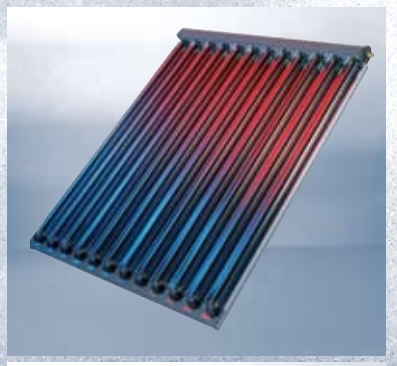
The competence brand for energy saving systems

Solar technology

High performance flat-plate collectors
High performance vacuum tube collectors
Swimming pool absorber
DHW cylinder options



Stiftung Warentest
test

GUT (1,6)

Solarkollektor TopSon F3 *
Standspeicher SEM-1-300
Solarregelung SM-1/BM-Solar

Im Test:
12 Solaranlagen zur Trinkwassererwärmung

Ausgabe 3/2008

*Nota: Successor TopSon F3-1 with improved performance data out now

TopLine / ComfortLine

High performance flat-plate collectors TopSon F3-1 / F3-Q
High performance flat-plate collector CFK-1
for solar heating systems used for DHW heating
for solar heating system used for central heating backup

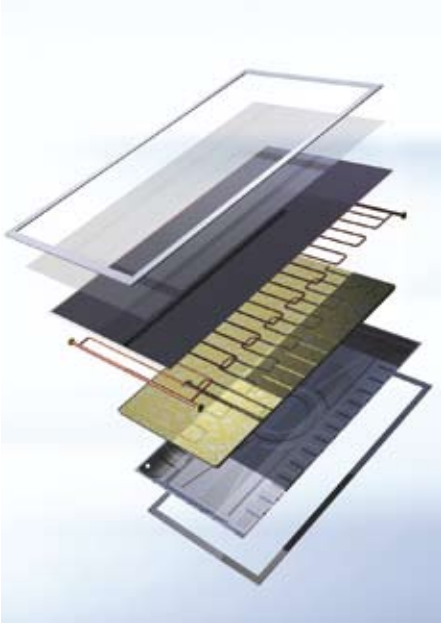


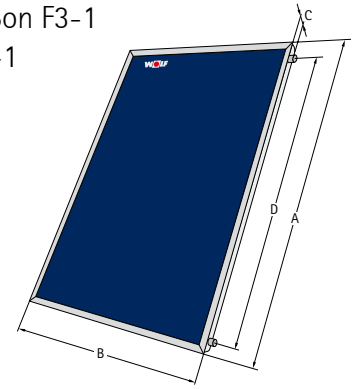
Abbildung: TopSon F3-1

Benefits of Wolf high performance flat-plate collectors:

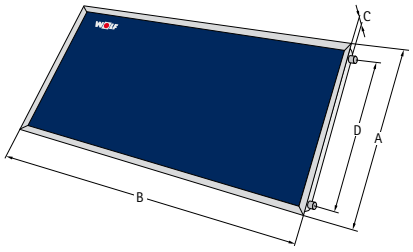
- High performance flat-plate collectors tested to EN 12975 part 2 with Top-energy utilisation; the minimum yield for grants/subsidies [Germany] has been certified
- Certified in accordance with Solar-Keymark (F3-1)
- The conditions set for the „Blue Angel" certificate of environmental excellence acc. to RAL UZ 73 are met
- Deep-drawn, highly weather resistant aluminium collector housing
- Thermal insulation made from Rockwool, 60 mm thick for minimum cool-down losses, TopSon F3-1/F3-Q with additional insulation on the sides
- Absorber with highly selective coating for extremely high yield
  Meander (TopSon F3-1/F3-Q) or harp (CFK-1) layout ensure an even flow and effective function during „Low Flow" operation
- Expansion joints between collectors
- Safety glass, 3,2 mm (TopSon F3-1/F3-Q) or 3,0 mm (CFK-1) thick; hail-proof to EN 12975, thermally pre-stressed, TopSon F3-1/F3-Q with improved transparency
- EPDM seal, pressed into a single-piece grip moulding
- With the TopSon F3-1/F3-Q, up to 5 collectors can be connected to one side; connection either on the l.h. or r.h. side
- Flat-plate collectors TopSon F3-1 and CFK-1 for „portrait" installation, TopSon F3-Q for „landscape" installation can be individually fitted with various assembly kits (accessory):
  - In-roof mounting kit suitable for double depression interlocking tiles
  - „AluPlus" on-roof mounting kit suitable for double depression interlocking tiles, slate or similar, corrugated or flat sheet roof coverings
  - „AluFlex" installing stands suitable for flat roofs or horizontal surfaces
  - „AluFlex" triangle stands designed for roofs with a low pitch to optimize the irradiation angle (adjustable to 20°, 30°, 45°), suitable for double depression interlocking tiles, slate or similar, corrugated or flat sheet roof coverings
- 5 year warranty

