

# SF60

## Water Heater and Swimming Pool Boiler

Technical Documentation



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a cleaner future



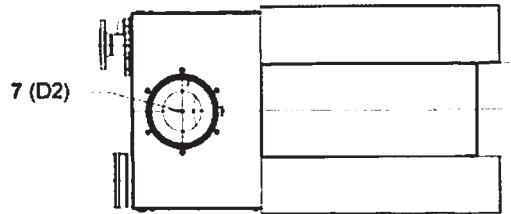
## Technical data

		SF61	SF62	SF63	SF64	SF65	SF66	SF67	
Nominal heat output at 80-60°C max/min*	kW	142.1/23.3	190.1/39.5	237.2/39.5	285.2/39.5	380.2/76.6	475.3/76.6	539.0/76.6	
Nominal heat output at 75-60°C max/min*	kW	142.2/23.5	190.3/39.5	237.4/39.5	285.5/39.5	380.6/76.6	475.8/76.6	539.6/76.6	
Nominal heat output at 40/30°C max/min*	kW	150.7/26.7	201.6/45.2	251.4/45.1	302.3/45.2	403.1/87.7	503.9/87.7	571.5/87.7	
Nominal heat input Hi max/min*	kW	145.0/24.5	194.0/41.5	242.0/41.5	291.0/41.5	388.0/80.5	485.0/80.5	550.0/80.5	
Efficiency at 80/60°C	%	98.0							
Efficiency at 40/30°C	%	103.9							
Annual efficiency (NNG 75/60°C)	%	106.8							
Annual efficiency (NNG 40/30°C)	%	110.4							
Standstill losses (T <sub>water</sub> = 70°C)	%	0.21	0.18	0.17	0.16	0.15	0.14	0.13	
Max. condensate flow	l/h	11	15	19	22	30	37	42	
Gas consumption H-gas max/min (10,9 kWh/m <sup>3</sup> )	m <sup>3</sup> /h	13.3/2.3	17.8/3.8	22.2/3.8	26.7/3.8	35.6/7.4	44.5/7.4	50.5/7.4	
Gas consumption L-gas max/min (8,34 kWh/m <sup>3</sup> )	m <sup>3</sup> /h	17.4/2.9	23.2/5.0	29.0/5.0	34.9/5.0	46.5/9.7	58.2/9.7	66.0/9.7	
Gas consumption LL-gas max/min (8,34 kWh/m <sup>3</sup> )	m <sup>3</sup> /h	17.4/2.9	23.2/5.8	29.0/5.8	34.9/5.8	46.5/11.2	58.2/11.2	66.0/11.2	
Gas consumption LPG max/min (12,8 kWh/kg)	kg/h	11.3/1.9	15.2/3.2	18.9/3.2	22.7/3.2	30.3/6.3	37.9/6.3	43.0/6.3	
Gas pressure H-gas	mbar	20							
Gas pressure L/LL-gas	mbar	25							
Gas pressure LPG	mbar	30/50							
Maximum gas pressure	mbar	100							
Fluegas temperature at 80/60°C max/min	°C	78/61							
Fluegas temperature at 40/30°C max/min	°C	56/30							
Fluegas quantity max/min*	m <sup>3</sup> /h	238/40	318/69	397/69	477/69	636/134	795/134	901/134	
CO <sub>2</sub> level natural gas max/min	%	10.2/9.4							
CO <sub>2</sub> level LPG max/min	%	11.9/10.0							
NO <sub>x</sub> level max/min	mg/kWh	35/15							
CO level max/min	mg/kWh	14/8							
Max. permissible flue resistance max/min	Pa	160/10	160/10	200/10	200/10	200/10	250/10	250/10	
Water volume	l	27	31	35	61	68	75	82	
Water pressure max/min	bar	8/1							
Electrical connection	V	230/400							
Frequency	Hz	50							
Mains connection fuse	A	10							
IP class	-	IP20							
Power consumption boiler max/min (excl. pump)	W	158/43	200/35	230/35	260/35	470/61	650/61	770/61	
Power consumption DHW pump (optional)	W	245	340	470	470	720	1150	1550	
Power consumption DHW bypass pump	W	245	245	245	245	380	460	530	
Power consumption swimming pool pump (optional)	W	550	900	1500	1100	2200	3000	3000	
Weight (empty)	kg	295	345	400	465	535	590	650	
Noise level at 1 meter distance	dB(A)	59							
Ionisation current minimum	µA	6							
PH value condensate	-	3.2							
CE certification code	-	CE-0063BS3840							
Water connections	-	R2"				DN65 PN16			
Gas connection	-	R3/4"	R1"			R1.1/2"			
Flue gas connection	mm	150		200		250			
Air intake connection (for room sealed use)	mm	130	150			200			
Condensate connection	mm	22							

