RATIO HP Buffer Cylinder

The combination for hot water and heating:
Vertical cylinder made from steel (inside raw, outside primed) to use in 2 cylinder systems for combining solar water heating and solar space heating. Also suitable for combining with solid fuel boilers or as buffer storage in large solar installations.

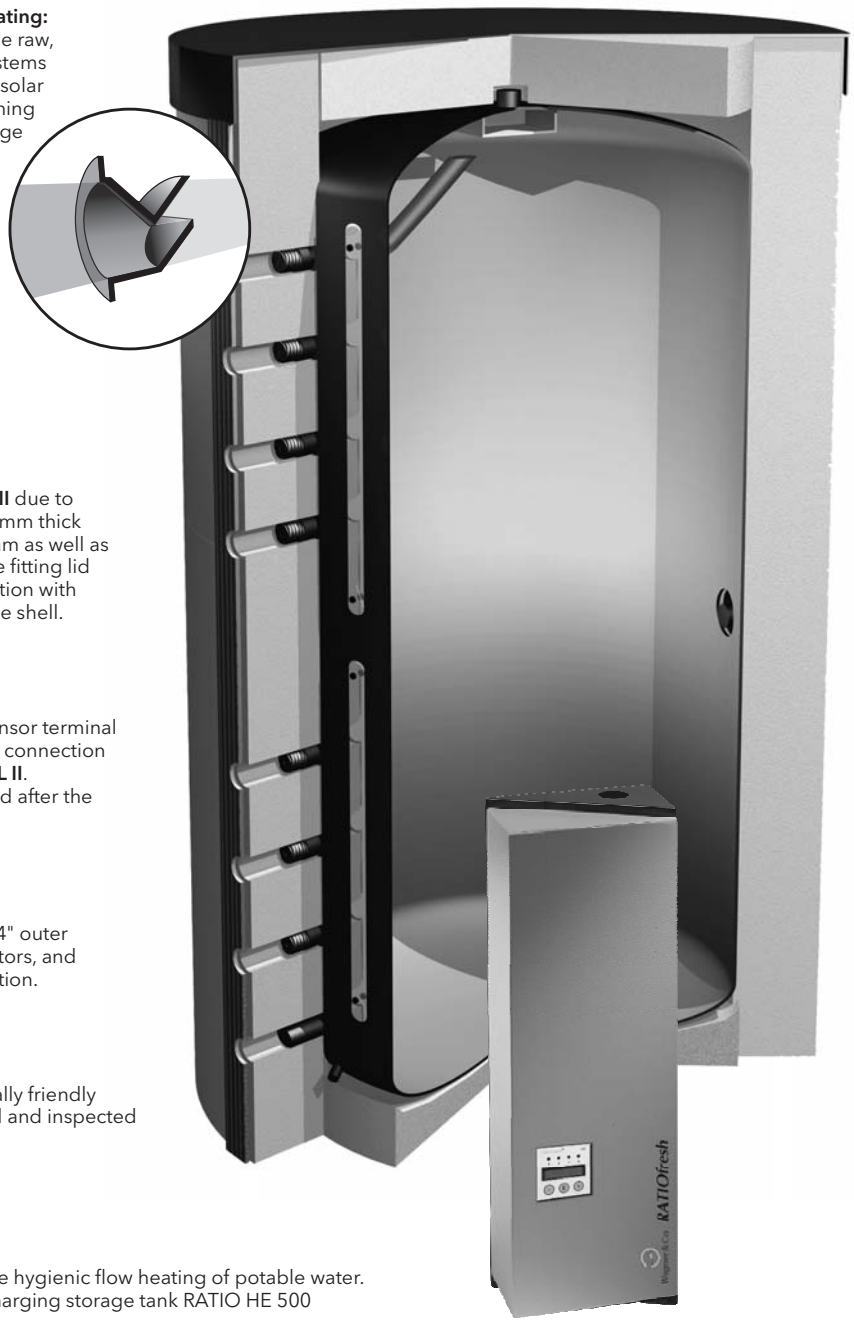
Connection option CONVECTROL II
The effective convection brake
Technically and fluidic optimized barriers separate the water cooled in the pipes safely from the hot cylinder water. This reduces heat losses at the pipe connections by up to 50%.

