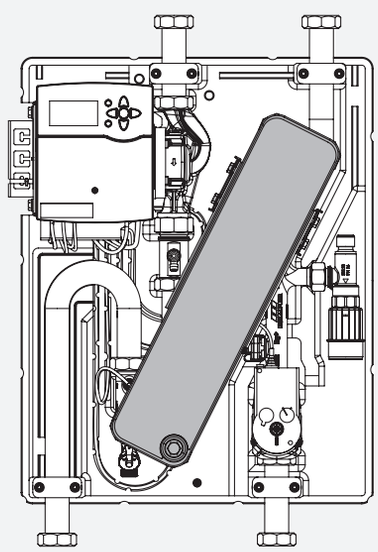
If not all of the water heaters in cascade units can be permanently used to capacity, hygienically risky standstill times for individual units may result. In such cases, cascade rotation prevents stagnation in individual water heaters. Thanks to the special structure of the plate heat exchanger and the water heater, sufficiently strong sheering forces occur on the walls. These ensure that no heavy deposits can form that provide protection and nutrients for pathogens.

6.4 Water Temperatures

In addition to water exchange and flow, the right temperature is one of the factors for success in perfect drinking water hygiene. According to DIN 1988-200, the hot water temperature must be at least 60 °C at the outlet of the water heater. In circulating hot water, the temperature must be kept at above 55 °C at all points. The cold water temperature should be less than 25 °C, and should preferably not exceed 20 °C. If these temperatures are not maintained, it can lead to a change in drinking water quality that is hazardous to health.

6.5 Nutrients

However, high water temperatures lead to increased lime solution from the drinking water. Limescale deposits on heat exchanger surfaces result in poorer efficiency of the complete system and provide good breeding ground for microorganisms. The limescale deposits therefore have to be removed using elaborate mechanical processes or by using acids. To ensure smooth and economical operation of the system permanently, the patented tilted position of the KTS plate heat exchanger ensures limescale protection thanks to faster cooling of the medium.



6.6 Sampling

In public buildings, regular monitoring of water quality (chemical and microbiological) is required according to DVGW worksheet W 551.
The requirements for correct sampling to test compliance with the limits of the Drinking Water Ordinance (TrinkwV) are described in DIN 38402-ff.
Correct sampling is possible only with suitable sampling valves.

DVGW Code of Practice W 551 shows a practical distribution of sampling points so that the contamination can be more precisely localised if necessary.

In highly complex installations, it makes sense to provide sampling points around the manifold and riser pipes and at the tapping points of the floor distribution lines. In general, however, the Public Health Department, determines when and where samples should be taken from (TrinkwV. Article 41 / 42, Order by the Public Health Department). The pivotable, DVGW-approved KEMPER sampling valves can be retrofitted optionally simply and independent of location instead of the draining shown.

6.6 Sampling

Note! It is important to ensure that no components of the water heater are damaged when flaming (disinfecting) the sampling valve. Particular attention must be paid to the insulation and cables here!

Read the following notes if the sampling valve in the water heater is to remain in the unit beyond the sampling period:

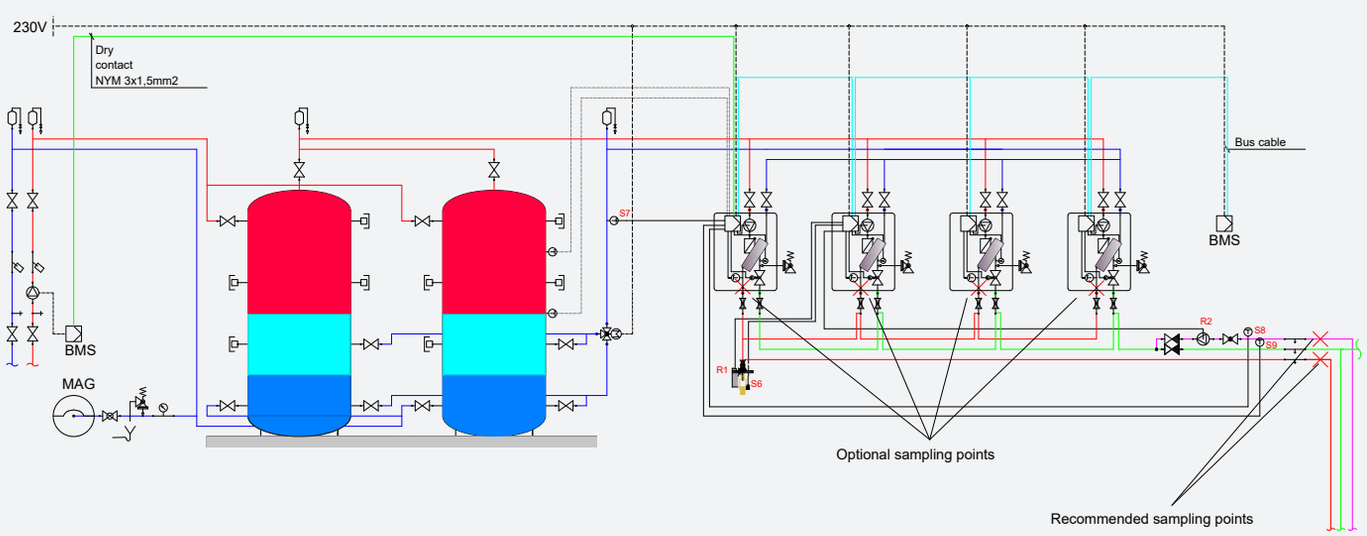
Note! The pipe must be turned up otherwise there is a risk that the insulation shell placed on it will get wedged. Completely drain the pipe before turning it up because possible water deposits will stagnate and could present a hygiene risk!

The necessary sampling points for carrying out a systemic examination in accordance with the Drinking Water Ordinance are described in Drinking water directive W 551 Section 9.1:

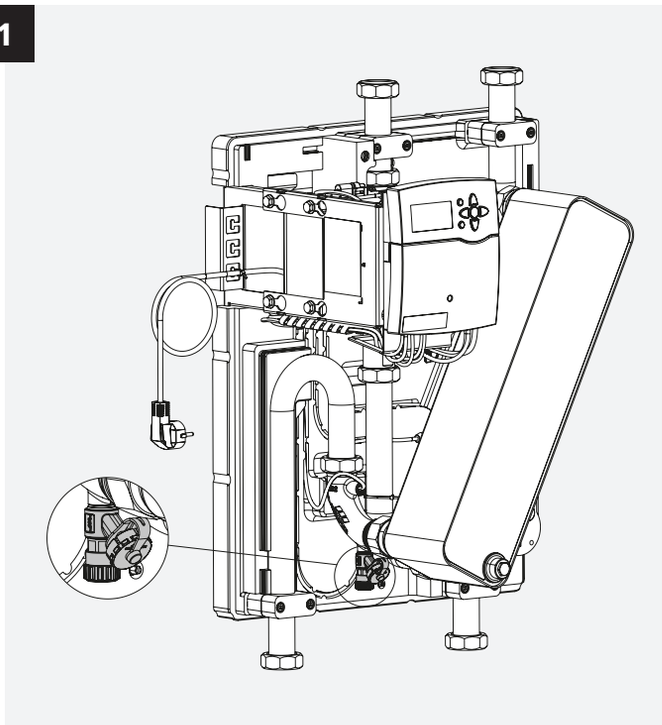
Samples must be taken from every domestic water installation as part of the exploratory investigation:

- Outlet of the pipe for drinking water (hot) from the water heater
- Reentry into the water heater (circulation pipe)
- Additional samples in the upstream pipework of the system (one tapping point per riser, each of which is as far as possible from the central hot water heating).
- Optional circulation headers
- Optional pipes/pipe sections or tapping points with known stagnation
- Optional tapping points in which the cold drinking water has the optimum water temperature of 25 °C or more after one litre has run off.
- Optionally in the water heater

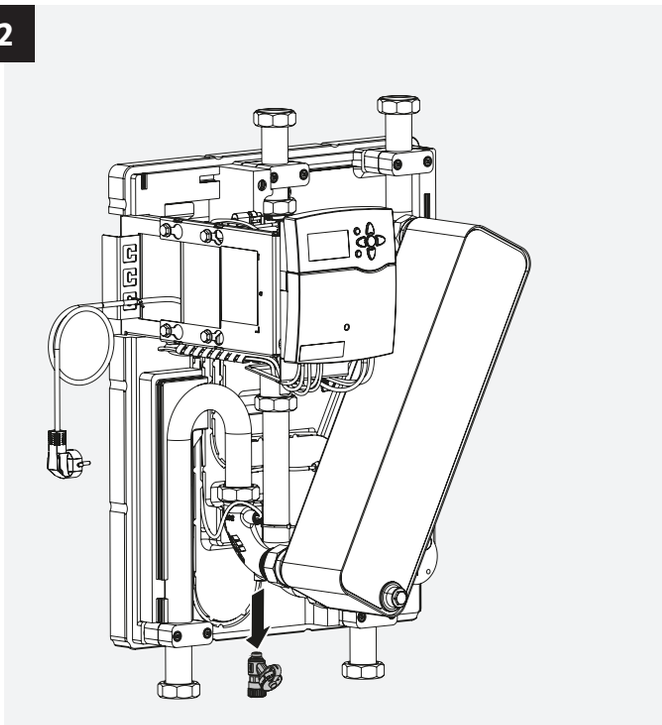
Where the circulation reenter the water heater, the sampling point should be chosen so that no malfunctions from the water heater can influence the result of the test.
To ensure that the drinking water is actually taken from the circulation, the sampling point should ideally be on the suction side of the circulation pump. Otherwise, appropriate measures must be taken to ensure that there can be no incorrect draw-off of drinking water from the water heater.
If sampling of the water heater is desired, for example in a further reaching test or a subsequent test, a sampling valve can be screwed directly in the KTS Water Heater. In this case, please read the notes in this Chapter *6.6 Sampling* (from page 46).