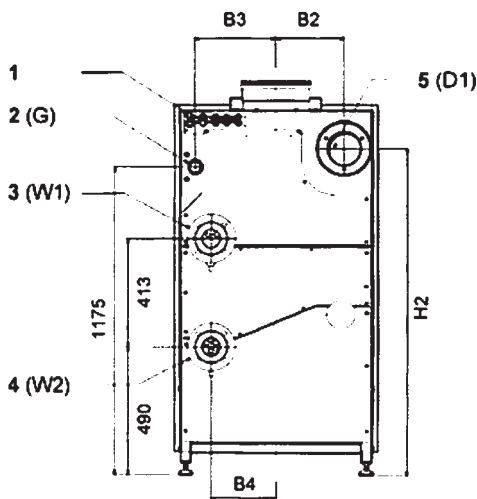
\* min load on gasses H/L/LPG. For type R602-R607 on LL-gas min value is 15% higher.

## Dimensions (water heater and swimming pool boiler)

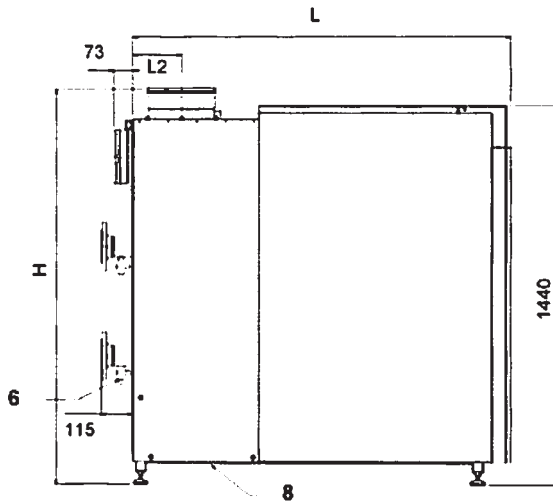
Top view



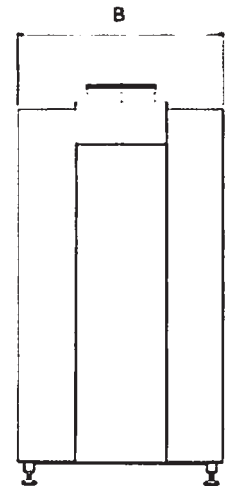
Rear view



Side view



Front view

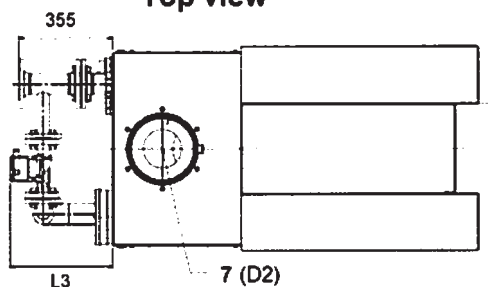


Dimensions	SF61	SF62	SF63	SF64	SF65	SF66	SF67	
L	mm	1105	1260	1470	1220	1435	1585	1735
L2	mm	127.5	127.5	137.5	137.5	187.5	187.5	187.5
H	mm	1480	1480	1500	1500	1500	1500	1500
H2	mm	1120	1130	1130	1150	1245	1245	1245
B	mm	670	670	670	770	770	770	770
B2	mm	225	235	235	235	260	260	260
B3	mm	260	260	260	310	310	310	310
B4	mm	130	130	130	245	245	245	245
D1	mm	130	150	150	150	200	200	200
D2	mm	150	150	200	200	250	250	250
W1	R" / DN	R2"	R2"	R2"	DN65 PN16			
W2	R" / DN	R2"	R2"	R2"	DN65 PN16			
G	R	R3/4"	R1"	R1"	R1"	R1 1/2"		

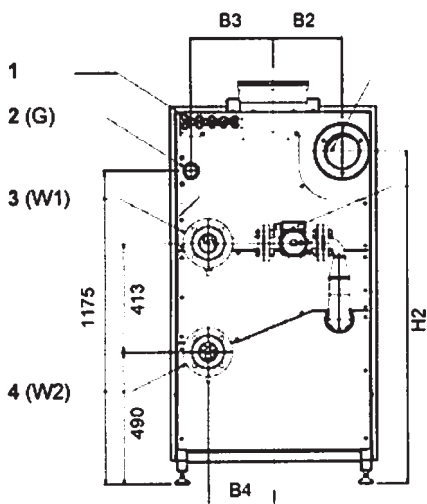
- 1 Electrical connections
- 2 Gas supply
- 3 Water supply
- 4 Water return
- 5 Air intake
- 6 Boiler water drain valve 1/2"
- 7 Flue gas outlet
- 8 Condensate drain flexible hose 25mm diam.