Minimal heat losses
When connecting with **CONVECTROL II** due to close-fitting, CFC-free 100-mm or 120-mm thick jacket insulation made from soft PU foam as well as the 100-mm or 120-mm thick and close fitting lid insulation and 50-mm thick floor insulation with scratch and impact resistant polystyrene shell.

Quick assembly
With flat-sealing screw connections, sensor terminal block and horizontal attachment of the connection pipes made possible by **CONVECTROL II**. Removable insulation can be reattached after the pipe installation is complete.

Many applications
Nine connections with flat-sealing 1 1/4" outer thread (OT) (upper as dip pipe), deflectors, and flow brake to support thermal stratification.

High quality
By using high-grade and environmentally friendly materials, made in Germany, produced and inspected in accordance with DIN 4753.



Option RATIOfresh

Optional
- RATIOfresh freshwater station for the hygienic flow heating of potable water.
- Also available as twice enameled charging storage tank RATIO HE 500 and RATIO HE 750.
- Generously dimensioned plain pipe heat exchanger (up to 3.6 m²).

Figure 1 RATIO HP Buffer Cylinder.

Technical Data

Feature		HP 500 / HP 500 G [1]	HP 800 / HP 800 G [1]	HP 1000 / HP 1000 G [1]	HP 1500 / HP 1500 G [1]
Article Number		130 102 25 / 130 102 26	130 102 35 / 130 102 36	130 102 33 / 130 102 34	130 102 37 / 130 102 38
Total height, without/with insulation in mm	**h / H**	1780 / 1840	1762 / 1840	2147 / 2222	
Tilted dimension, height without insulation in mm		1870	1910	2270	2320
Diameter, without/with insulation in mm	**d / D**	650 / 850	800 / 1040	800 / 1040	1000 / 1240
Weight, without insulation kg (without/with heat exchanger) in kg		104 / 144	130 / 190	145 / 205	200 / 270
total volume in l (without/with heat exchanger) in kg		525 / 510	790 / 765	980 / 955	1475 / 1445
Volume share, above connection F in liter		270	280	470	700
Permiss. working overpressure in bar		3			
Permiss. operating temperature in °C		90			
Connection G5/4" OT x 45, flat-sealing in mm (with P800 G a. P1000 G solar return)	**A**	225	251		325
Connection G5/4" OT x 45, flat-sealing[2] in mm	**B**	375	401		425
Connection G5/4" OT x 45, flat-sealing[2] in mm	**C**	575	601		
Connection G5/4" OT x 45, flat-sealing[2] in mm	**E**	775	801		
Connection 1/2" IT x 33 for drain valve in mm	**M**	132	146		220
Connection 1 1/2" IT x 33 for optional immersion heater in mm	**L**	975	1201		
Connection G5/4" OT x 45, flat-sealing in mm (with P800 G a. P1000 G solar flow)	**F**	875	1101		1035
Connection G5/4" OT x 45, flat-sealing[2] in mm	**G**	1175	1201		
Connection G5/4" OT x 45, flat-sealing in mm	**I**	1275	1301		
Connection G5/4" OT x 45, flat-sealing as dip pipe in mm	**J**	1375	1401		
Connection G5/4" OT x 45, flat-sealing[2] in mm	**K**	1735	1717	2147	
Sensor terminal block, length in mm	**T**	approx. 2 x 500			
Thermal insulation (PU soft foam, PS outer shell, floor 50 mm)		100-mm lid and jacket	120-mm lid and jacket		
Heat loss rate acc. to DIN EN V 12977-3 in H/C[3]		3.5	3.7	4.1	4,9
Optional solar heat exchanger (only f. HP 500 G, 800 G, 1000 G)		**HP 500 G**	**HP 800 G**	**HP 1000 G**	**HP 1500 G**
Material		Quality steel St 37-2			
Heat exchanger area in m²	**W**	1.9	3		3.6
Fluid volume in liter		11.6	18.3		21.4
Pressure loss at 500 l/h in mbar		8	12		14
Permiss. working overpressure in bar		10			
Recommended collector area in m²		up to approx. 10 m²	up to approx. 15 m²	up to approx. 17 m²	up to approx. 20 m²