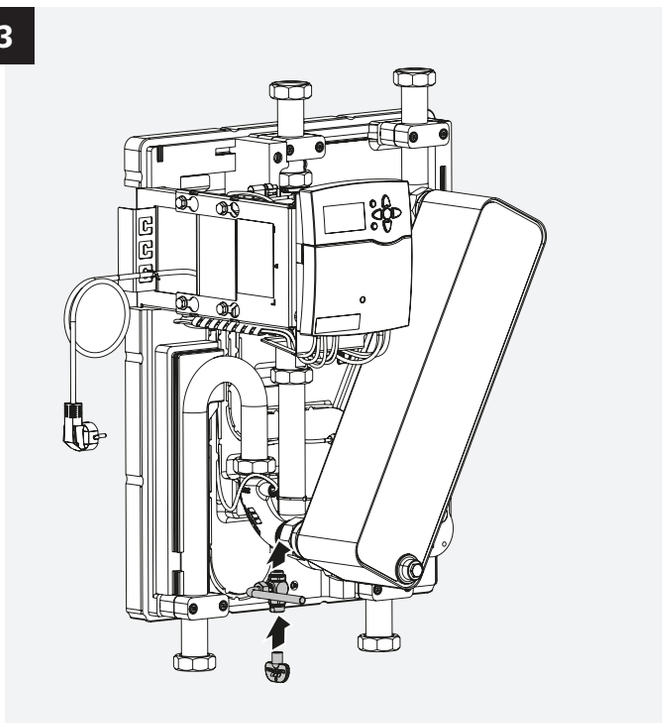
1



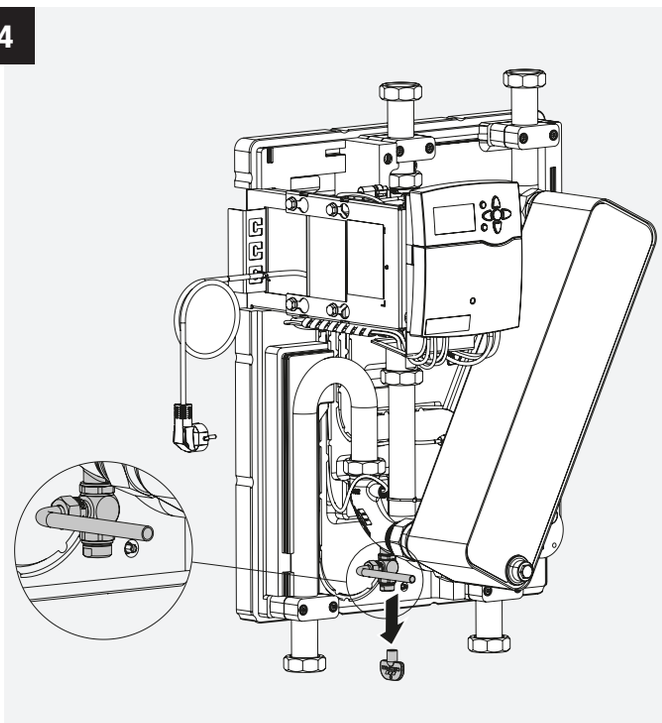
2



3



4



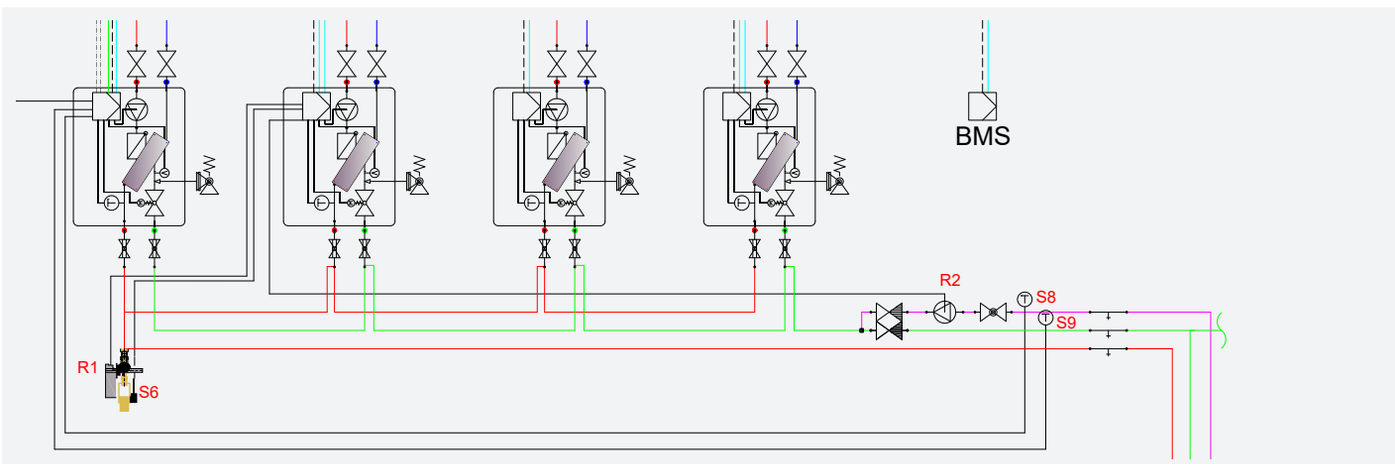
6.7 Sizing and Connecting the Flushing Pipe

Size the wastewater connection to be sufficiently large according to DIN EN 12056 and DIN 1986-100. Accept the volume flow that can be arise at the flush point through the connection pipe. According to the factory configuration, this is 10 l/min.

Ideally, loop the hydraulic connection of the flush point or connect the flush point directly after the water heater using non-branch pipes that are as short as possible.

If you do not tightly connect the flush point and connect it to the sewer network, you can deactivate the overflow sensor in the settings under the item Flush.

Note! Set the duration of the flush so that at least the cold-water pipe to the units is flushed.



Hygienically connected water heaters

6.8 Thermal disinfection

Note! During disinfection, adapt the circulation pump to the circulation volume flow that you need for thermal disinfection.

Attention! Make sure that your heat generator can achieve 2k over-temperature flow temperature to the desired hot water temperature for disinfection.

Attention! If you want to interrupt thermal disinfection of the water heater, select the dedicated menu item 'Interrupt' in the Disinfection mode.

If you have to carry out thermal disinfection, you can select this function in the menu of the water heater. An important factor for thermal disinfection is not to carry it out for preventative reasons, never mind repeatedly.
With the temperature rise in the drinking water you usually achieve only very short-time effects and no permanent improvement to the drinking water quality. The thermo-tolerance of the single-cell beings and biofilms also increases during the disinfection phase. If we view this over a longer period, the drinking water quality in the system can deteriorate considerably. If legionella strains are in what is known as a VBNC stage, they are resistant to temperatures over 70 °C right up to 90 °C for a period of more than 60 minutes (solar pasteurisation).

The legionella that are actually killed by the measure become biomass in the event of non-use. Without the killed mass being flushed out, this then acts as additional breeding ground for more legionellas, OPPPs and other organisms.
Without optimisation of the hydraulics, preventative thermal disinfection therefore has no effect and leads to collateral damage to the material.

If you want to conduct thermal disinfection, proceed as follows:
Main menu> Modes> Disinfection > Start
After activating the function, the water heater starts to product default 75 °C hot water. Using the sub-items in the Disinfection menu, you can individually set the maximum duration of the disinfection method.
Using the PWH-Temp. Sub-item, you can set the desired hot water temperature in the event of disinfection. Please note that you must disinfect the entire hot water system at at least 70 °C.
Use the menu item 'Total duration' to set the duration of the action, including pre-heating the buffer tank.
Use the 'Duration disinf.' sub-item to set the pure disinfection time of the drinking water system.
With the 'ΔTaus PWH' to set how much your hot water temperature should fall in relation to the set target temperature until the timer pauses the disinfection action if the system falls below the temperature.

7 Commissioning

Note! Pay attention to neat cable lying in the unit.

Note! The unit must be perfectly filled and vented

Note! Check whether all screwed connections and pipe clamps in the unit are tightened properly.

Note! Optionally, conduct an actuator test.

Note! Check the complete system for leaks before commissioning.

Note! Check the sensor values for plausibility after commissioning.

Note! Check whether the wastewater pipe of the pressure-relief valve is sized and mounted correctly.

Note! During commissioning or repair, make sure that the blade of the control engages correctly on the measuring track.

7.1 Commissioning Wizard

Carry out the following points for correct commissioning:
- Vent and flush all drinking water and heating pipes
- Apply voltage to the controller or the water heater.
- Flush the circulation pipe at a central point in the water heaters.
- Carry out the IBN menu of the controller at water heater 1.

1

System configuration
In system configuration, set whether you are using a cascade or a single unit. If it is a cascade, set how many units it comprises.

After the time has been set, the additional features of the water heater are queried:

2

Circulation pump

Is the circulation pump connected to the water heater or is it controlled externally? (Fig. 1)

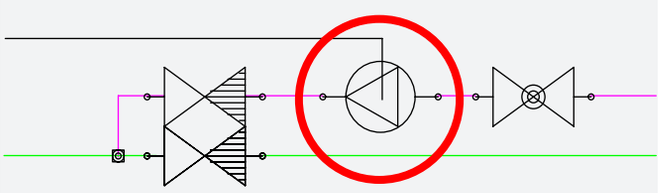


Fig. 1

3

Recharge request
Is recharging the buffer tank controlled via the water heaters? (Fig. 2)

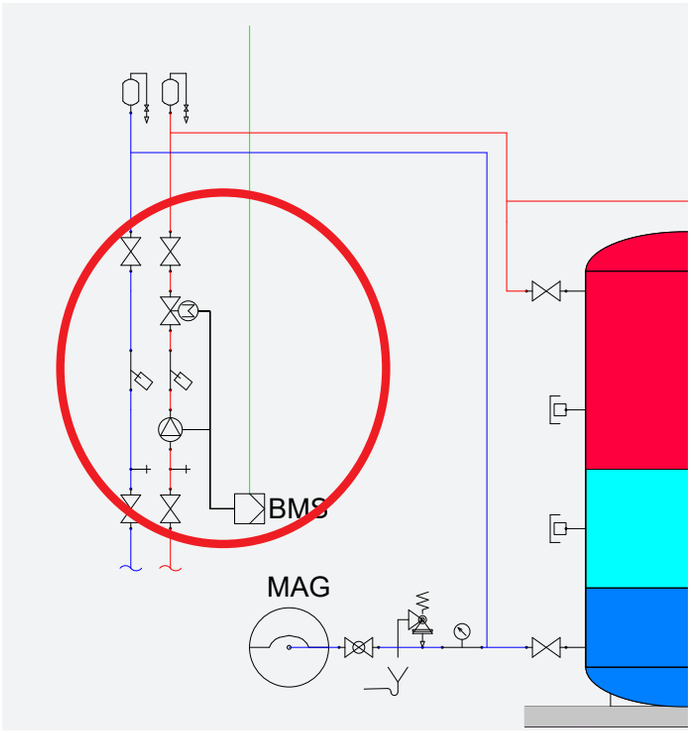


Fig. 2

4

2-way valve
Is a 2-way valve installed for return flow stratification? (Fig. 3)

Note! Carry out the important advanced settings described below.

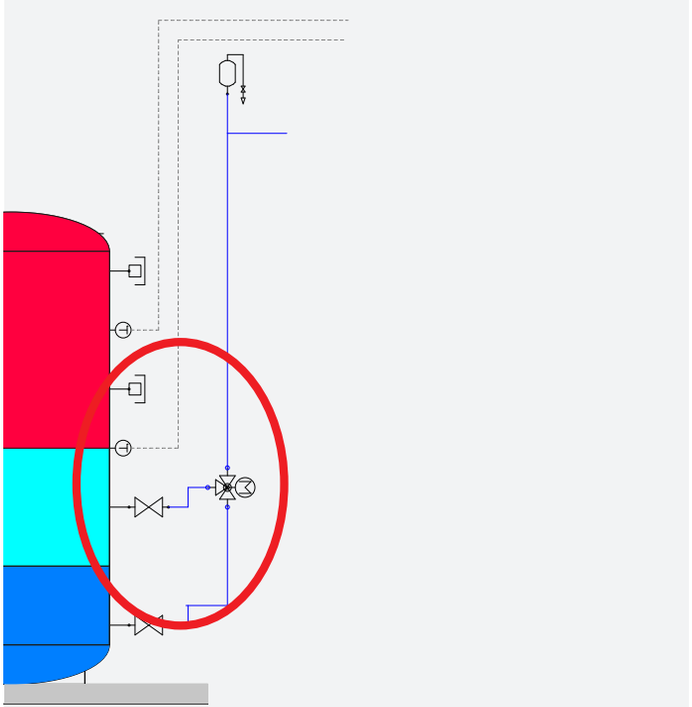


Fig. 3

7.1 Commissioning Wizard

5

Flushing function
Is a flush valve connected to the water heater? (Fig. 4)

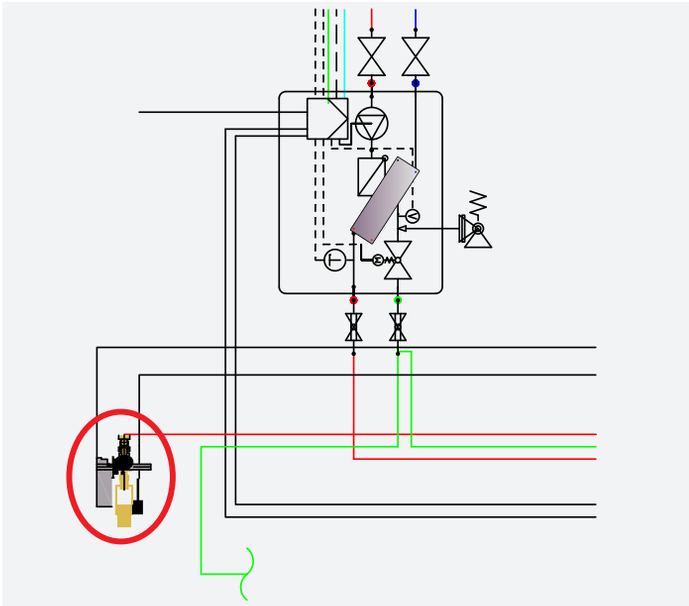


Fig. 4

After ending the commissioning menu on water heater 1, you must conduct the commissioning on water heater 2.

- Here, first of all set which unit in the cascade it refers to. Then do the same for all the other cascade units.
- Cross the relevant number of the sticker for this purpose on the controller front corresponding to the unit in the cascade.