## Dimensions (bypass water heater)

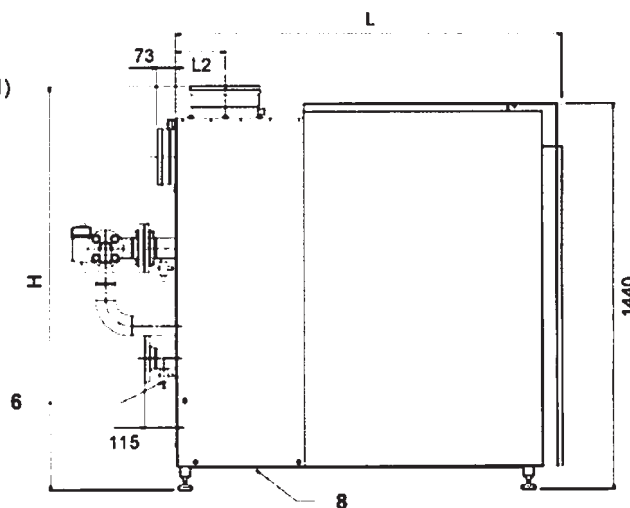
Top view



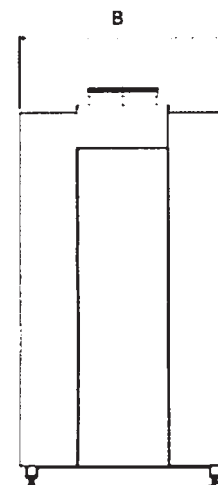
Rear view



Side view



Front view



Dimensions	SF61	SF62	SF63	SF64	SF65	SF66	SF67	
L	mm	1105	1260	1470	1220	1435	1585	1735
L2	mm	127.5	127.5	137.5	137.5	187.5	187.5	187.5
L3	mm	425	425	425	390	390	510	510
H	mm	1480	1480	1500	1500	1500	1500	1500
H2	mm	1120	1130	1130	1150	1245	1245	1245
B	mm	670	670	670	770	770	770	770
B2	mm	225	235	235	235	260	260	260
B3	mm	260	260	260	310	310	310	310
B4	mm	130	130	130	245	245	245	245
D1	mm	130	150	150	150	200	200	200
D2	mm	150	150	200	200	250	250	250
W1	R" / DN	R2"	R2"	R2"	DN65 PN16			
W2	R" / DN	R2"	R2"	R2"	DN65 PN16			
G	R	R3/4"	R1"	R1"	R1"	R1 1/2"		

- 1 Electrical connections
- 2 Gas supply
- 3 Water supply
- 4 Water return
- 5 Air intake
- 6 Boiler water drain valve 1/2"
- 7 Flue gas outlet
- 8 Condensate drain  
flexible hose 25mm diam.
- 9 Bypass pump

## General

This document is meant to be used in addition to the SH60 heating boiler documentation, in case of having an SF60 water heater or swimming pool version. This documentation only contains the difference in construction and application to the heating boiler version. General information on the boiler (transport, commissioning, maintenance, etc.) can be found in the heating boiler documentation.

## Technical Description

The SF60 water heater and swimming pool boilers are applicable for direct heating of sanitary hot water or swimming pool water without using an hydraulic separation (i.e. plate heat exchanger) in the system.

This special version of the SF60 boiler series is mainly identical to the heating boiler version, except for the manifolds on the heat exchanger. These are made from stainless steel to allow contact with potable water.



## Water quality

### Water heater

As a water heater is constantly flushed with fresh water, there are restrictions to the maximum flow temperature related to the hardness of the water. The following table indicates the maximum flow temperatures for different water hardness values. Not respecting these values can lead to damage of the heat exchanger.

Maximum flow temperature related to water hardness				
Water hardness		Max. setpoint (P1)	Temp. limiter setting	High limit setting
[°dH]	[°f]	[°C]	[°C]	[°C]
0 - 5	0 - 9	90	97	100
5 - 15	9 - 27	85	92	95
15 - 20	27 - 36	80	87	90
20 - 28	36 - 50	60	67	70

### Swimming pool boiler

The flow temperature of the swimming pool boiler may never exceed 57°C, in order to protect the boiler against scaling problems due to the high water volume of the swimming pool. Therefore, the high limit thermostat limits the boiler at 52°C. For comfort reasons, the maximum setpoint is limited at 36°C.

## Hot water production (water heater only)

The following table shows the sanitary hot water tapping volumes which can be achieved with an R600 water heater, based on a cold water inlet temperature of 10°C.

Hot water tapping volumes (cold water = 10°C)							
	Output	flow @50°C	flow @60°C	flow @65°C	flow @70°C	flow @80°C	flow @90°C
	[kW]	[l/min]	[l/min]	[l/min]	[l/min]	[l/min]	[l/min]
SF61	142	51.1	40.8	37.1	34.0	29.2	25.5
SF62	190	68.3	54.7	49.7	45.5	39.0	34.2
SF63	237	85.2	68.2	62.0	56.8	48.7	42.6
SF64	285	102.5	82.0	74.5	68.3	58.6	51.2
SF65	380	136.6	109.3	99.4	91.1	78.1	68.3
SF66	475	170.8	136.6	124.2	113.9	97.6	85.4
SF67	539	193.8	155.0	141.0	129.2	110.7	96.9

## Hydraulic Connection

### Water Heater

The SF60 water heater must be installed in such a way that a minimum water flow rate of 30% of the nominal flow rate can be assured at all times when the burner is switched on. The SF60 water heater can increase the water temperature by maximum 17k at once. This means that the water has to cycle through the boiler several times when for example cold water of 10 degrees Centigrade has to be heated up to 60 degrees Centigrade (3 times).