Specification

TopSon F3-1
CFK-1



TopSon F3-Q

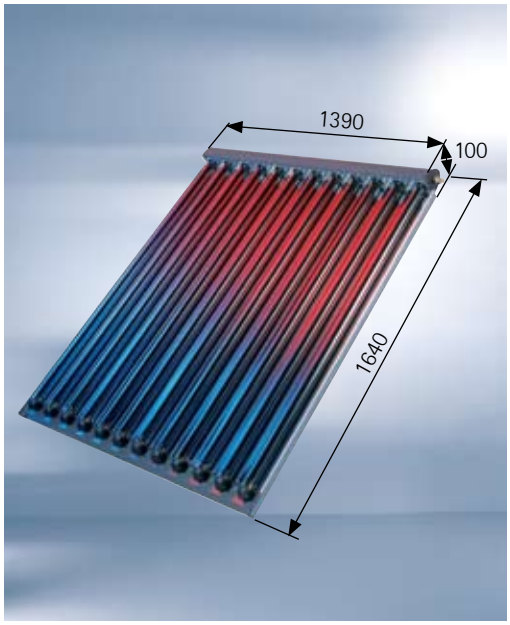


High performance flat-plate collector	Type	TopSon F3-1	TopSon F3-Q	CFK-1
Length	A mm	2099	1099	2099
Width	B mm	1099	2099	1099
Depth	C mm	110	110	110
Flow/return	D mm	1900	900	1900
Connections (flat sealing with union nut)	G	¾"	¾"	¾"
Angle of inclination		15° to 90°	15° to 90°	15° to 90°
Optical efficiency *	%	80,4	81,9	71,2
Heat loss coefficient a_1 *	W/(m² K)	3,235	3,312	3,5
Heat loss coefficient a_2 *	W/(m² K²)	0,0117	0,0181	0,0084
Max. idle temperature	°C	194	198	196
Irradiation angle correction factor IAM-50 *	%	94	93	95,2
Thermal capacity C *	kJ/(m² K)	5,85	6,3	4,723
Max. operating pressure	bar	10	10	10
Gross area	m²	2,3	2,3	2,3
Effective absorber area	m²	2,0	2,0	2,0
Content	litres	1,7	1,9	1,1
Weight (dry)	kg	40	41	36
Recommend flow vol. per collector	litres/h	30 - 90	30 - 90	90
Heat transfer medium		ANRO (undiluted)		
Solar-Keymark registration no.		011-7S260F	-	-

* Values to EN 12975

ComfortLine

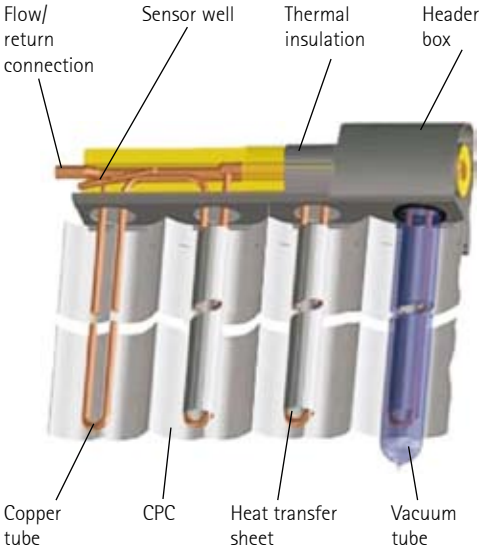
High performance vacuum tube collectors CRK
for solar heating systems used for DHW heating
for solar heating systems used for central heating backup



CRK benefits at a glance:

- The CRK collectors meet the requirements set for the „blue Angel" certificate of environmental excellence acc. to RAL UZ 73
- Powerful: high performance on the smallest of footprints; high yields particularly during spring and autumn; especially suitable for a combination of DHW heating and central heating backup
- Durable: Direct flow collector designed similar to a Thermos flask, enables a life-long vacuum and therefore ensures high thermal insulation; borosilicate glass hail-proof to DIN EN 12 975
- Constant: Absorber with highly selective coating on the external surface of the internal glass tube inside the high vacuum and therefore protected from environmental influences, no degradation and thus permanently high efficiency
- Flexible: modular layouts for ideal matching to the space available on the roof
- High aesthetics: elegant appearance through small tube diameter, optimised distance between pipes and appealing design
- Easy to install: compact and handy; fully assembled; ready to plug in; suitable for on-roof mounting and free-standing installation
- Warranty: 5 years

Specification



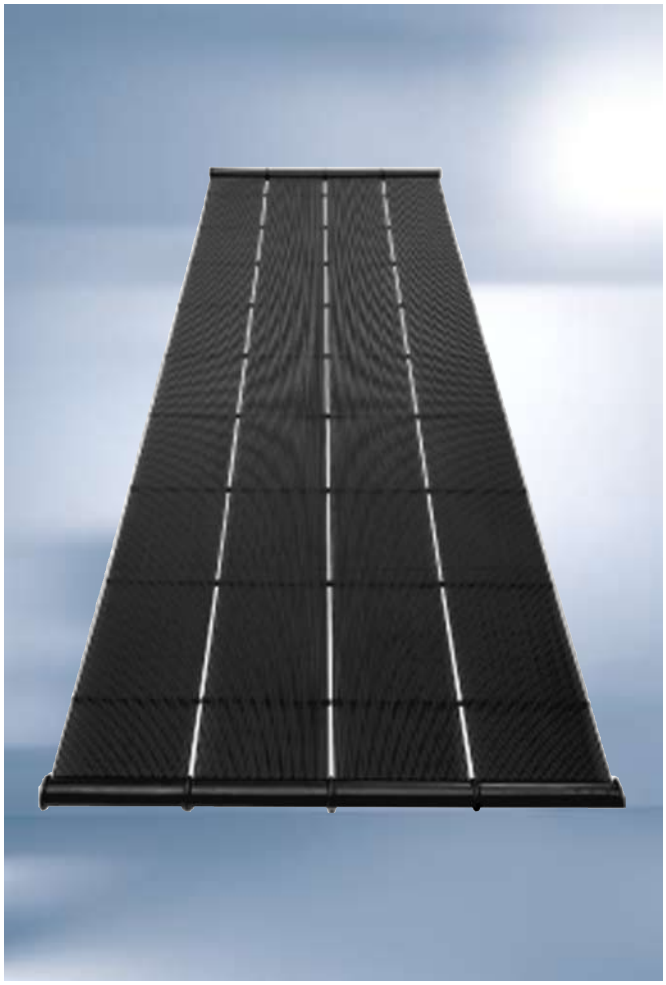
The CPC (Compound Parabolic Concentator) increases the efficiency of the tubes by its specific geometry. Thus, even diffuse sunlight is directed to the absorber, in case of an unfavourable irradiation angle.

Vakuum-Röhrenkollektor	**Typ**	**CRK-12**
Connections (flat sealing with union nut)	mm	15
Angle of inclination		15° to 90°
Absorption (energy absorption)	%	95
Emissions	%	5
Optical efficiency *	%	64,2
Heat loss coefficient a_1 *	W/(m² K)	0,885
Heat loss coefficient a_2 *	W/(m² K²)	0,001
Max. idle temperature	°C	272
Irradiation angle correction factor $K_{50°}$ *	%	0,89
Effective thermal capacity *	C_{eff} in kJ/(m² K)	8,416
Max. operating pressure	bar	10
Pressure drop	mbar	7
Number of vacuum tubes per collector	Stück	12
Diameter of glass tubes	mm	47/37/1,6
Gross area	m²	2,28
Effective absorber area	m²	2,0
Content	Ltr.	1,6
Weight (dry)	kg	37,6
Heat transfer medium		LS (undiluted)
Solar-Keymark		011-7S321 R