1) G = Model with heat exchanger

2) Connections equipped with inflow brakes (**S**)

3) Calculations based on ENV 12977-3:2001

All connections with pipe threads DIN ISO 228-1 (cyl.) flat-sealing
IT = Inner thread, OT = Outer thread

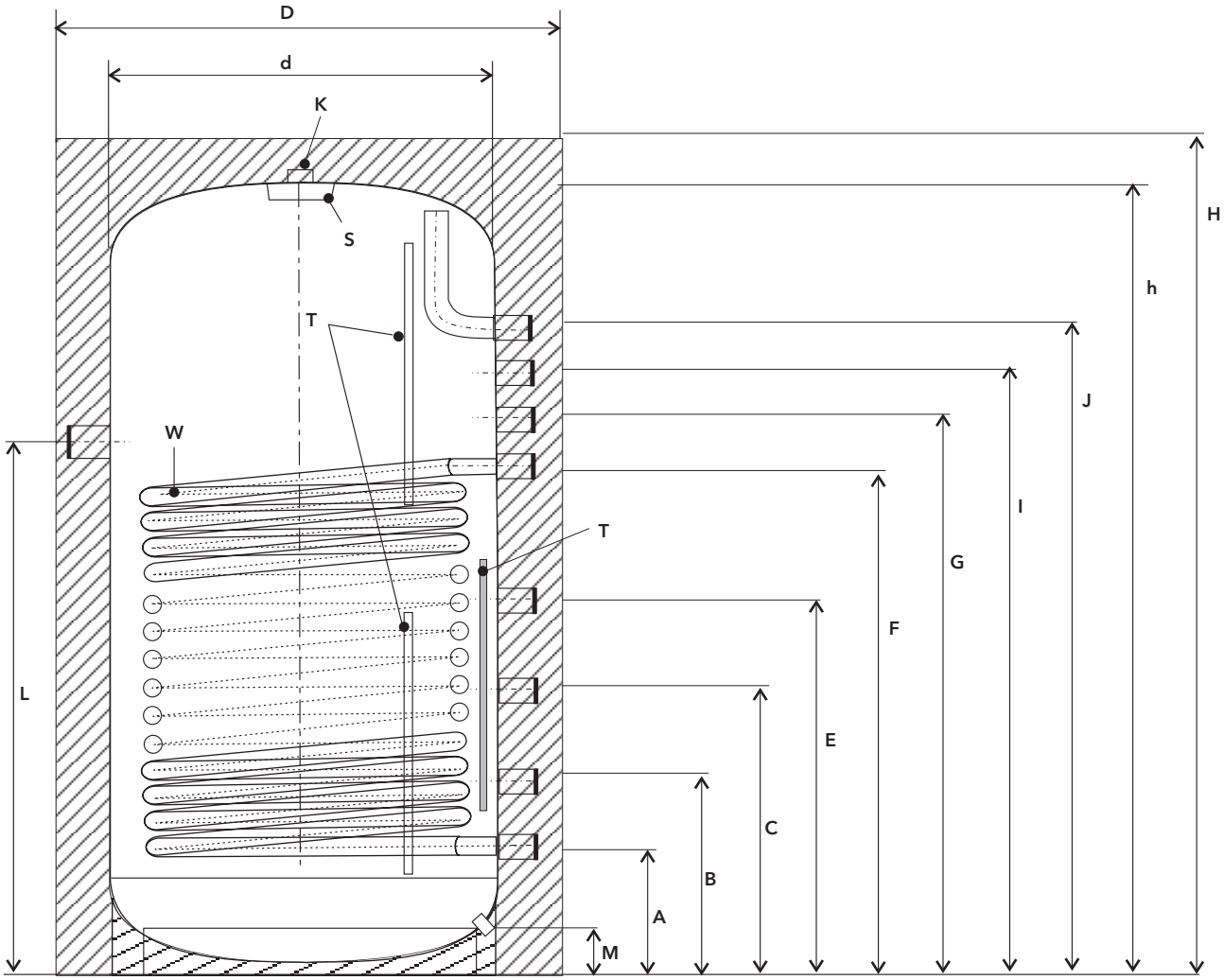


Figure 2 Cross-section of RATIO HP buffer cylinder with dimensions.