This is normally done by installing the SF60 water heater in combination with a buffer tank. The flow rate from the tank to the water heater and back can then be secured by the (primary) water heater pump.

The table below shows the nominal water flow data at a  $\Delta T$  of 17K, plus the pump data of the (optional) pump kit for each type of water heater.

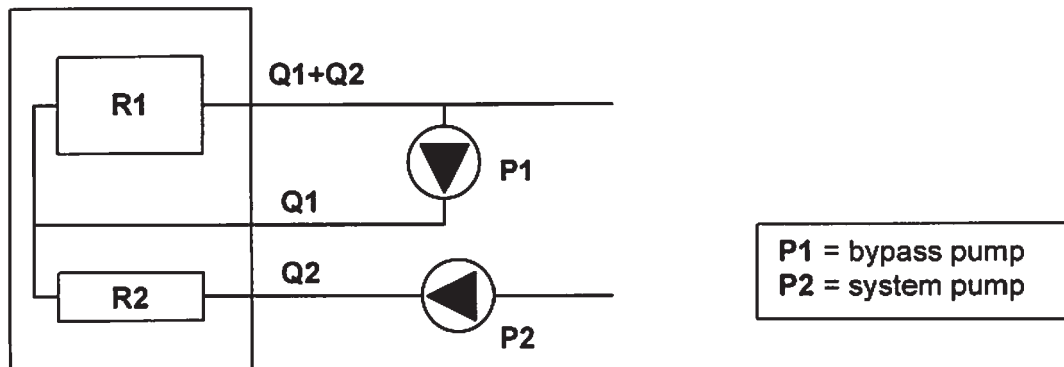
Water flow data water heater								
	$\Delta T$	Nominal flow rate	Boiler resistance	Pump type	Voltage	Curve setting	Pump head	Residual pump head
	[K]	[m <sup>3</sup> /h]	[kPa]	[-]	[V]	[-]	[kPa]	[kPa]
SF61	17	7.2	14	UPS 32-80B	230	3 -	34 -	20 -
SF62		9.5	25	UPS 32-120FB	230	3 2	61 30	36 5
SF63		12.0	39	UPS 40-120FB	230	3 2	64 48	25 9
SF64		14.4	21	UPS 40-120FB	230	3 2	50 30	29 9
SF65		19.2	37	UPS 50-120FB	400	3 2	64 47	27 10
SF66		24.0	58	UPS 65-120FB	400	3 -	76 -	18 -
SF67		27.2	76	UPS 65-180FB	400	3 -	104 -	28 -



## Bypass water heater

When a higher temperature increase than 17K should be achieved directly within one step, this can be done by using a water heater with internal bypass. The built-in bypass pump secures a minimum flow rate through the water heater.

When using a water heater with bypass, the internal pump will not transport the hot water from the water heater to the system. Therefore a system pump should be selected, based on the desired  $\Delta T$ . Below you'll find a schematic drawing of the situation, plus two tables with all the necessary information for the selection of the system pump. Please be aware that for the calculation method an additional resistance of 10 kPa for the system piping is included.



		Bypass pump data						
		SF61	SF62	SF63	SF64	SF65	SF66	SF67
Pump type	[-]	UPS 32-80B	UPS 32-80B	UPS 32-80B	UPS 32-80B	UPS 32-120FB	UPS 40-120FB	UPS 50-120FB
Voltage	[V]	230	230	230	230	230	230	400
$\Delta T = 40K$	Curve setting	2	2	3	3	1	1	1
$\Delta T = 50K$		2	3	3	3	2	2	2
$\Delta T = 55K$		2	3	3	3	2	2	2
$\Delta T = 60K$		2	3	3	3	3	2	2
$\Delta T = 70K$		2	3	3	3	3	3	2
$\Delta T = 80K$		2	3	3	3	3	3	2