7.2 Advanced Settings

After ending the Commissioning Wizard, adjust the following important points in the plumber menu.

Menu>Setting>Operator code PW: 1864> then the following settings are possible in the menu:

1

Circulation pump
The circulation pump is permanently controlled as standard. You can set this in the menu item -> Settings -> Circulation.

2

Re-loading
Menu item -> Settings -> Re-load

Here, you can set via the hysteresis 'on' with which over-temperature in relation to the hot water temperature the heat to TF 03 is to be charged.

3

Return stratification

Info There is no default setting here as standard.

Menu item -> Settings -> Re-load

You have to define whether the 2-way valve switches between the return temperature and TF 04 thermostatically or using a temperature difference.

- Thermostatically: Here, only the return temperature sensor is considered for the decision to switch the 2-way valve. You can adjust the limit to switch here using 't-on'.
- At type difference, the 'on' and 'off' switching threshold for mean stratification is defined in the buffer tank. For this, the temperature in the buffer below and the return temperature are considered.
- Installation position! Here, you have to set whether the 3-`way valve is installed with the outlet facing right or left to the buffer tank.

4

Flushing function
You can set the duration of the flush here.

7.3 Adjustable Hot Water Temperature

If you want to change the adjustment range of the maximum and minimum hot water temperatures, proceed as follows:

Menu>Setting>Operator code PW: 1864> then the following settings are possible in the menu:

PWH > PWH-MIN> 30 °C-70 °C

For setting the hot water temperature < 60 °C, please check the conditions of the 3 litre rule in the building plans.

7.4 Controller update

To update the controller, remove the SD card from the left-hand side: of the controller.
On your PC, add another folder to the SD card with the name 'FIRMWARE' in addition to the existing folders 'EVENTS' and 'LOGS' and store the new software there.
Now take the SD card and install it in the controller again.

There is now a query concerning an update; confirm this query.

Carry out an update on all water heaters.

7.5 Activate Function

If you have accidentally deactivated functions during commissioning that you need or if you want to retrofit certain functions, proceed as follows:

Menu>Setting>Operator code PW: 1864> then you can change the following settings in the main menu under Settings:

- Re-load (YES/NO)
- Circulation (YES/NO)
- Flushing function (YES/NO)
- Blocking protection (YES/NO)
- Fault relay (YES/NO)
- Optimisation function (YES/NO)

7.6 Saving and Reading Settings on the SD Card

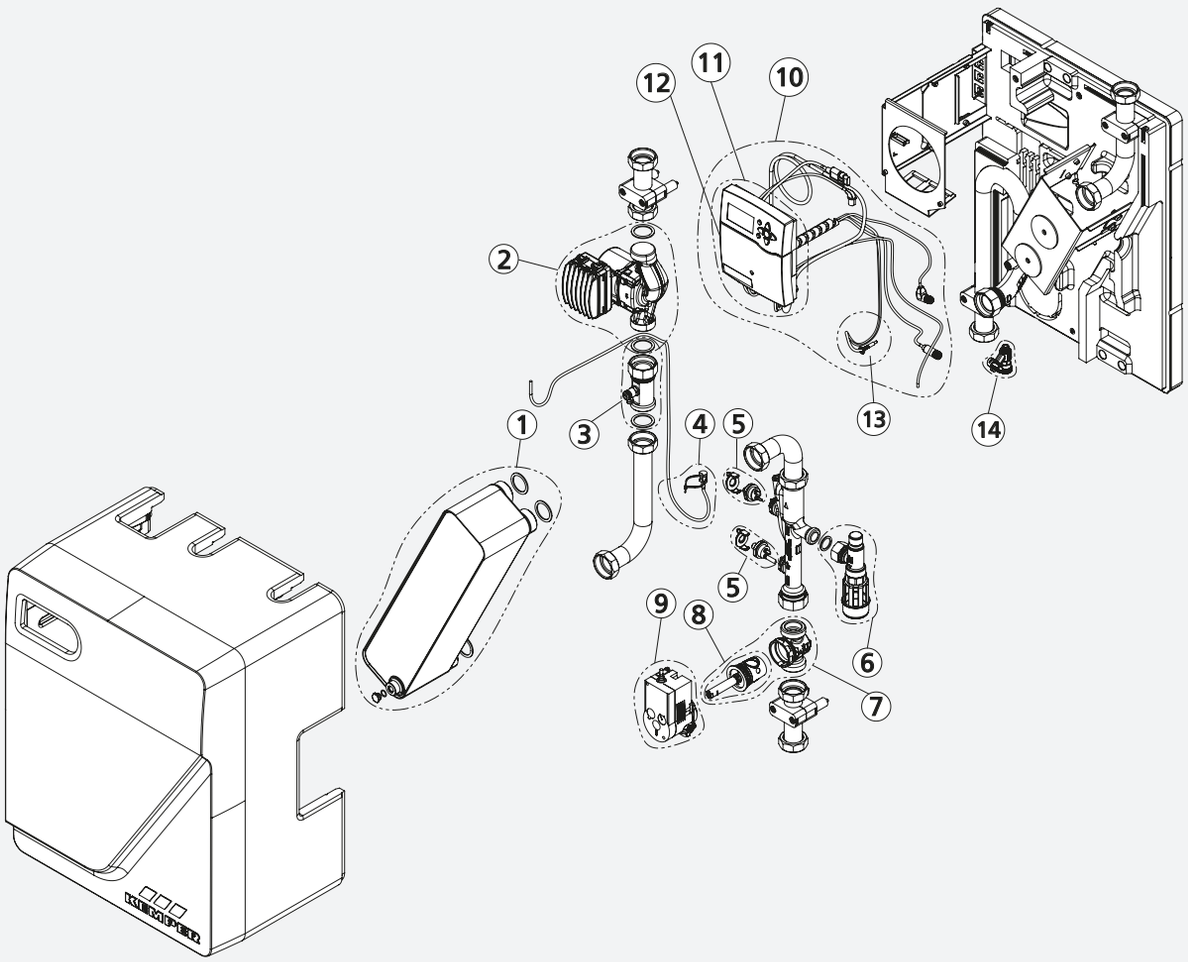
You have the option to save parameters that were set during and after commissioning on the SD card in the controller.
Proceed as follows:

Menu>Settings>Data logger> Save settings.

To load the settings on the controller again or on another identical cascade, proceed as follows:

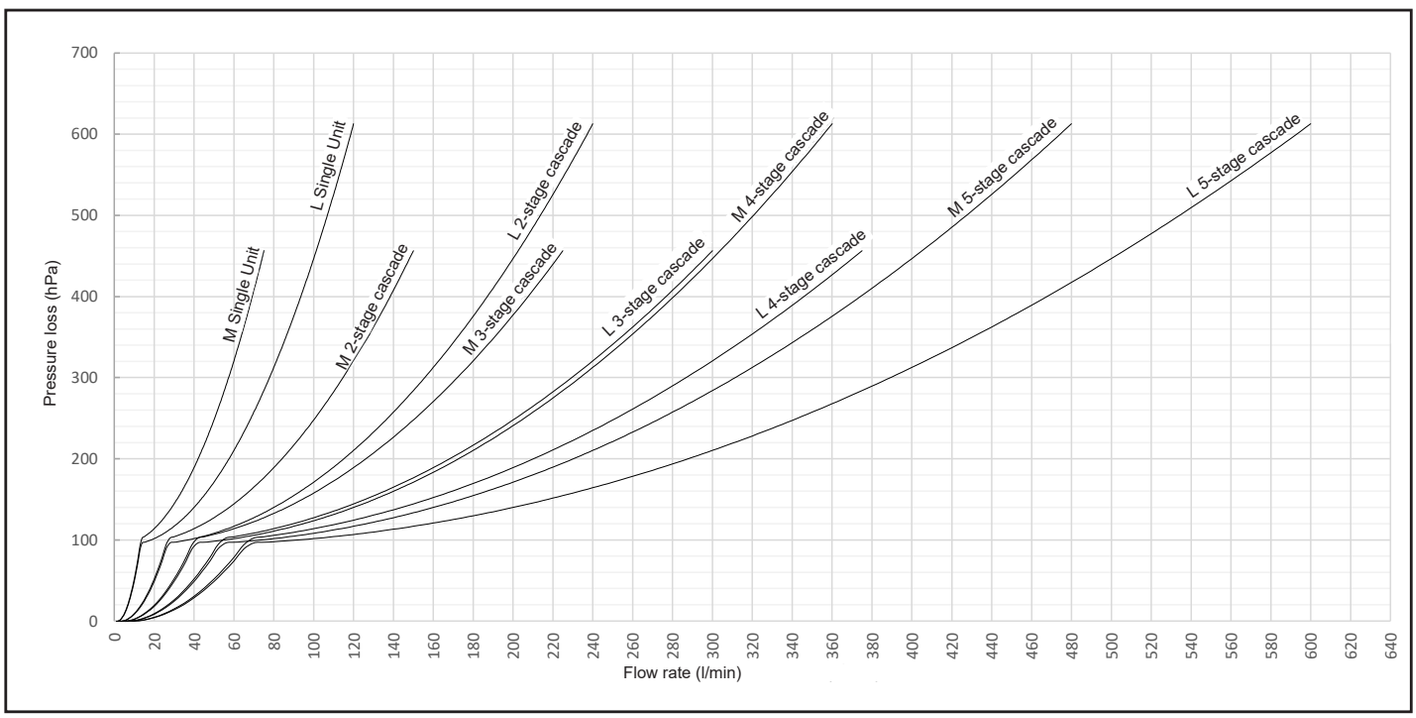
Menu>Settings> Data logger> Load setting>
Operator code 1864