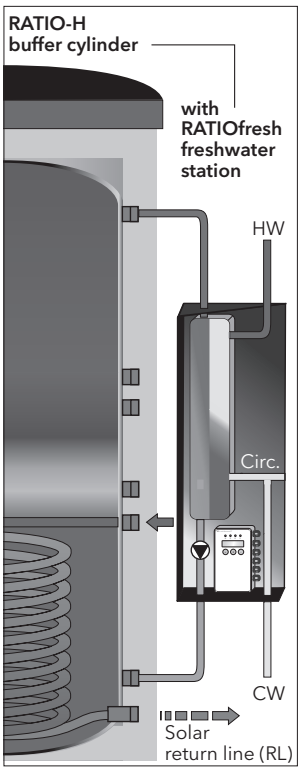


Figure 3 RATIO HP buffer cylinder and option Cross-section of RATIOfresh freshwater station.

Accessories	
Product	**Article Number**
RATIO connection kit Kombi STANDARD	139 000 12
RATIO connection kit Kombi CONVECTROL	130 100 64
Storage tank height adjusting unit	139 000 16
Electr. immersion heater 3 kW	130 101 66
Electr. immersion heater 6 kW	130 101 65
Assembly tool for hook closure strip	130 002 39
RATIOfresh freshwater station 250	150 300 65
RATIOfresh freshwater station 400	150 300 66
RATIOfresh freshwater station attachment kit	139 000 28
See price list for plate heat exchanger and additional accessories.	

Convection Brake CONVECTROL

Using the CONVECTROL convection brakes makes it possible to lower heat losses of the solar cylinder by up to 50 % per pipe connection. The patented design of the barriers separates the water cooled in the connection pipes from the hot content of the cylinder. Annual cylinder heat losses are thus reduced by 10 % to 20 %.

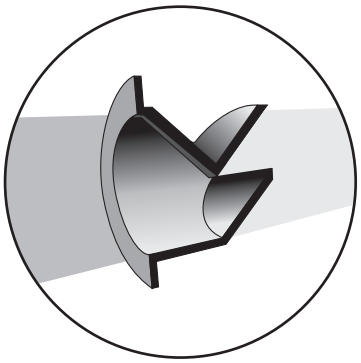


Figure 4 Convection brake CONVECTROL.

Without Convection Brake

If the solar cylinder is in standby mode, hot water emerges from the storage tank into the upper section of the connection pipe and flows along this pipe. While in this pipe, the water cools down to the ambient temperature and drops into the lower pipe section due to the increasing density. In the lower pipe section, the cold water returns to the cylinder (one-pipe convection). Energy is continuously withdrawn from the cylinder.

With Convection Brake

The inlet opening at the pipe sleeve positioned high prevents the water cooled in the connection pipe from flowing back to the solar cylinder. The upper barrier prevents the hot water from the cylinder from flowing into the connection pipe. The thermal conduction via the pipe fitting is blocked between the end faces with the flat seals. The heat losses of the pipe connection are reduced by up to 50 %.