		System pump design data							
		SF61	SF62	SF63	SF64	SF65	SF66	SF67	
$\Delta T = 40K$	Flow rate	[m <sup>3</sup> /h]	3.1	4.1	5.1	6.1	8.2	10.2	11.6
	Required pump head	[kPa]	35.5	28.9	57.3	50.7	42.3	49.0	60.6
$\Delta T = 50K$	Flow rate	[m <sup>3</sup> /h]	2.4	3.2	4.1	4.9	6.5	8.2	9.2
	Required pump head	[kPa]	30.3	58.5	50.8	44.4	40.8	56.3	64.6
$\Delta T = 55K$	Flow rate	[m <sup>3</sup> /h]	2.2	2.9	3.7	4.4	5.9	7.4	8.4
	Required pump head	[kPa]	27.3	56.4	48.7	41.4	34.7	53.0	61.4
$\Delta T = 60K$	Flow rate	[m <sup>3</sup> /h]	2.0	2.7	3.4	4.1	5.4	6.8	7.7
	Required pump head	[kPa]	26.2	55.4	46.6	39.3	58.6	47.9	69.1
$\Delta T = 70K$	Flow rate	[m <sup>3</sup> /h]	1.7	2.3	2.9	3.5	4.7	5.8	6.6
	Required pump head	[kPa]	24.2	52.3	44.4	35.2	51.4	61.6	66.8
$\Delta T = 80K$	Flow rate	[m <sup>3</sup> /h]	1.5	2.0	2.6	3.1	4.1	5.1	5.8
	Required pump head	[kPa]	22.1	50.2	40.3	30.2	45.3	53.5	65.6

## Swimming Pool Boiler

The SF60 swimming pool boiler should be installed in parallel with the main water flow, going back from the filtering installation to the swimming pool. The swimming pool boiler can increase the water temperature by maximum 15K at once.

As a swimming pool installation is an open system with hardly any static pressure, it is necessary to create a pressure of at least 0.5 bar in the boiler by installing a regulation valve in the flow connection of the boiler.

The table below shows the nominal water flow data at a  $\Delta T$  of 15K, plus the pump data of the (optional) pump kit for each type of swimming pool boiler.

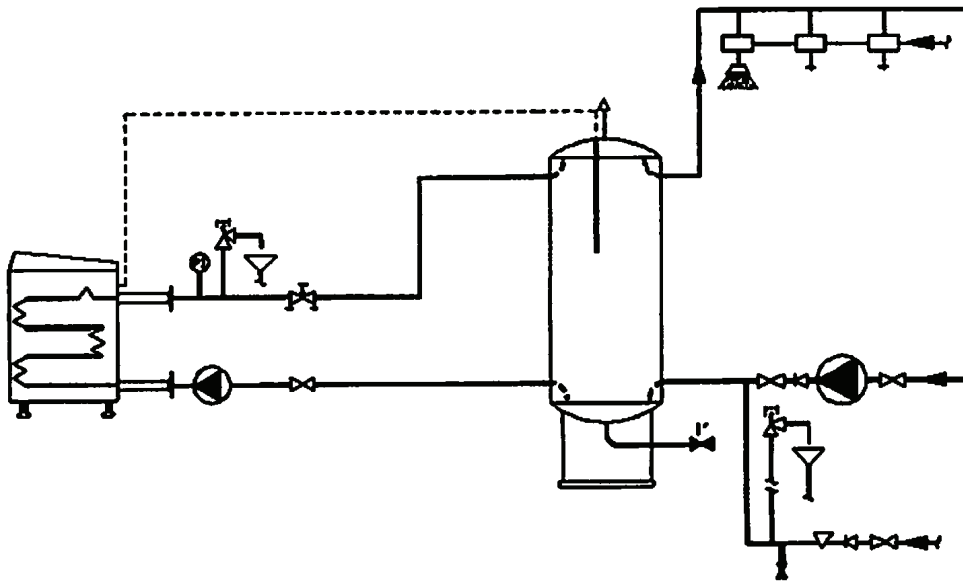
Water flow data swimming pool boiler								
	$\Delta T$	Nominal flow rate	Boiler resistance	Req. static pressure	Pump type	Voltage	Pump head	Residual pump head
	[K]	[m <sup>3</sup> /h]	[kPa]	[kPa]	[-]	[V]	[kPa]	[kPa]
SF61	15	8.1	18	50	COM350/05	230	90	22
SF62		10.8	32	50	COM350/09	230	110	28
SF63		13.6	50	50	COM350/15	230	145	45
SF64		16.3	27	50	COM350/11	230	102	25
SF65		21.7	48	50	CO500/22	400	140	42
SF66		27.2	75	50	CO500/30	400	161	36
SF67		30.8	98	50	CO500/30	400	151	3

## System Examples

The following examples are only meant to give an indication of the possibilities available with the SF60 water heater and swimming pool boilers. These examples can not be used in a project without any further analysis of the project situation by an authorised company.