i Modbus Information

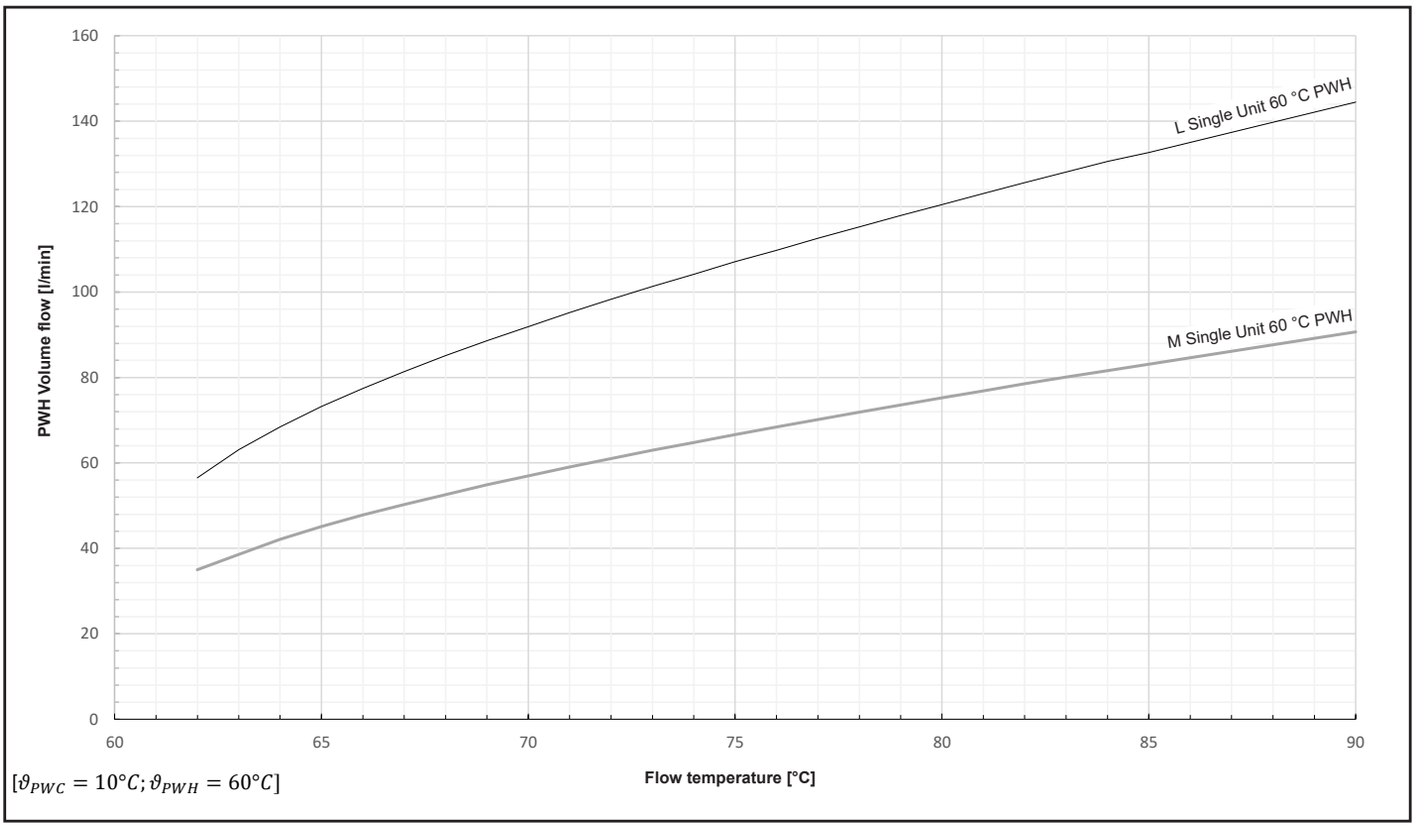


No.	Designation	Part No.
1	• Plate heat exchanger, copper-soldered for KTS Water Heater M • Plate heat exchanger, stainless steel for KTS Water Heater M • Plate heat exchanger, copper-soldered for KTS Water Heater L • Plate heat exchanger, stainless steel for KTS Water Heater L	9159900100 9259900100 9159900200 9259900200
2	• Pump for KTS Water Heater M • Pump for KTS Water Heater L	9160200100 9160200200
3	Gravity brake	9160201300
4	HZVL temperature sensor	9160200700
5	Flow sensor 1.8-32 l/min Flow sensor 9-150 l/min	9160201500 9160201600
6	Pressure-relief valve with add-on parts	9160201700
7	KHS for actuator DN 32	6860G03200
8	Top part complete with stainless steel ball	68600032KP
9	Actuator with flange adapter	6860000600
10 (inkl. 4+13)	• Controller for KTS Water Heater single unit and master • Controller for KTS Water Heater slave	9160200300 9160200400
11	• Controller for KTS Water Heater single unit and master without cable • Controller for KTS Water Heater slave without cable	9160200500 9160200600
12	SD card for controller	9160200900
13	PWH temperature sensor	9160200800
14	Drain valve G 1/4	J71091730000600
-	Temperature sensor set for buffer tank	9160201400

Pressure Loss Drinking Water Side (Secondary)

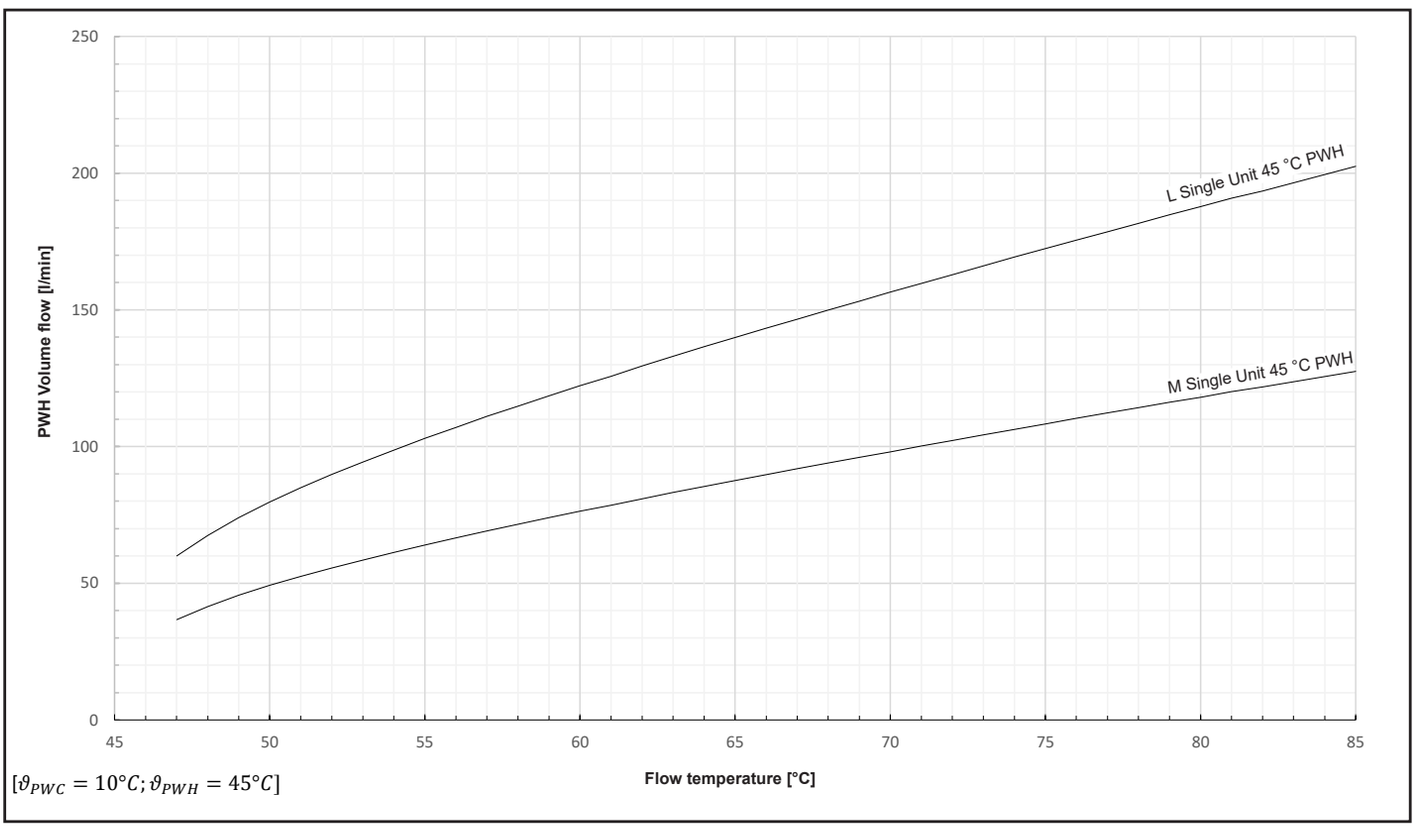


Performance Diagram Single Units PWH 60 °C



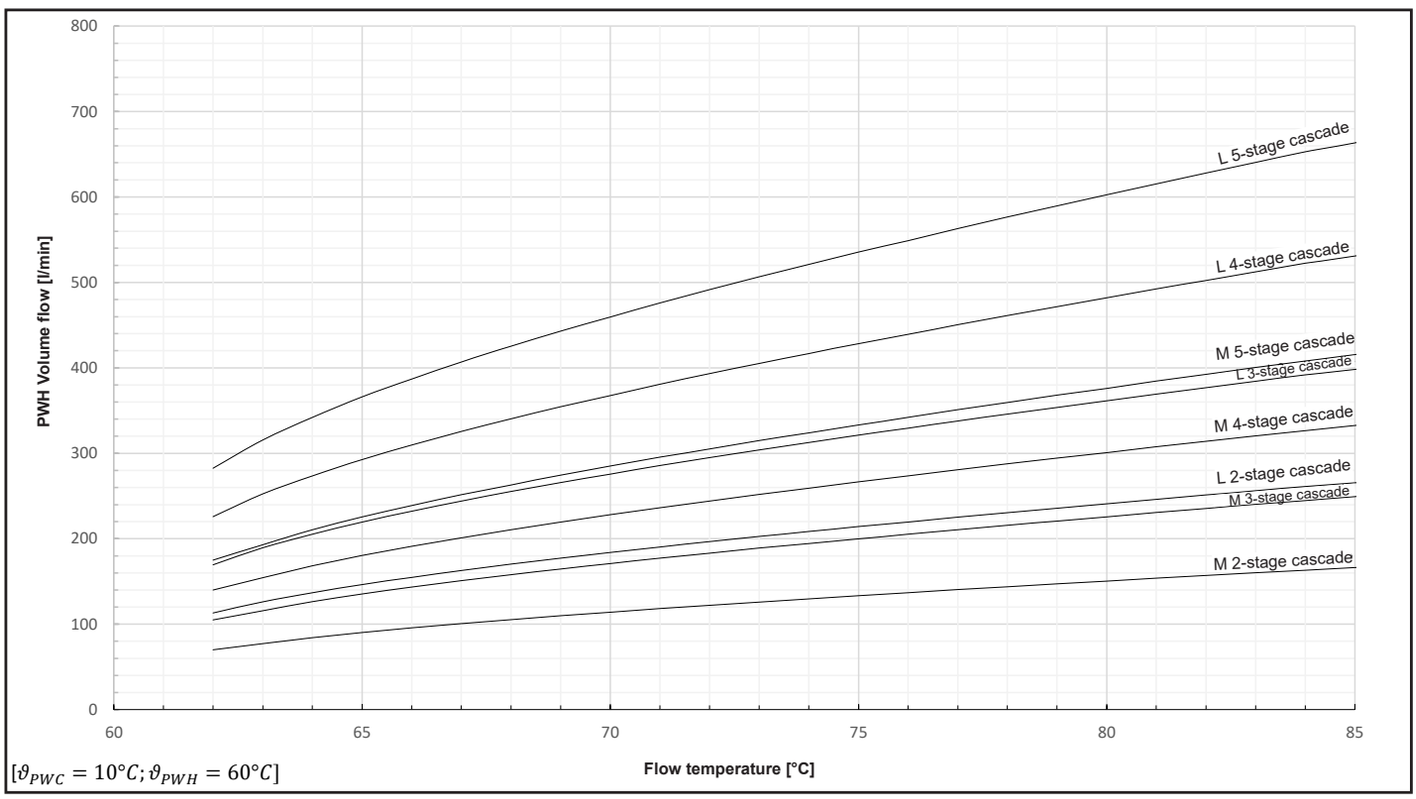
$[\vartheta_{PWC} = 10°C; \vartheta_{PWH} = 60°C]$

Performance Diagram Single Units PWH 45 °C



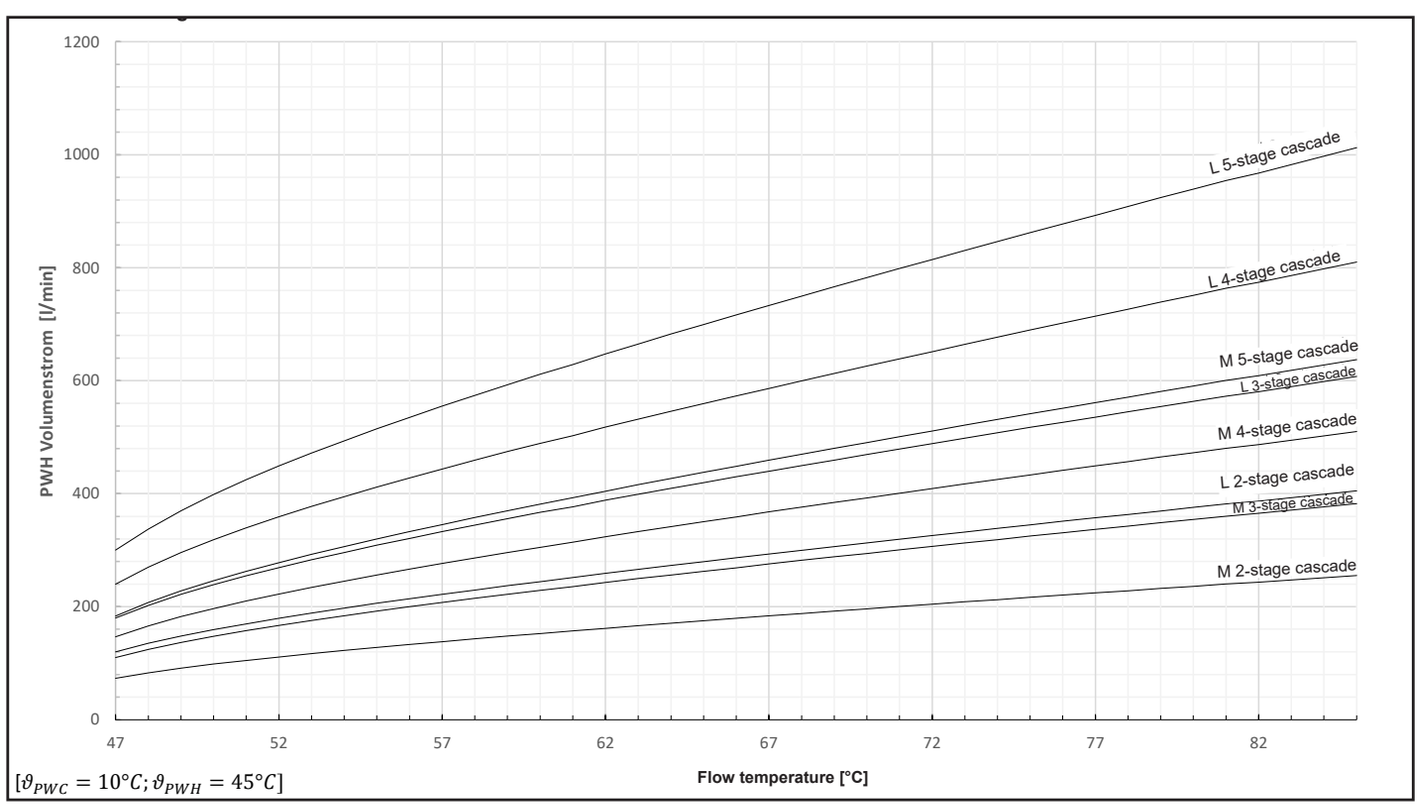
$[\vartheta_{PWC} = 10°C; \vartheta_{PWH} = 45°C]$