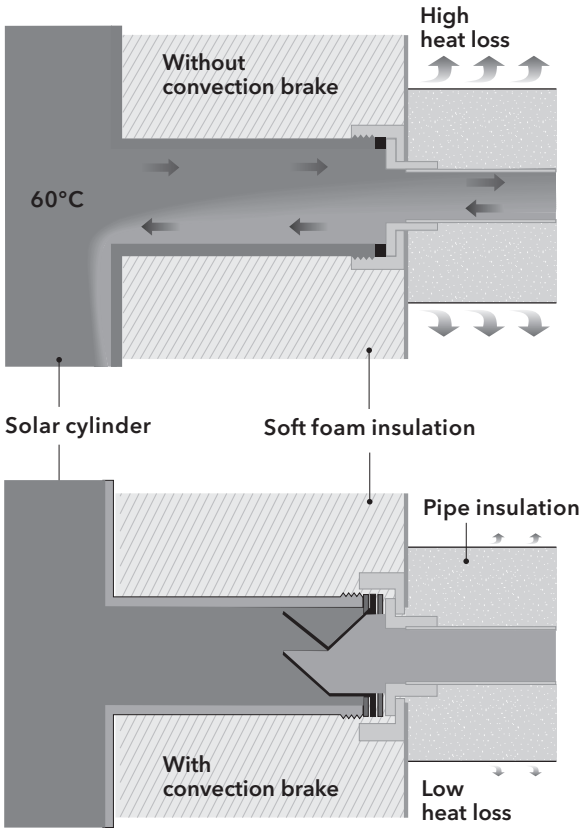


Figure 5 Heat losses at cylinder pipe connection with and without CONVECTROL II convection brake.

Technical Data CONVECTROL	
Outer diameter	Ø 38.5 mm/27 mm f. 5/4" OT
Length	30 mm
Material	PA 6-3-T, 40 % fiberglass reinforced
Thermal stability acc. to ISO 75, Version A+B	> 230 °C
Continuous operation temperature	max. 95 °C
Temporary max. temperature	max. 140 °C
Tensile e-modulus ISO 527	11000 MPa
Creep modulus (1000h)	5200 MPa
Coefficient of linear expansion	0.222×10^{-4} K^{-1}
Permits and certificates:	DVGW-DZW, KTW, BgVV

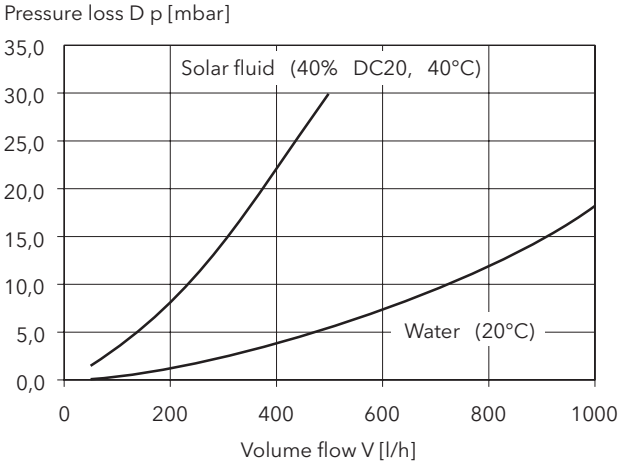


Figure 6 Pressure loss of the CONVECTROL convection brake with water and solar fluid flows.