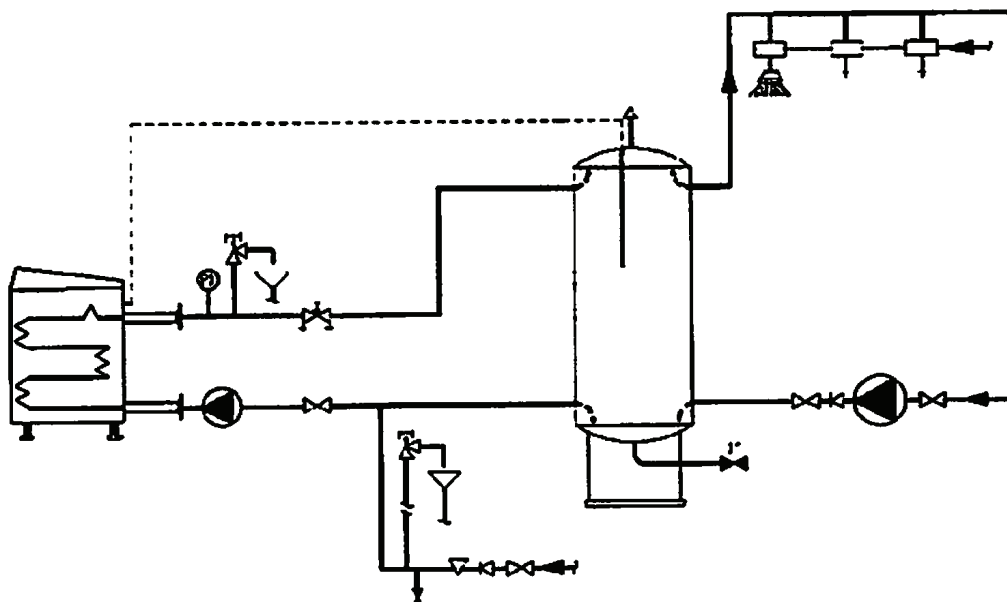
### System 1: Water Heater with Buffer Tank (1)

Water heater connected to a buffer tank with the cold water feed connected to the return connection of the buffer tank. This is the most common way to connect a water heater. Having the cold water feed on the return connection of the tank results in less start/stop sequences of the water heater and creates a stable temperature control in a normal hot water installation.



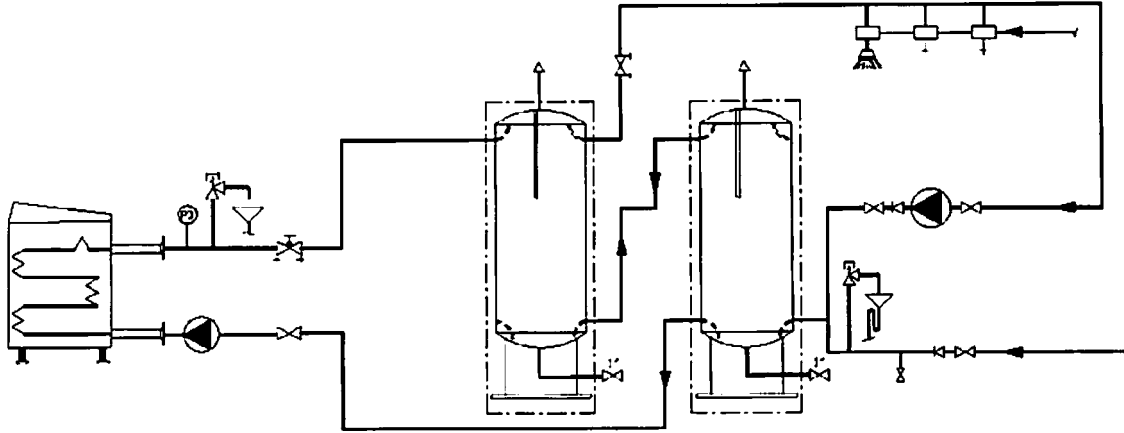
### System 2: Water Heater with Buffer Tank (2)

Water heater connected to a buffer tank, with the cold water feed connected to the return connection of the water heater. This system is only applicable when there is a constant hot water demand of hot water, peak loads can cause a high number of start and stop sequences.



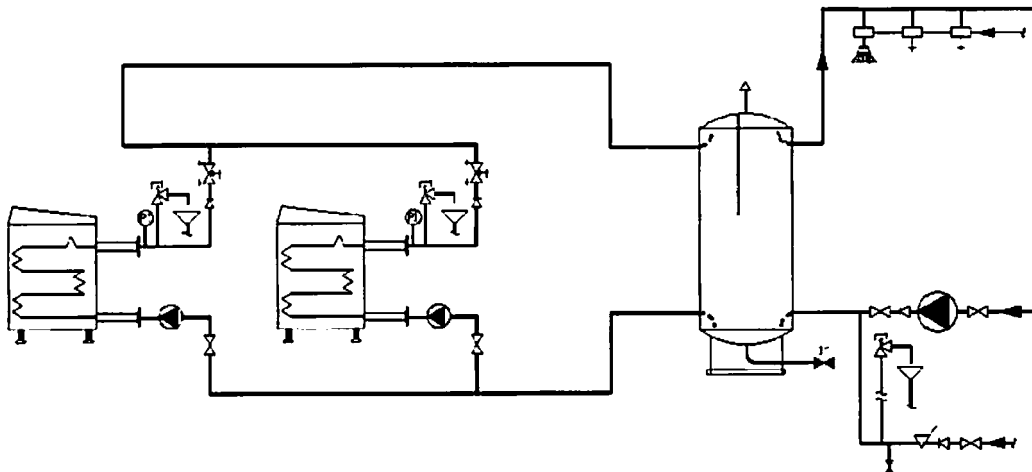
**System 3: water heater with big buffer tank**

When having temporary peak demand, it's useful to have a big buffer tank (or multiple smaller tanks in series) in combination with a small water heater capacity. The capacity of the water heater is determined by the maximum loading time of the buffer tank.