* Values to EN 12975

Swimming pool absorber

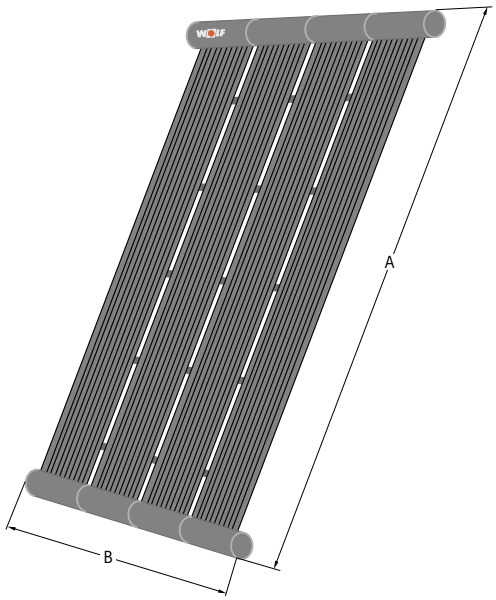
Economic solution for efficiently heating swimming pool water



Benefits of the swimming pool absorber at a glance:

- Low investment and operating costs
- Long service life through robust absorber tubes
- Scale and dirt-repellent absorber system
- High energy yields through the utilisation of solar and environmental energy
- UV and weather-resistant
- Small attack areas for gusts of wind
- Compact panel dimensions of 3,23 m x 1,24 m
- 5 year warranty

Specification



Swimming pool absorber		
Length	A mm	3230
Width	B mm	1240
Operating temperature	°C	5-90
Permissible operating pressure at 20°C	bar	25
Permissible operating pressure at 80°C	bar	8
Pressure drop	mbar	2
Absorber surface area	m²	3,5
Content	litres	12
Weight (dry)	kg	10
Recommended flow volume per absorber	litres/h	350

Control units

TopLine solar technology

Solar module SM1

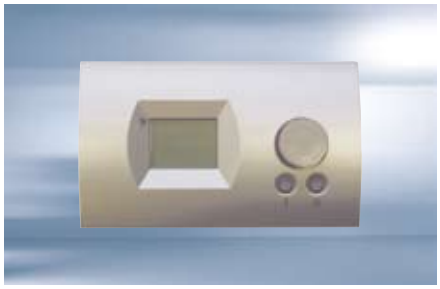
- Extension module for the regulation of one solar circuit
- In conjunction with Wolf boilers, greater energy saving through intelligent cylinder reheating, i.e. blocking cylinder reheating when there is sufficient solar yield
- Optional connection of heat meters
- Display of the set and actual values on the BM programming module, BM-solar
- eBus interface
- Rast-5 connection technology

incl. one collector sensor (PT 1000) and one storage sensor (NTC 5K) each with sensor well

Solar module SM2

- Extension module for the regulation of a solar system including up to 2 cylinders and 2 collector fields, incl. 1 collector sensor, 1 cylinder sensor, each with sensor well
- Easy configuration of the controller through selection of pre-defined system options
- In conjunction with Wolf boilers, great energy saving through intelligent cylinder reheating, i.e. blocking cylinder reheating when there is sufficient solar yield
- Heat meter function
- Display of the set actual values on the BM and BM-Solar programming module
- eBus interface with automatic energy management
- Rast-5 connection technology

incl. one collector sensor (PT 1000) and one storage sensor (NTC 5K) each with sensor well



Programming module BM-Solar

- required for solar module SM1 when used as an independant solar control (Stand-Alone operation)
- LC-Display
- Control by rotary selector with key function
- eBus interface
- the programming module may be installed in a wall mounting base as a remote control for SM1 or SM2

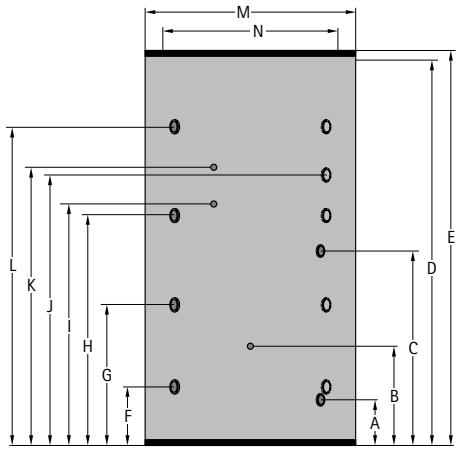
Stratification cylinder BSP / BSP-W

BSP-800/1000 for combination with solar systems, biomass and fossil cumbustibles
BSP-W1000 for combination with solar systems and heat pumps

Benefits of the Wolf stratification cylinder BSP:

- Space-saving stratification cylinder
- Hydraulic components e.g. fresh water module, 2 mixing valve circuits, solar pump/fitting assembly are suitable for optimal installation either on the cylinder or the wall
- Stratification sheet inserts stabilize the temperature levels in the cylinder and improve the solar yield considerably
- Hygienic hot water preparation via highly efficient fresh water module (30l/min)
- DHW circulation kit optional; control via timer, thermostat or opening the water tap
- Optional with 2 mixing valve circuit assemblies for high or low temperature circuit
- Minimum energy loss through single-cylinder system
- Economic solution for heating backup
- Removable thermal insulation for easier transport into the installation room
- 5 year warranty on the freestanding cylinder
  2 year warranty on all electrical and moving parts

Specification



Stratification cylinder		BSP-800	BSP/BSP-W1000
Cylinder capacity	litres	785	915
Solar return	A mm	230	230
Solar sensor	B mm	490	550
Solar flow	C mm	910	1030
Overall height without insulation	D mm	1755	2040
Overall height with insulation	E mm	1825	2110
Connection	F mm	260	310
Connection	G mm	630	745
Connection	H mm	1030	1250
Sensor	I mm	1230	1300
Connection (BSP-W1000 only)	J mm	-	1430
Sensor	K mm	1350	1510
Connection	L mm	1430	1710
Outside diameter incl. insulation	M mm	1000	1000
Outside diameter excl. insulation	N mm	790	790
Height of unit when tilted, excl. insulation	mm	1788	2068
Solar flow/return	G	1"	1"
Connection	Rp	1½"	1½"
Sensor (4 pcs.) internal diameter	mm	15	15
Heat exchanger surface - solar	m²	2,5	3
Heat exchanger capacity - solar	litres	16,5	19,8
Max. operating pressure of cylinder	bar	3	3
Max. operating pressure of heat exchanger	bar	10	10
Max. operating temperature of cylinder	°C	95	95
Weight	kg	160	180

Fresh water module BSP-FW		
Hot water output at 90°C buffer temp.	litres/min	30
Weight	kg	16
Fresh water module BSP-FWL (BSP-W1000 only)		
Hot water output at 50°C buffer temp.	litres/min	10
Weight	kg	20
Fresh water module BSP-FW / BSP-FWL		
Max. operating pressure - heating	bar	3
Max. operating pressure - sanitary water	bar	10
Max. operating temperature	°C	95
Power consumption	W	95
Electrical connection		230V/50Hz