System Solutions – A Selection

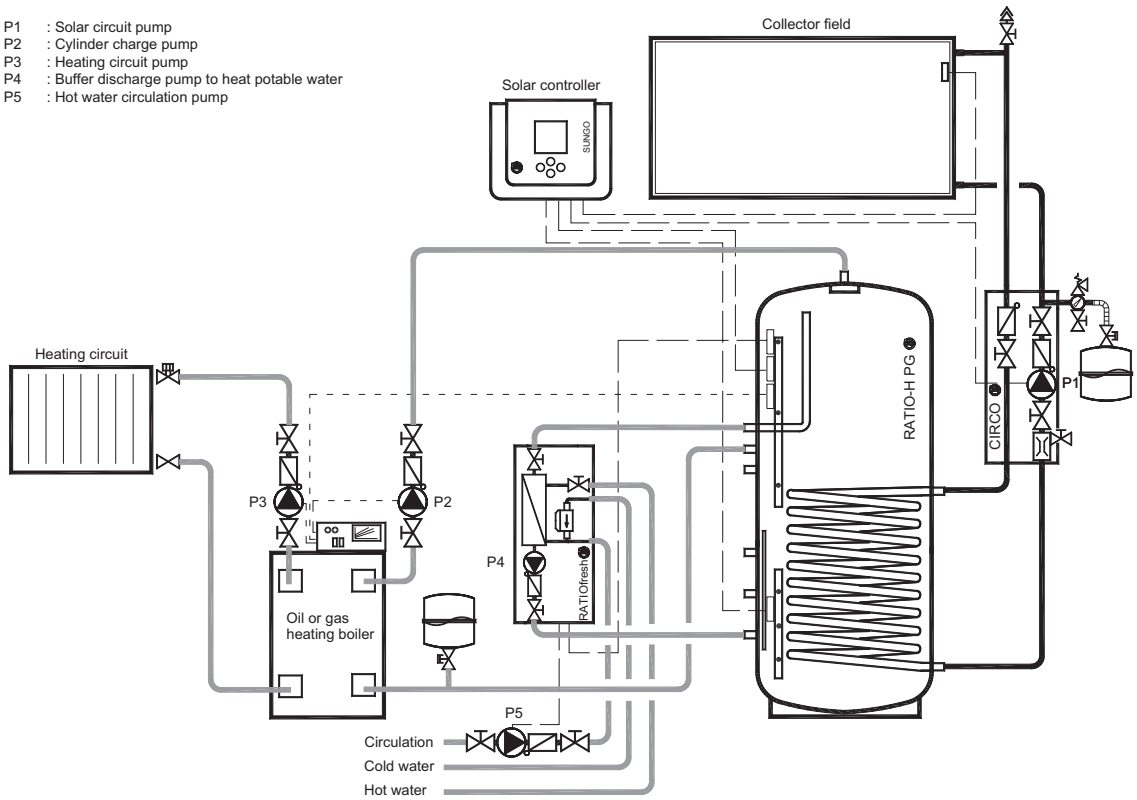


Figure 7 Solar installation for hot water preparation: One storage tank system in conjunction with oil or gas boiler, buffer cylinder RATIO HP G and freshwater station RATIOfresh. Water is heated using an electronically controlled flow process. The controller of the freshwater station maintains a constant withdrawal temperature and especially low buffer storage return temperatures. The low temperature level in the lower storage tank section makes it possible for the Solar installation to provide heat to the buffer cylinder even when solar irradiation is low. The FRESHcontrol controller also regulates the speed-controlled actuation of the hot water circulation pump.