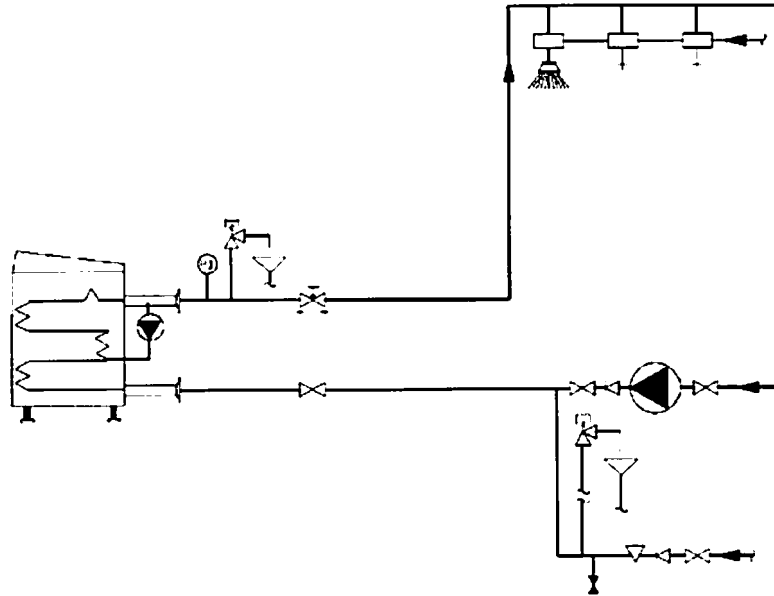
**System 4: water heater cascade**

When having a constant high demand of hot water, it's useful to install a high capacity water heater (or even a cascade of multiple water heaters) in combination with a small buffer tank. The Buffer tank is only covering the starting delay of the boilers, after that the boilers completely cover the hot water demand constantly.



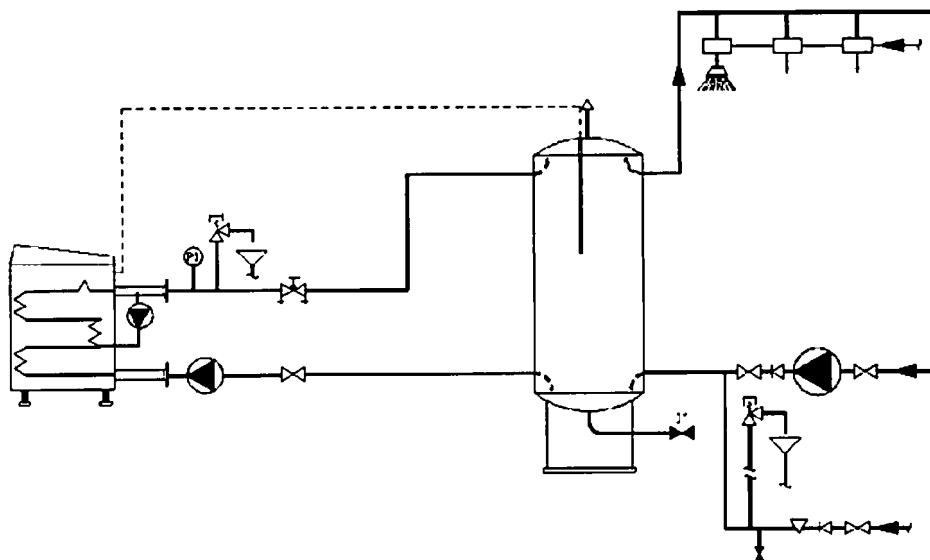
**System 5: bypass water heater**

This system is mainly used in industrial processes with a constant demand of hot water. The bypass water heater can be used without a buffer tank, as the internal bypass covers the minimum flow rate through the water heater. The Bypass water heater can heat up the hot water with higher  $\Delta T$  than the R600 standard water heater ( $\Delta T = 17K$ ). The chapter "Hydraulic connection" describes the flow rates with the different  $\Delta T$  values.