Performance Diagram PWH 60 °C



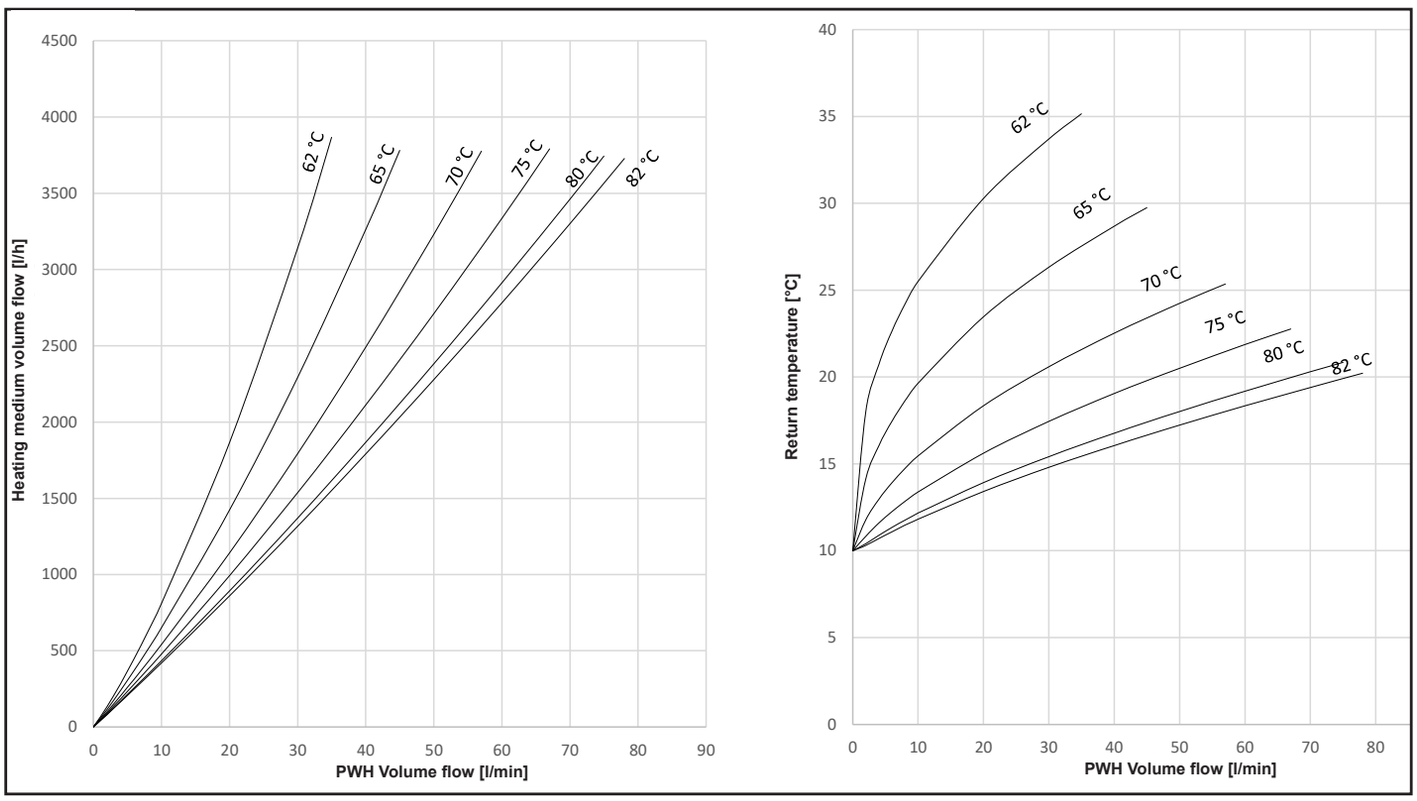
$[\vartheta_{PWC} = 10°C; \vartheta_{PWH} = 60°C]$