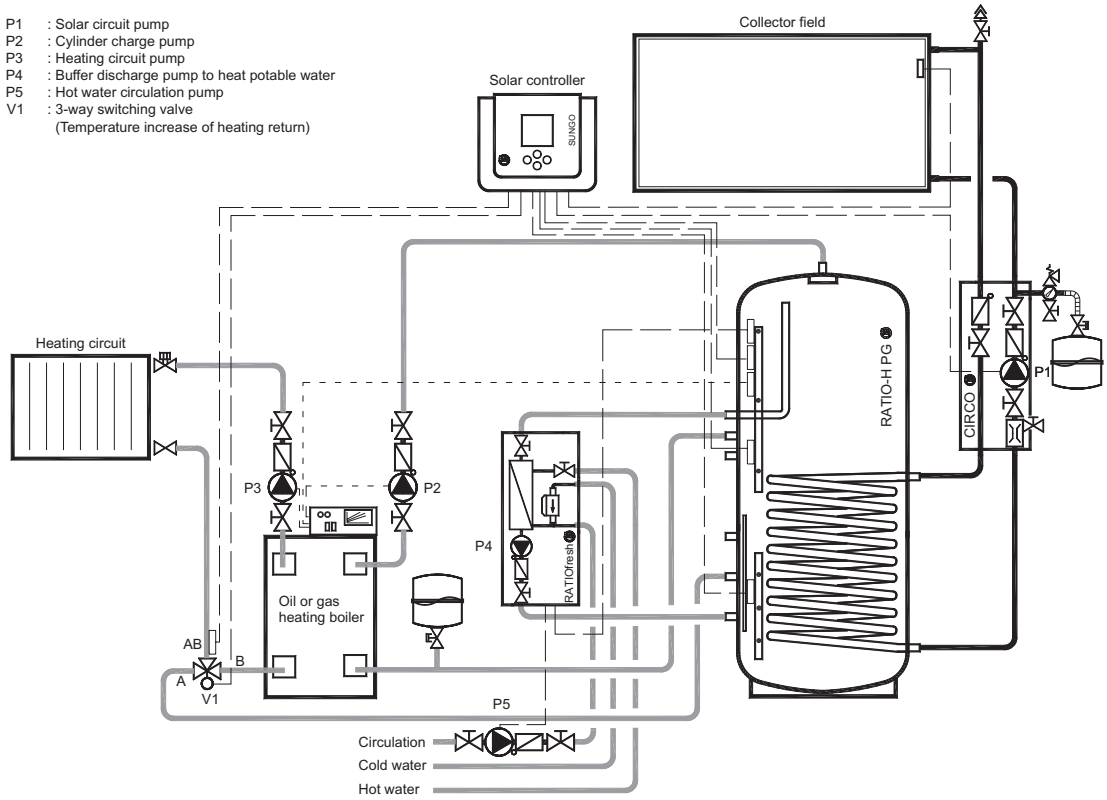


Figure 8 Solar installation for hot water preparation and heating support: One storage tank system in conjunction with oil or gas boiler, buffer cylinder RATIO HP G and freshwater station RATIOfresh. Water is heated using an electronically controlled flow process. The controller of the freshwater station FRESHcontrol maintains a constant withdrawal temperature and especially low buffer storage return temperatures. Solar energy for room heating is utilized by raising the return temperature of the heating circuit when the temperature in the buffer cylinder is sufficiently high.

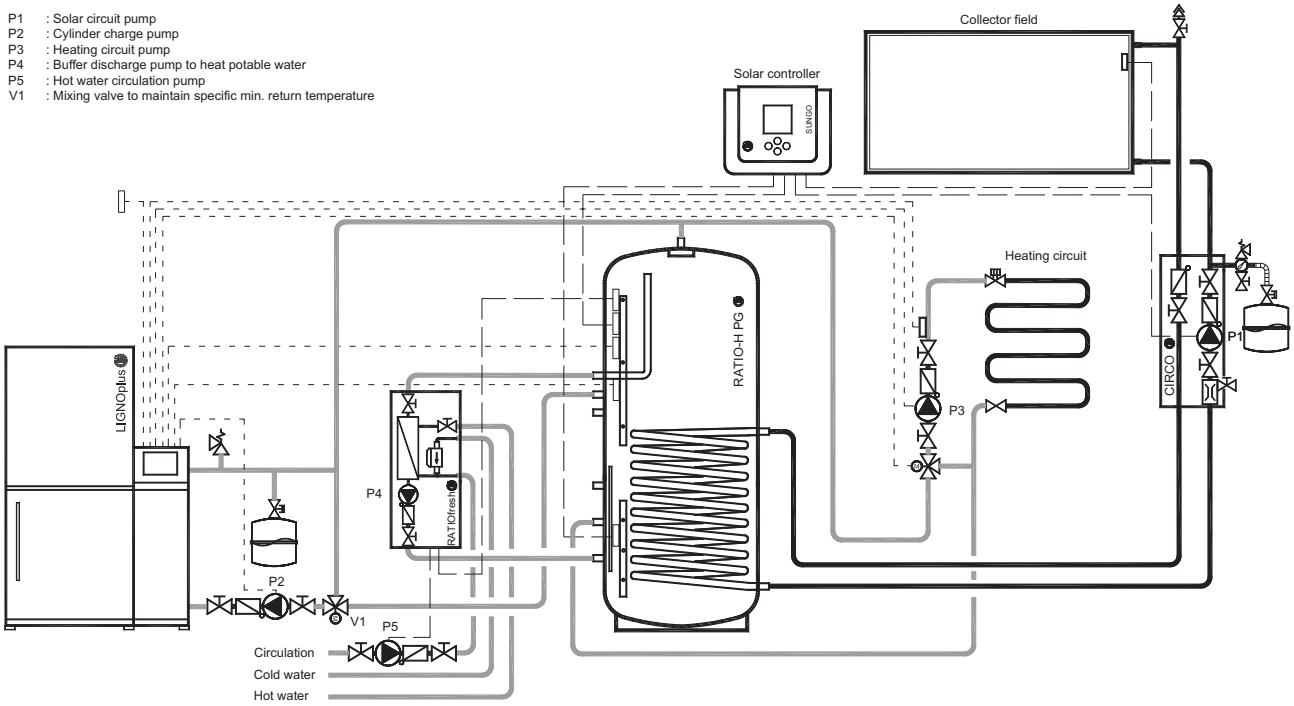


Figure 9 Solar installation for hot water preparation and heating support: System as heating buffer system with pellet boiler, buffer cylinder RATIO HP G, and RATIOfresh freshwater station. Water is heated using an electronically controlled flow process. The FRESHcontrol controller maintains a constant withdrawal temperature and especially low buffer storage return temperatures as well as speed-controls the hot water circulation pump. The pellet boiler heats only the upper buffer storage tank section.