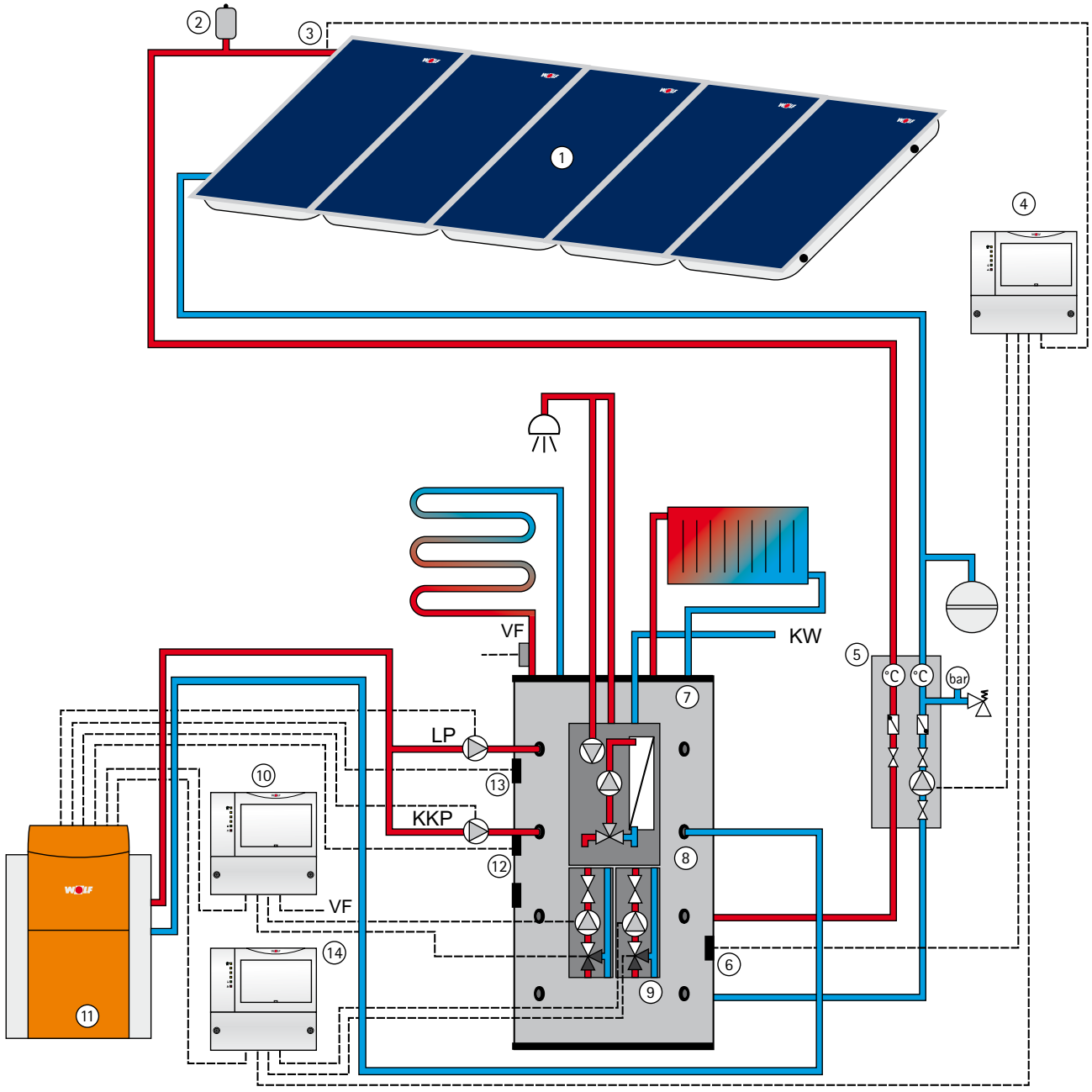
Accessories

- Mixing valve assembly BSP-MK 1*
  for low temperature circuit
- Mixing valve assembly BSP-MK 2*
  for high temperature circuit
- Mixing valve assembly BSP-MK 1 and 2*
  for both low temperature and
  high temperature circuit
- DHW circulation module for fresh water module

* BSP-800/1000 only

Pipework layout „Wolf-Solar heating“

Solar DHW heating and central heating backup with stratification cylinder BSP



1. Collector array
2. Air vent trap
3. Collector sensor
4. Solar module SM1
5. Pump/fitting assembly
6. Solar control unit cylinder sensor
7. Stratifiction cylinder BSP
8. Fresh water module for DHW heating
9. Heating circuit and mixing valve circuit assembly
10. Mixer module MM
11. Oil/gas boiler with control R2
12. Collective sensor
13. Cylinder sensor, heating water
14. Mixer module MM

When using a control system R3, there is no return temperature boost required for central heating backup with the stratification cylinder.

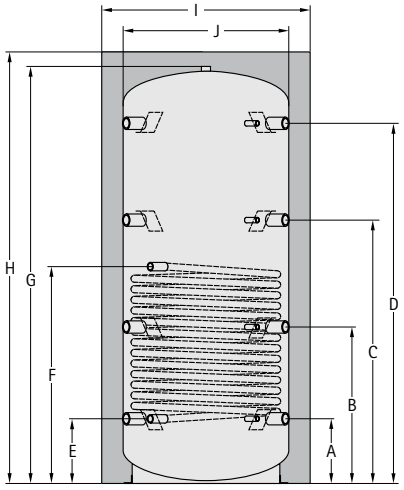
Buffer cylinder SPU-2-W / SPU-2

made from steel, with quality certificate
Indirect steel coils for the SPU-2-W

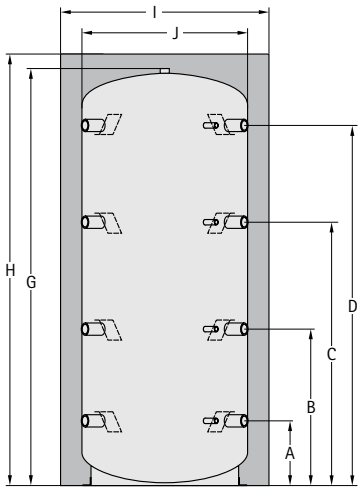
Benefits of the Wolf SPU-2-W / SPU-2:

- Steel buffer cylinder with 500 to 1500 litre capacity with indirect steel coil, max. operating pressure 3 bar
  Type SPU-2 without indirect coils
- 8 ½" connections and 4 ½" connections in the cylinder wall
- Highly effective thermal insulation and low thermal losses through high-grade soft foam thermal insulation, 100 mm thick
- Removable thermal insulation for easier transport into the installation room
- Thermal insulation (CFC free)
- 5 year warranty on the freestanding cylinder
  2 year warranty on all electrical and moving parts