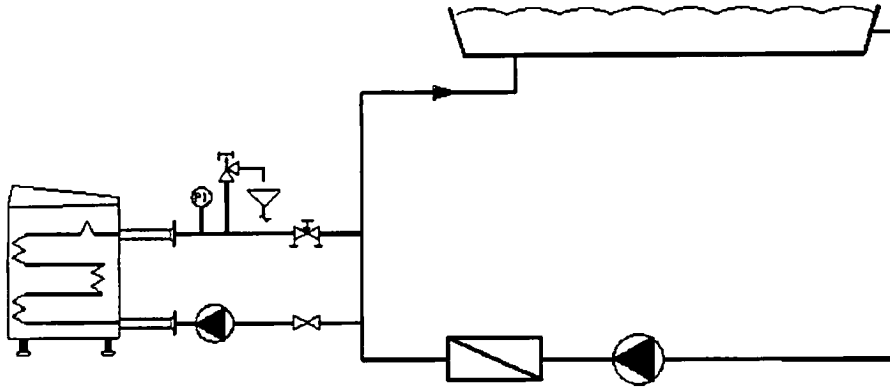
**System 6: bypass water heater with buffer tank**

This system is mainly used in industrial processes, where there is a requirement for direct increase of the water temperature with more than 17K, without having a constant demand. Without the buffer tank the bypass water heater would generate many starts and stops and have a restive regulation.



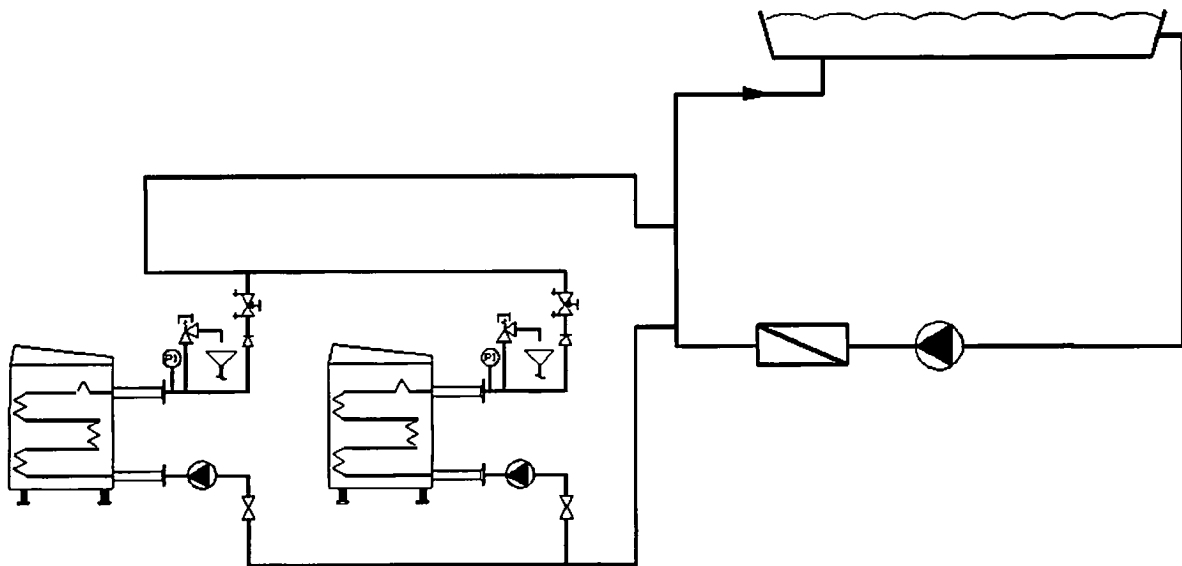
### System 7: swimming pool boiler

The swimming pool boiler is installed in parallel with the swimming pool circulation loop, after the filtering installation. The swimming pool boiler only heats up a partial flow, which is mixed in the main loop to the swimming pool.



### System 8: swimming pool boiler cascade

In this situation the swimming pool boilers are connected in parallel to the circulation loop as well. It's important to connect the boilers in such a way, that both boilers are flushed with an equal water flow rate. This can be done with a regulation valve or by connecting the boilers in reversed return.



## Accessories

For the **SF60** water heater and swimming pool boilers the following accessories are available:

### Water heater:

- Accessory kit with pump and stainless steel flanges, safety valve and manometer.

Connection sizes components							
	SF61	SF62	SF63	SF64	SF65	SF66	SF67
Safety valve	Rp 1.1/4"						
Manometer	R 1/4"						
Pump	G2"	DN32	DN40	DN40	DN50	DN65	DN65
Flanges	-	1.1/4"	1.1/2"	1.1/2"	2"	2.1/2"	2.1/2"

### Bypass water heater:

- Accessory kit with safety valve and manometer.

Connection sizes components							
	SF61	SF62	SF63	SF64	SF65	SF66	SF67
Safety valve	Rp 1.1/4"						
Manometer	R 1/4"						

### Swimming pool boiler:

- Accessory kit with pump, safety valve and manometer.

Connection sizes components							
	SF61	SF62	SF63	SF64	SF65	SF66	SF67
Safety valve	Rp 1.1/4"			Rp 1.1/2"			
Manometer	R 1/4"						
Pump in	Rp 1.1/2"				Rp 2"		
Pump out	Rp 1.1/4"				Rp 1.1/2"		

Consult your supplier for more information on the available accessories.

PART OF BDR THERMEA

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