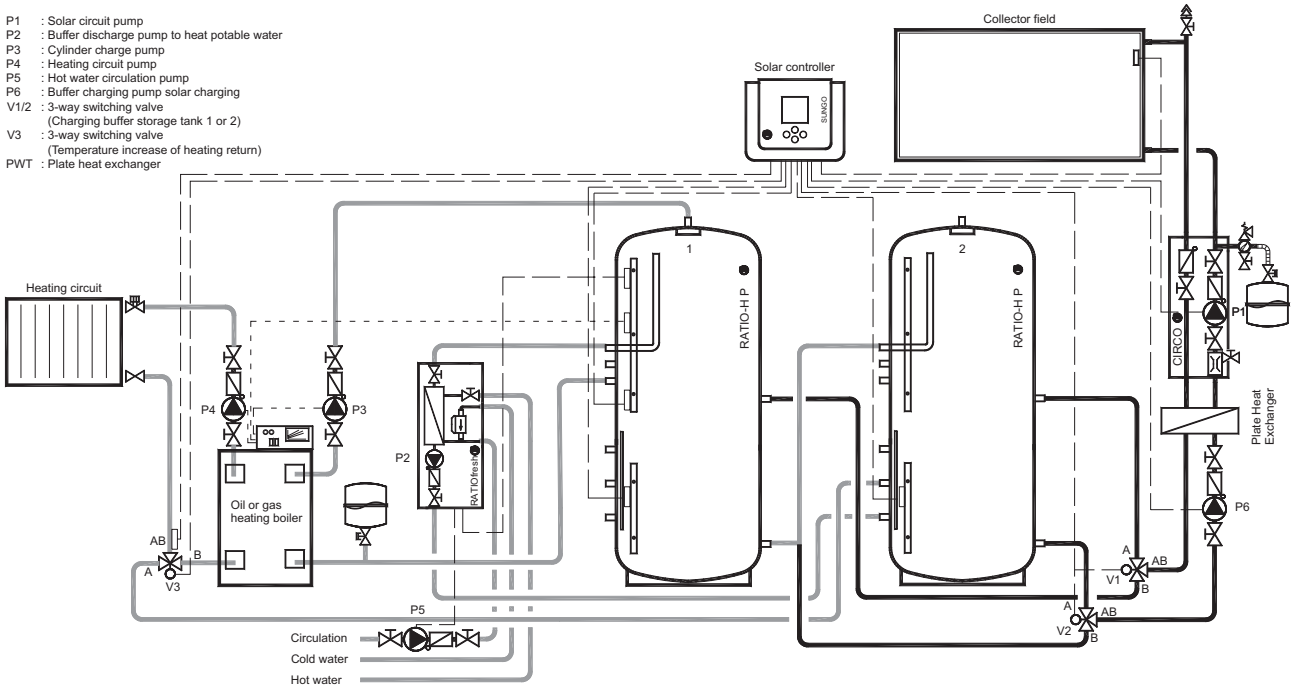


Figure 10 Solar installation for hot water preparation and heating support. System with oil or gas boiler, 2 buffer cylinders RATIO HP, and freshwater station RATIOfresh. Buffer cylinder 1 is first charged by the collector field. Water is heated using an electronically controlled flow process. The freshwater station controller not only ensures an energetically favorable discharging of the buffer when tapping hot water, it also runs the speed-controlled hot water circulation pump. If temperatures in the primary buffer cylinder are sufficient, solar heat is used for heating by raising the heating return temperature.

WAGNER & CO · Zimmermannstraße 12 · D-35091 Cölbe/Marburg · ☎ +49 6421 80 07-0 · Fax 80 07-22