Specification



Type SPU-2-W



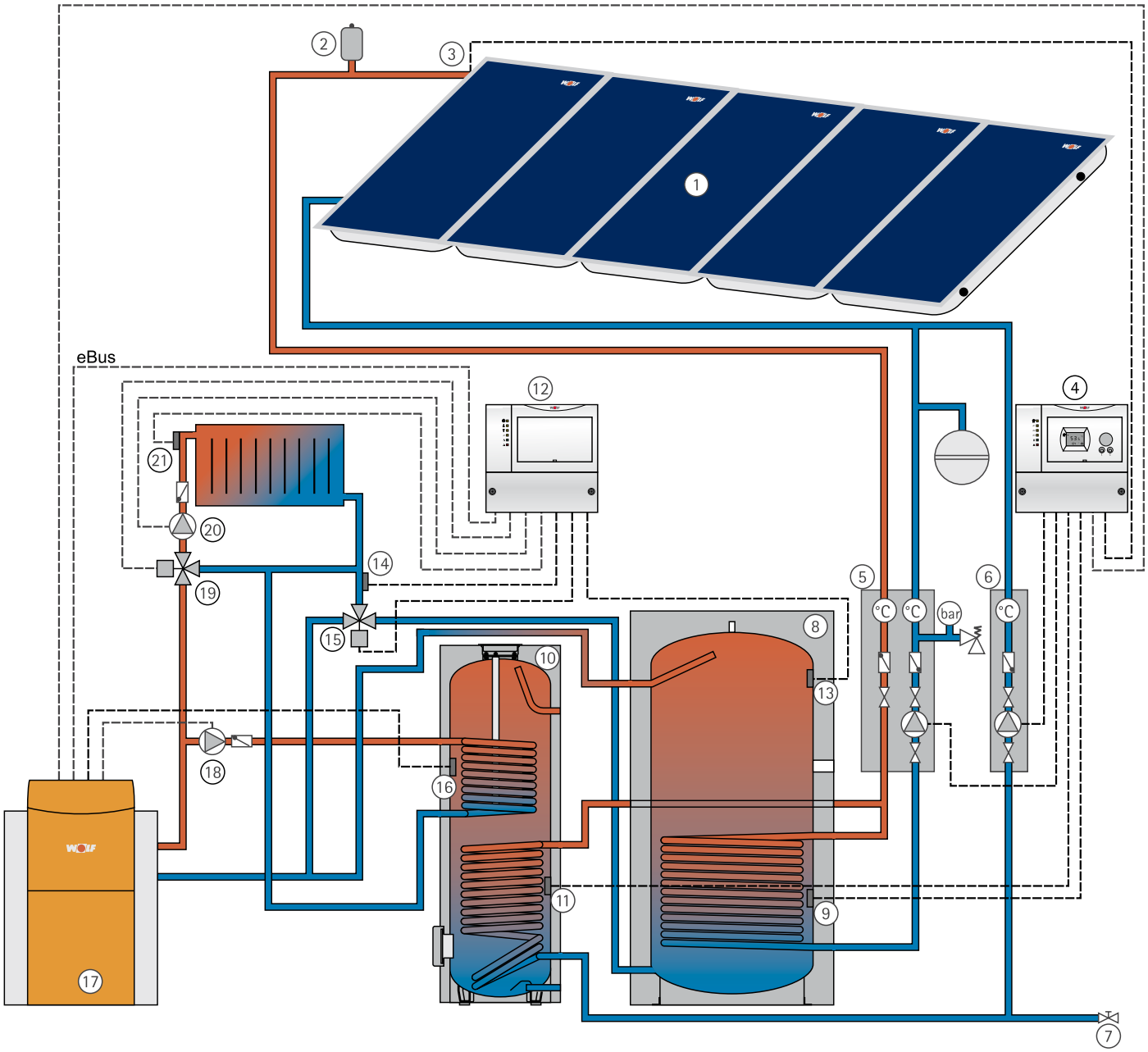
Type SPU-2

Buffer cylinder	Type SPU-2-W	500	800	1000	1500
	Type SPU-2	500	800	1000	1500
Cylinder capacity	SPU-2-W Ltr.	480	730	915	1520
	SPU-2 Ltr.	490	775	935	1545
Connection / thermometer / sensor strip	A mm	210	260	307	372
Connection / thermometer / sensor strip	B mm	605	630	745	817
Connection / thermometer / sensor strip	C mm	995	1030	1250	1342
Connection / thermometer / sensor strip	D mm	1345	1380	1710	1752
Indirect coil return *	E mm	210	260	307	372
Indirect coil flow *	F mm	1105	930	1030	1172
Height excl. thermal insulation	G mm	1560	1640	1980	2070
Height incl. thermal insulation	H mm	1640	1700	2050	2150
Diameter incl. thermal insulation	I mm	850	990	990	1200
Diameter excl. thermal insulation	J mm	650	790	790	1000
Height tilted, incl. thermal insulation	mm	1860	1980	2290	2460
Height tilted, excl. thermal insulation	mm	1630	1720	2060	2180
Connections (8 pcs.)	Rp	1½"	1½"	1½"	1½"
Thermometer (4 pcs.)	Rp	½"	½"	½"	½"
Indirect coil connection *	Rp	1"	1"	1"	1"
Indirect coil area *	m²	1,8	2,4	3	3,6
Coil content *	litres	10,5	13,5	17,0	20,5
Max. operating pressure prim. * / sec.	bar	10/3	10/3	10/3	10/3
Max. operating temperature prim. * / sec.	°C	110/95	110/95	110/95	110/95
Weight	SPU-2-W kg	110	140	175	230
	SPU-2 kg	85	106	133	180

* only for SPU-2-W

Pipework layout

Solar DHW heating and central heating backup with solar cylinder SEM-1 and buffer cylinder SPU-2-W



1. Collector array
2. Air vent trap