Performance Diagram PWH 45 °C

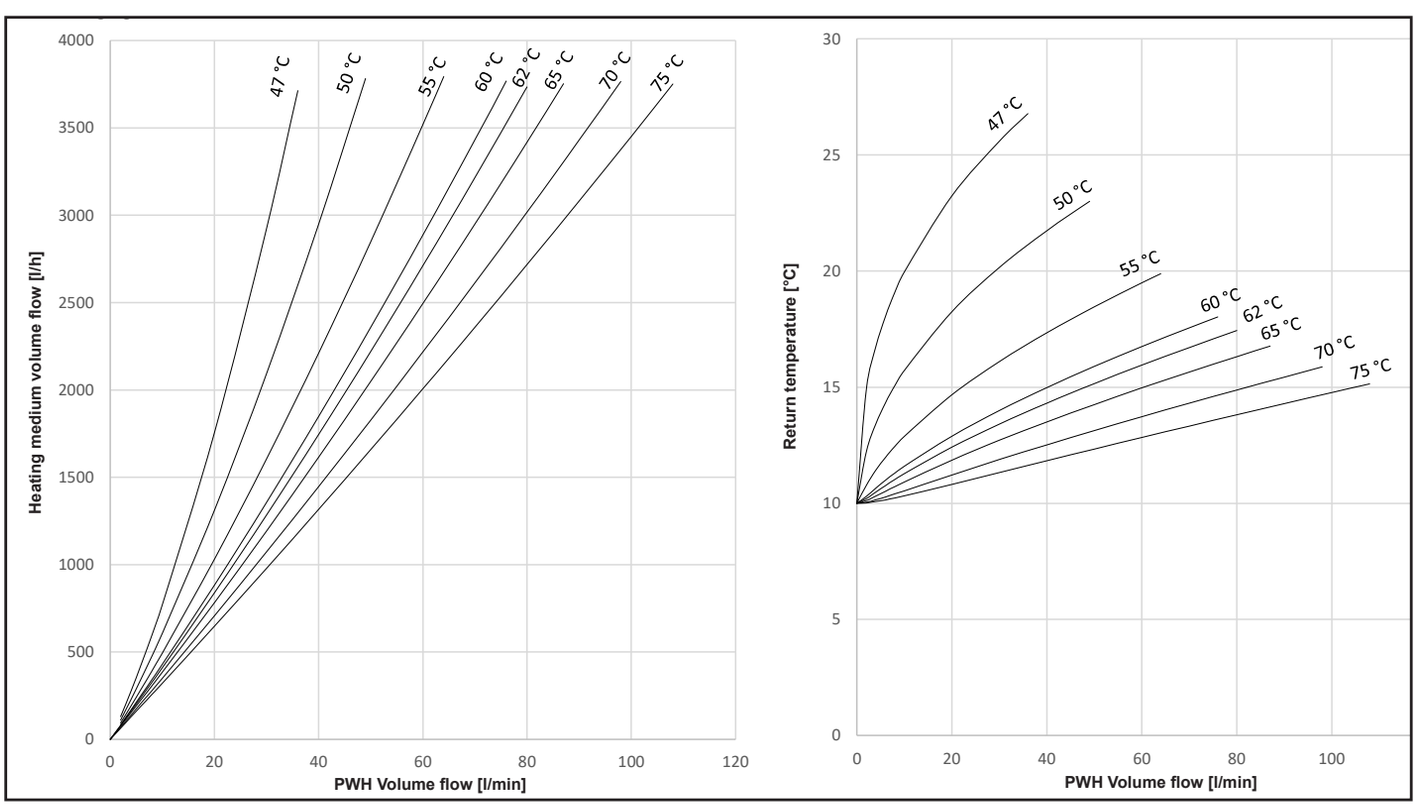


$[\vartheta_{PWC} = 10°C; \vartheta_{PWH} = 45°C]$

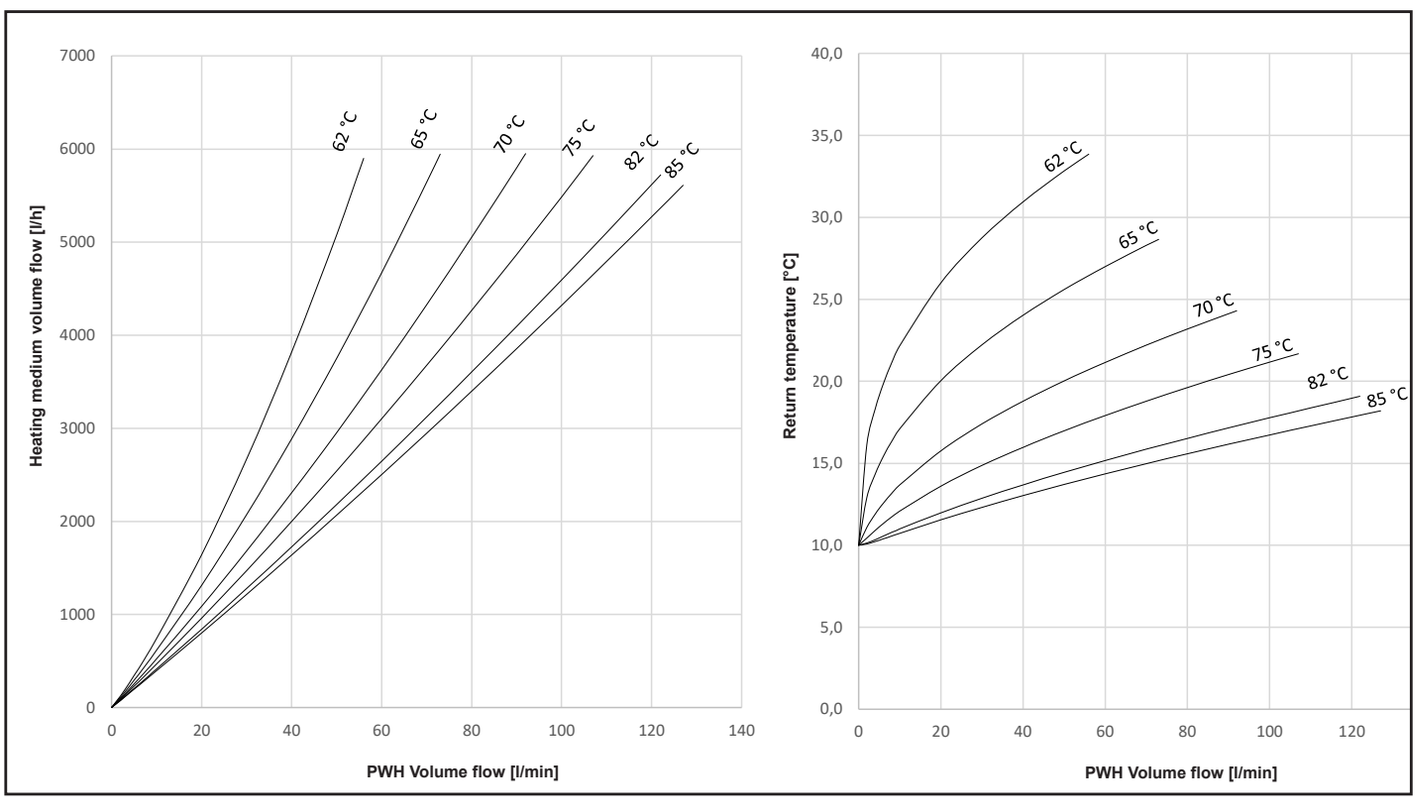
Water Heater: M
PWH: 60°C



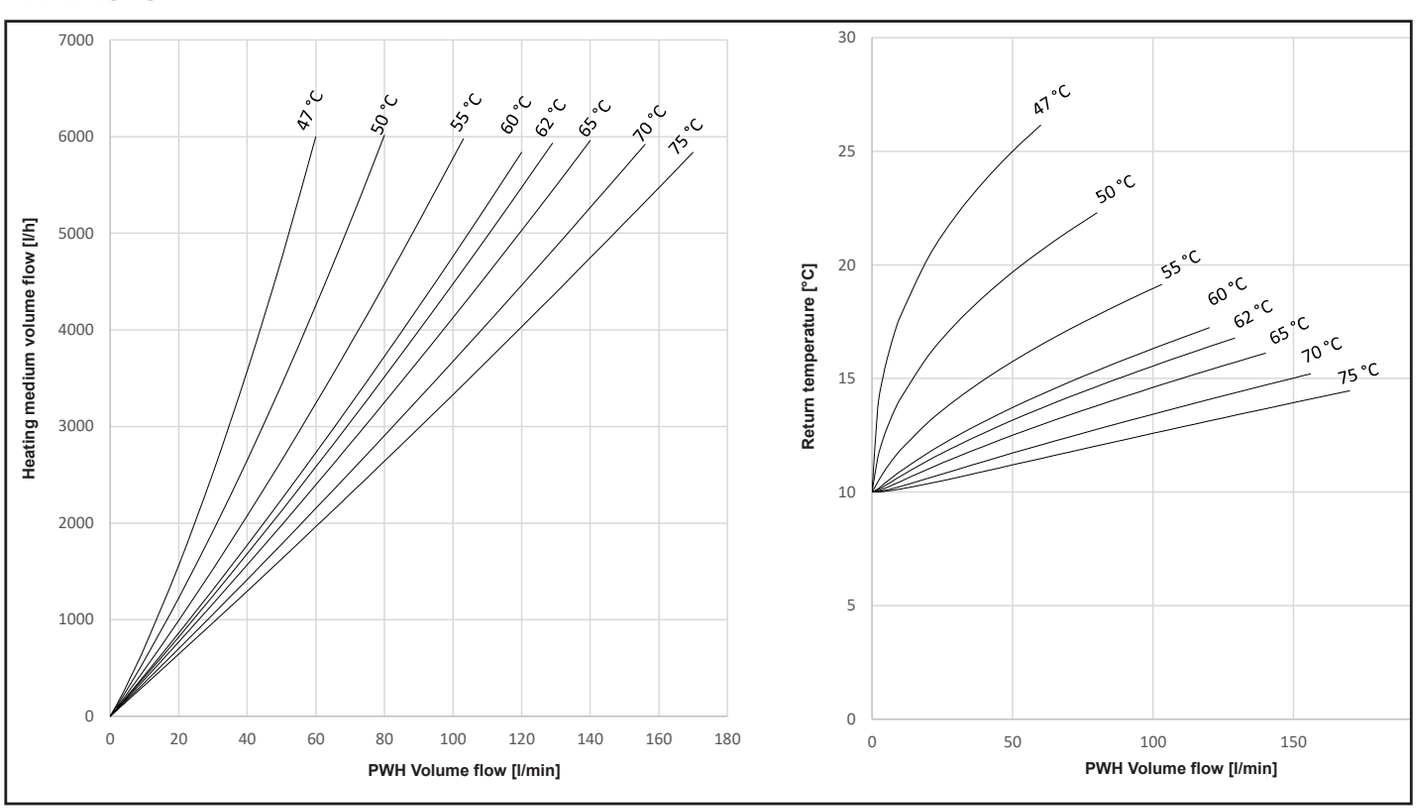
Water Heater: M
PWH: 45°C



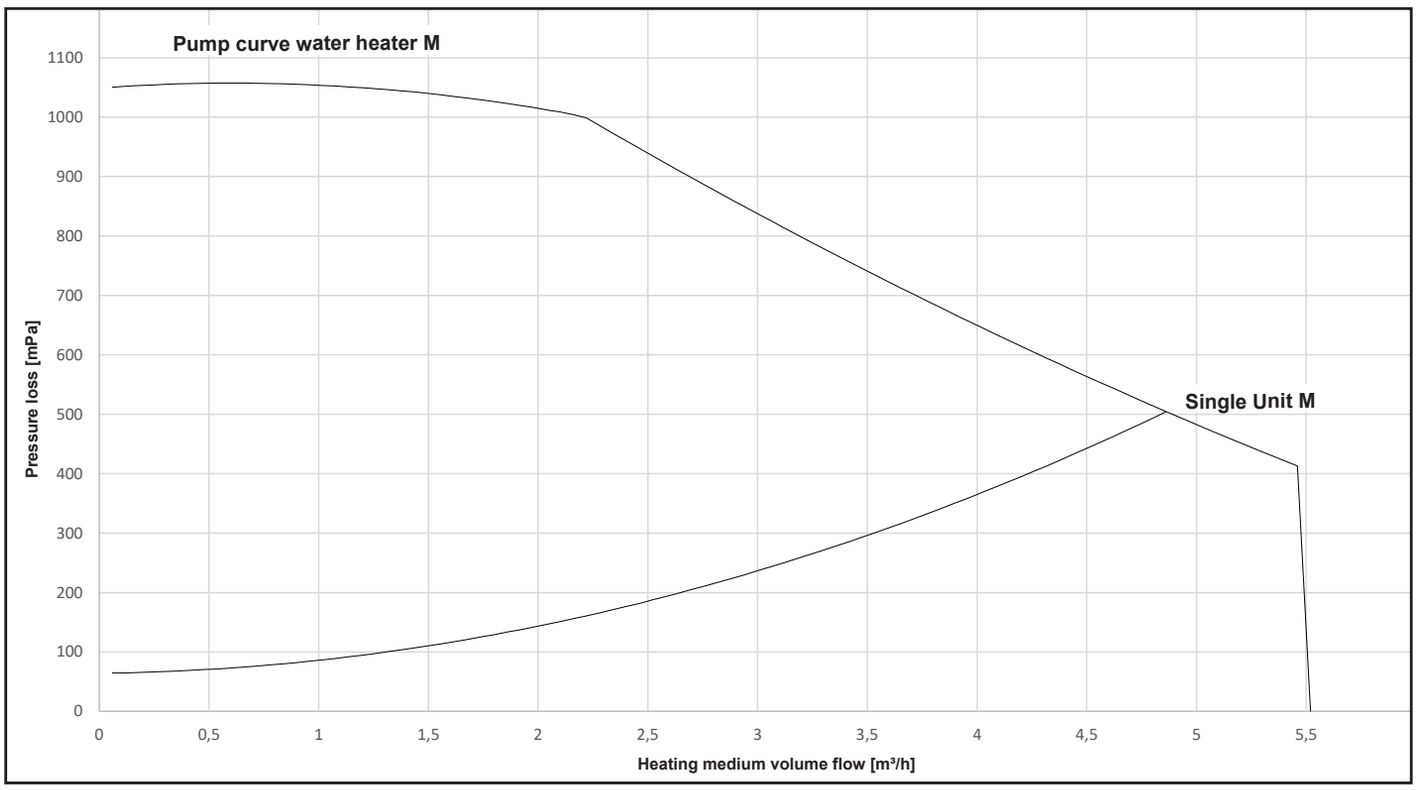
Water Heater: L
PWH: 60°C



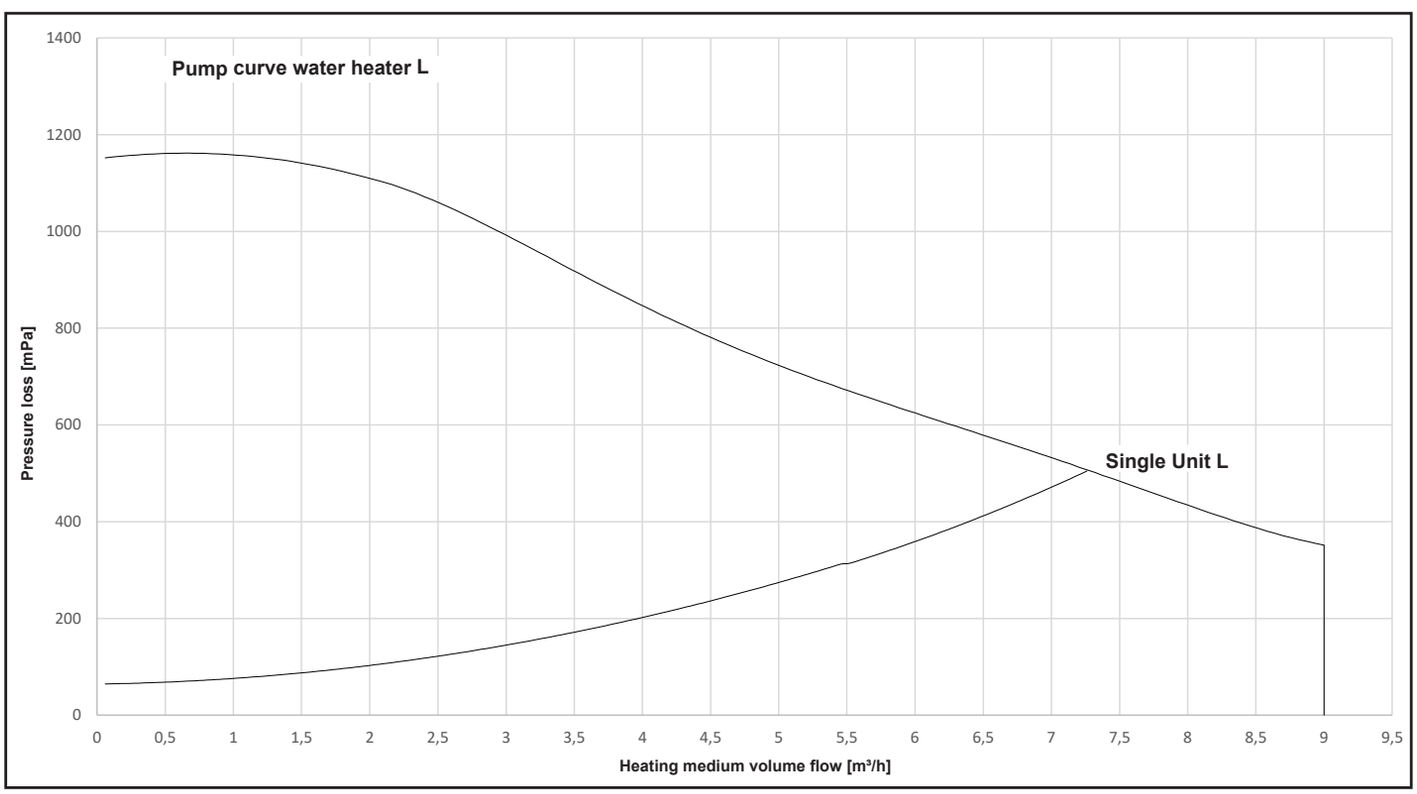
Water Heater: L
PWH: 45°C



Pump Curve and Primary Pressure Loss M

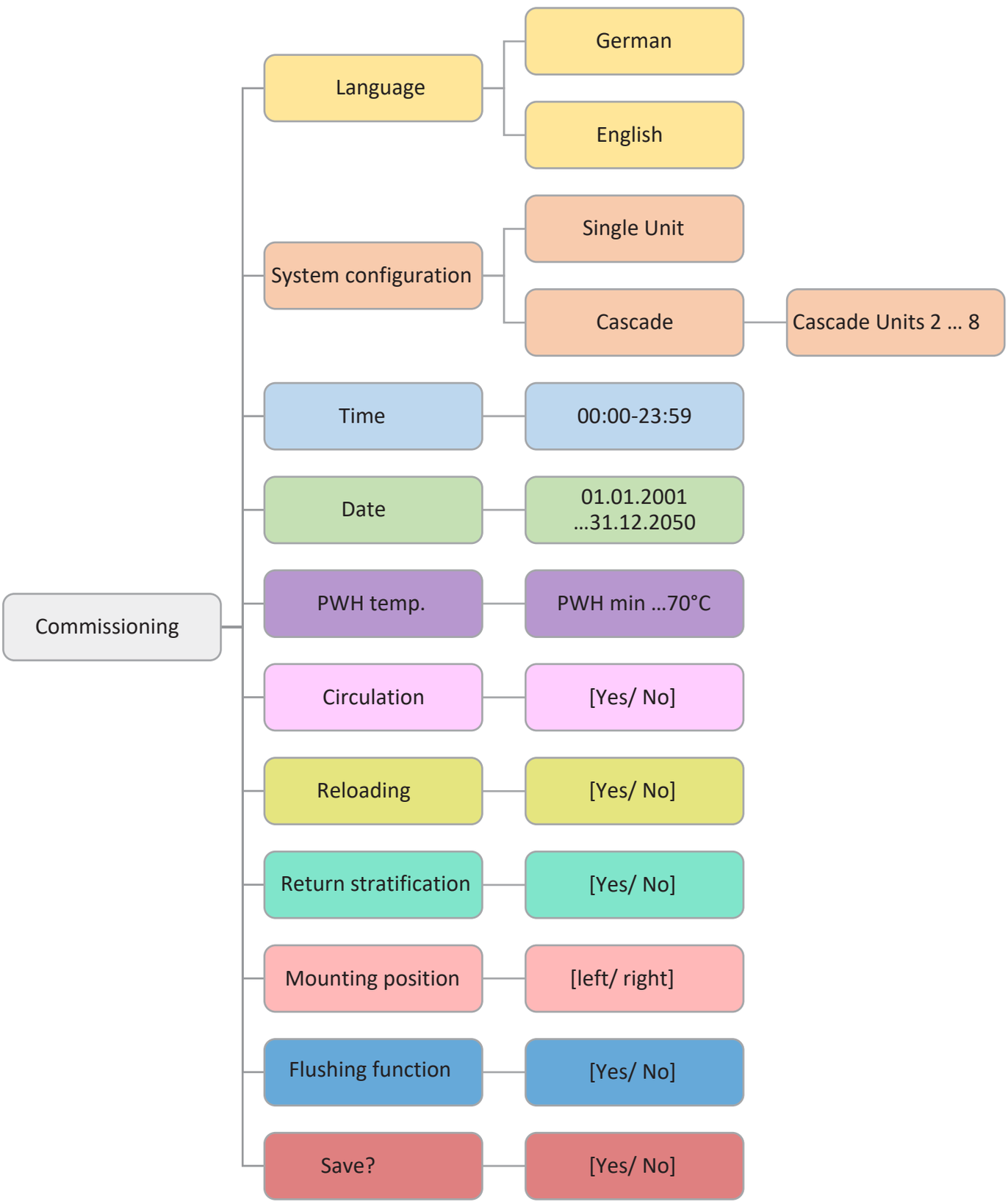


Pump Curve and Primary Pressure Loss L

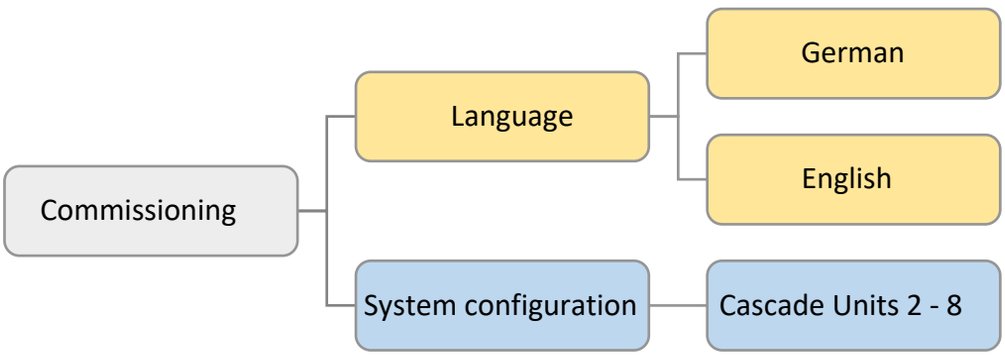


10 Menu Structure

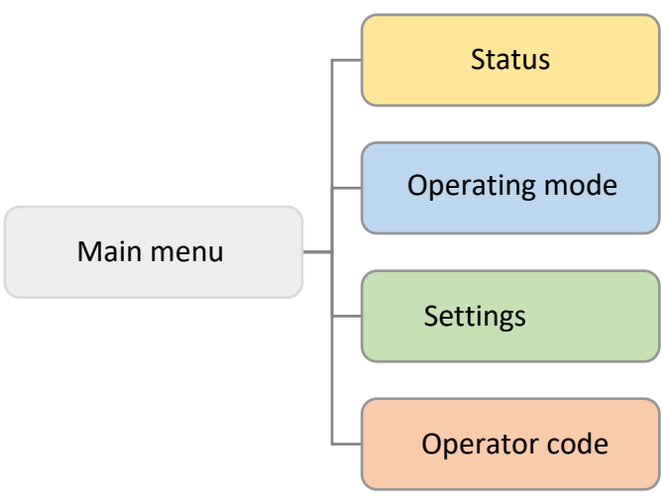
10.1 Menu Structure Commissioning Wizard Water Heater 1

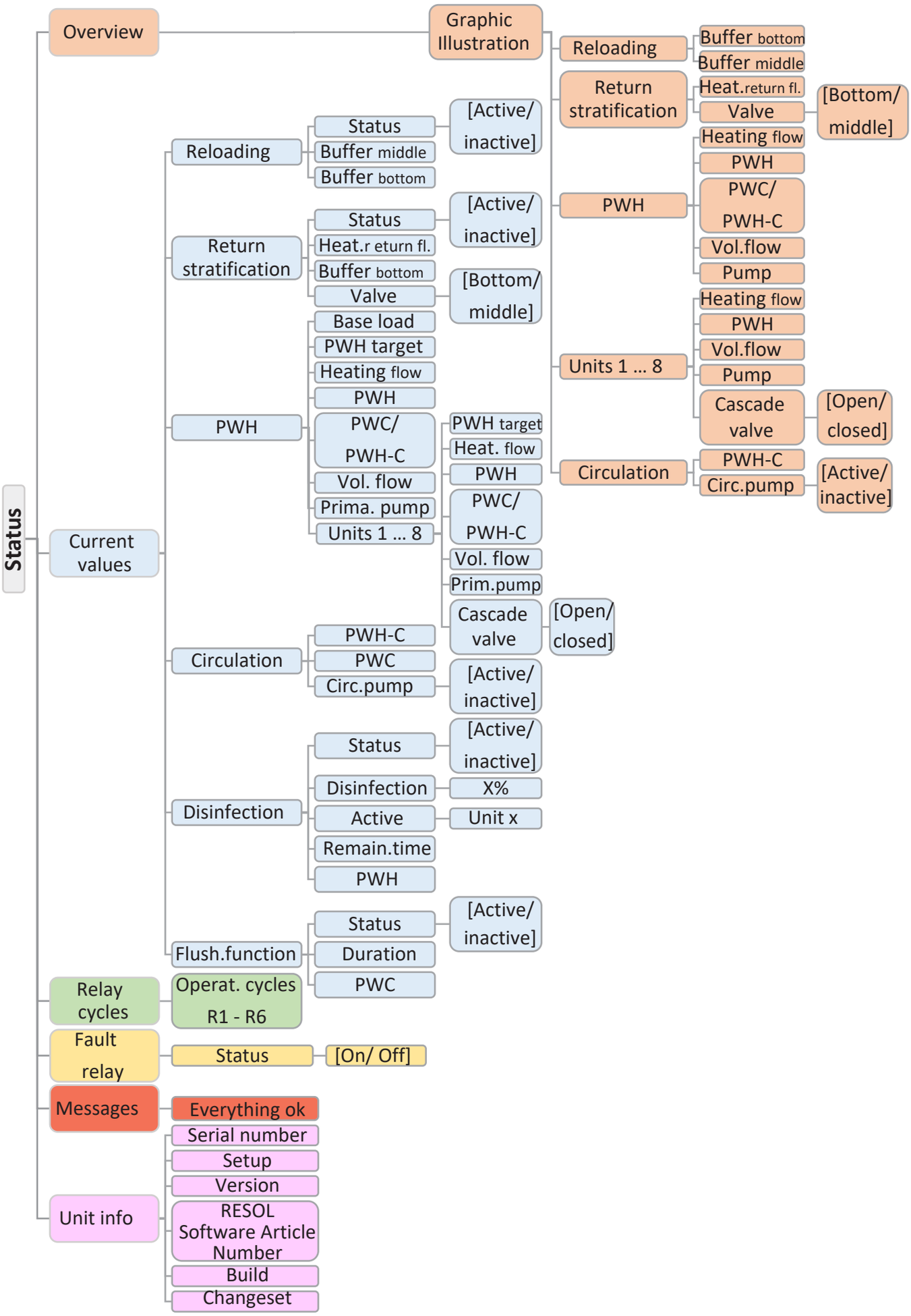


10.1 Menu Structure Commissioning Wizard Water Heater 2-8

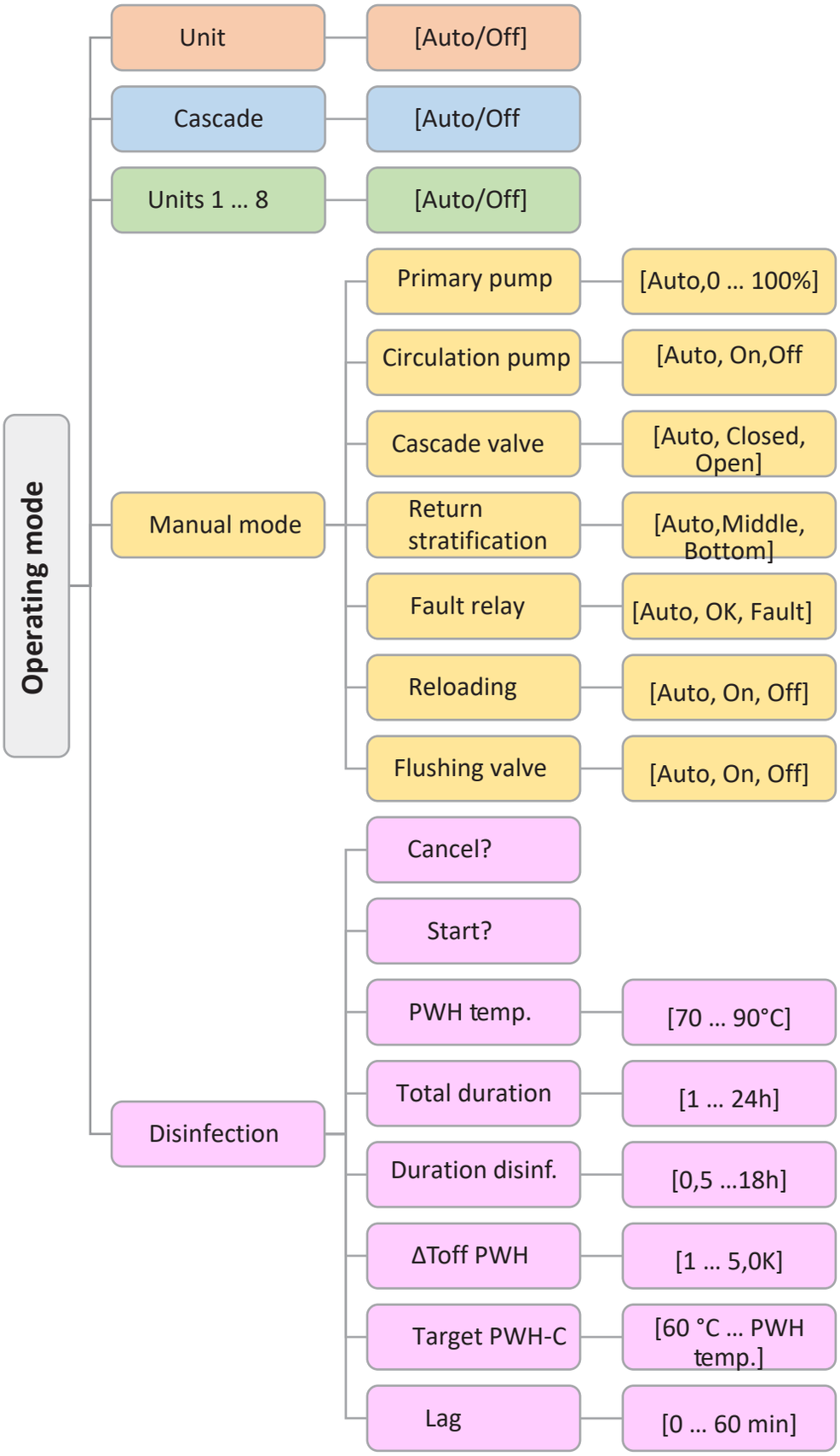


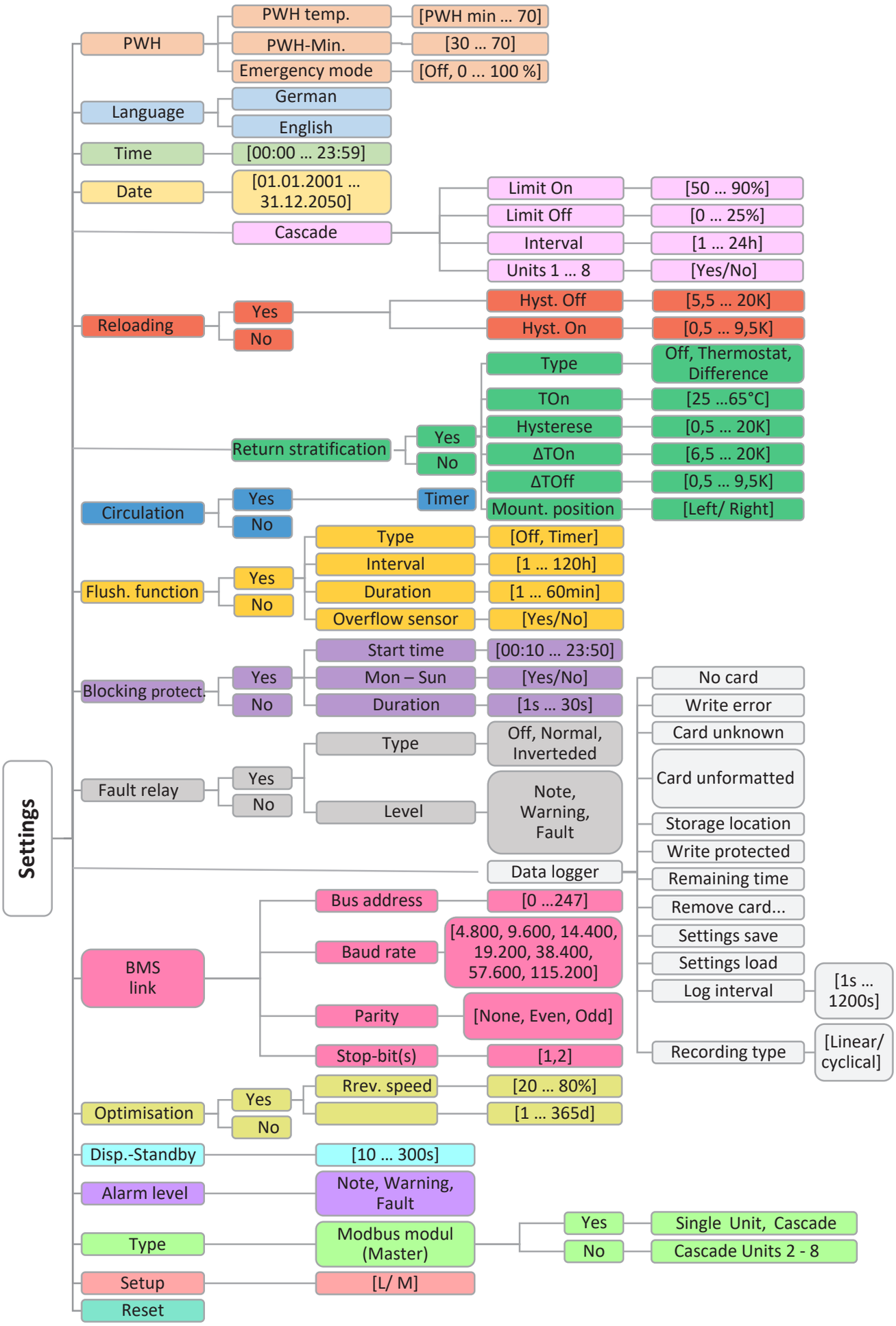
10.2 Menu Structure Main Menu

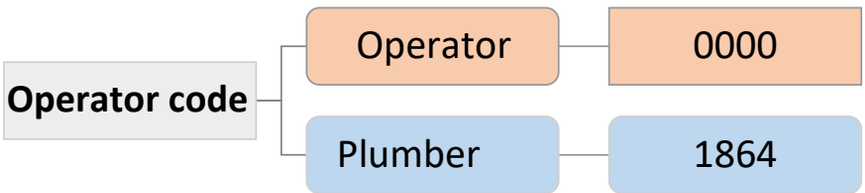



Status
Overview
Graphic Illustration
Reloading
Buffer bottom
Buffer middle
Return stratification
Heat.return fl.
Valve
[Bottom/ middle]
PWH
Heating flow
PWH
PWC/ PWH-C
Vol.flow
Pump
Units 1 ... 8
Heating flow
PWH
Vol.flow
Pump
Cascade valve
[Open/ closed]
Circulation
PWH-C
Circ.pump
[Active/ inactive]
Current values
Reloading
Status
Buffer middle
Buffer bottom
[Active/ inactive]
Return stratification
Status
Heat.r eturn fl.
Buffer bottom
Valve
[Active/ inactive]
[Bottom/ middle]
PWH
Base load
PWH target
Heating flow
PWH
PWC/ PWH-C
Vol. flow
Prima. pump
Units 1 ... 8
PWH target
Heat. flow
PWH
PWC/ PWH-C
Vol. flow
Prim.pump
Cascade valve
[Open/ closed]
Circulation
PWH-C
PWC
Circ.pump
[Active/ inactive]
Disinfection
Status
Disinfection
Active
Remain.time
PWH
[Active/ inactive]
X%
Unit x
Flush.function
Status
Duration
PWC
[Active/ inactive]
Relay cycles
Operat. cycles R1 - R6
Fault relay
Status
[On/ Off]
Messages
Everything ok
Unit info
Serial number
Setup
Version
RESOL Software Article Number
Build
Changeset

Menu Structure Operating Mode




Settings
PWH
PWH temp.
[PWH min ... 70]
PWH-Min.
[30 ... 70]
Emergency mode
[Off, 0 ... 100 %]
Language
German
English
Time
[00:00 ... 23:59]
Date
[01.01.2001 ... 31.12.2050]
Cascade
Limit On
[50 ... 90%]
Limit Off
[0 ... 25%]
Interval
[1 ... 24h]
Units 1 ... 8
[Yes/No]
Reloading
Yes
No
Hyst. Off
[5,5 ... 20K]
Hyst. On
[0,5 ... 9,5K]
Return stratification
Yes
No
Type
Off, Thermostat, Difference
TOn
[25 ...65°C]
Hysterese
[0,5 ... 20K]
ΔTOn
[6,5 ... 20K]
ΔTOff
[0,5 ... 9,5K]
Mount. position
[Left/ Right]
Circulation
Yes
No
Timer
Type
[Off, Timer]
Interval
[1 ... 120h]
Duration
[1 ... 60min]
Flush. function
Yes
No
Overflow sensor
[Yes/No]
Blocking protect.
Yes
No
Start time
[00:10 ... 23:50]
Mon – Sun
[Yes/No]
Duration
[1s ... 30s]
Fault relay
Yes
No
Type
Off, Normal, Inverteded
Level
Note, Warning, Fault
Data logger
No card
Write error
Card unknown
Card unformatted
Storage location
Write protected
Remaining time
Remove card...
Settings save
Settings load
Log interval
[1s ... 1200s]
Recording type
[Linear/ cyclical]
BMS link
Bus address
[0 ...247]
Baud rate
[4.800, 9.600, 14.400, 19.200, 38.400, 57.600, 115.200]
Parity
[None, Even, Odd]
Stop-bit(s)
[1,2]
Optimisation
Yes
No
Rrev. speed
[20 ... 80%]
[1 ... 365d]
Disp.-Standby
[10 ... 300s]
Alarm level
Note, Warning, Fault
Type
Modbus modul (Master)
Yes
Single Unit, Cascade
No
Cascade Units 2 - 8
Setup
[L/ M]
Reset


Operator code
Operator
0000
Plumber
1864

11 Troubleshooting Chart

Event ID		Meaning	Recommended Solution
1	Date/Time	*Malfunction:* Clock module failed	Replace controller
2	Sensor fault	*Malfunction:* Sensor fault, short circuit, cable interrupted or no sensor available(kept general/every sensor)	Localise and replace faulty sensor using the relevant data points. Data point displaying an implausible value. // Localise and replace faulty sensor using the controller's graphic overview. This is showing an implausible value in the display.
3	Casc config.	*Fault:* incorrect configuration of the cascade// Device allocation faulty	Conduct commissioning again or pay attention to the number of devices. Check the device allocation of the slaves for double allocation. E.g. two modules allocated as module 2.
4	Valve open	*Malfunction:* There is a permanent volume flow on a device although no flow should be present.	Check the function of the cascade valve. This can affect both the motor and the 2-directional valve of a device. This notification can also be used if the circulation pump is faulty.
5	Valve closed	*Malfunction:* There is no volume flow on a device that should be active (flow missing).	Check the function of the cascade valve. This can affect both the motor and the 2-directional valve of a device. This notification can also be ussed if the circulation pump is faulty. In addition, the function and correctness of the volume flow sensor must be checked.
6	Software-Update	*Malfunction:* Different software versions installed on the devices.	Localise the device with out-of-date software in the cascade (device info) and carry out a software update.
7	Hot water emergency mode	*Malfunction:* Emergency mode has been activated on the controller (manual default PWM control) and the automatic mode, i.e., automatic control of the hot water temperature via the controller, has been deactivated. **Warning!** There is a risk of scalding because the pump can run at 100%.	Deactivate emergency mode via the water heater controller in the settings, under the section PWH.
8	Single controller	*Note:* Faulty controller configuration, station 1 incorrect configuration.	Carry out commissioning again or check the station parameters in the settings, station 1 has been set as a single unit instead of a cascade.
9	Timeout Station 1- 8	*Malfunction:* Faulty communication connection.	Check the wiring and the correct connection of the K-Bus connecting plug.
17	Buffer >95°C	*Warning:* Permitted maximum temperature of the buffer tank exceeded.	Set stratification temperature of the buffer tank at max. 90 °C. Check that the stratification circuit of the buffer tank is not fully charged.
18	Buffer temperature	*Warning:* Minimum temperature in the buffer tank not reached. This can apply to thermal disinfection as well as the standard operation of hot water provision.	Set stratification temperature of the buffer tank to desired hot water temperature + 2k.
19	Absenken der Vorlauftemperatur möglich	*Note:* Flow temperature in the buffer tank unnecessarily high. This is a suggestion for optimisation.	Reduce stratification temperature of the buffer tank by - 2k.
20	Flush lock	*Malfunction:* Thermal condition not met within the stated period.	Check whether the flush valve opens correctly. Otherwise, check thermal parameters (desired temperature and duration).
21	Overflow	*Malfunction:* A backflow has been detected in the connected flush point.	Check the wastewater-side connection of the flush point for contamination and backflow.
22	Modbus Modul	*Malfunction:* Modbus module failed	Replace controller
23	Manual mode active via Modbus	*Note:* System is controlled in manual mode via a BMS.	Deactivate the external control.
24	Device version	*Malfunction:* Differently sized devices have been declared within a cascade. (M stations and L stations)	Check which devices you have installed in the cascade. Only the same sizes can be used within a cascade.

KEMPER

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