3. Collector sensor
4. Temperature differential control unit SM2
5. Pump/fitting assembly
6. Pump/fitting assembly extension
7. Fill & drain valve
8. Buffer cylinder SPU-2-W
9. Solar circuit cylinder sensor (buffer cylinder)
10. DHW cylinder
11. Solar circuit cylinder sensor (DHW)
12. Mixer module MM (config. 4)
13. Buffer cylinder sensor
14. Return temperature sensor
15. Three-way diverter valve
16. Cylinder sensor, heating water
17. Boiler with control R2
18. Cylinder charging pump, heating water
19. Mixing valve motor
20. Mixing valve circuit pump
21. Flow sensor mixing valve circuit

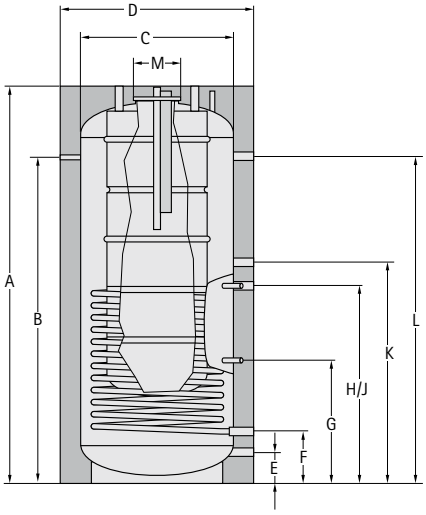
Dual cylinder SED-750/250

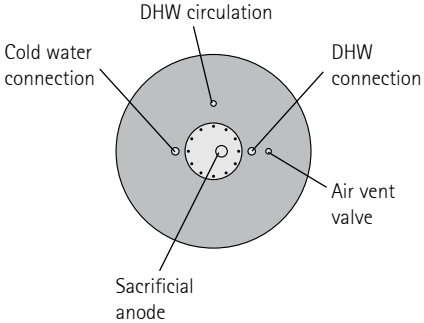
made from steel, with quality certificate and internal DHW cylinder and thermostatic water mixing valve

Benefits of the Wolf SED-750/250:

- Dual cylinder made from steel, tested to DIN 4753, total capacity 750 l, buffer cylinder 500 l with internal indirect coil for solar heating and one DHW cylinder with 250 l capacity
- The interior of the DHW cylinder is protected against corrosion by a two-layer enamel coating and a protective magnesium anode
- Highly effective thermal insulation and low thermal losses through high-grade soft foam thermal insulation, 100 mm thick
- Removable thermal insulation for easier transport into the installation room
- Thermal insulation (CFC free)
- 5 year warranty on the freestanding cylinder
  2 year warranty on all electrical and moving parts

Specification

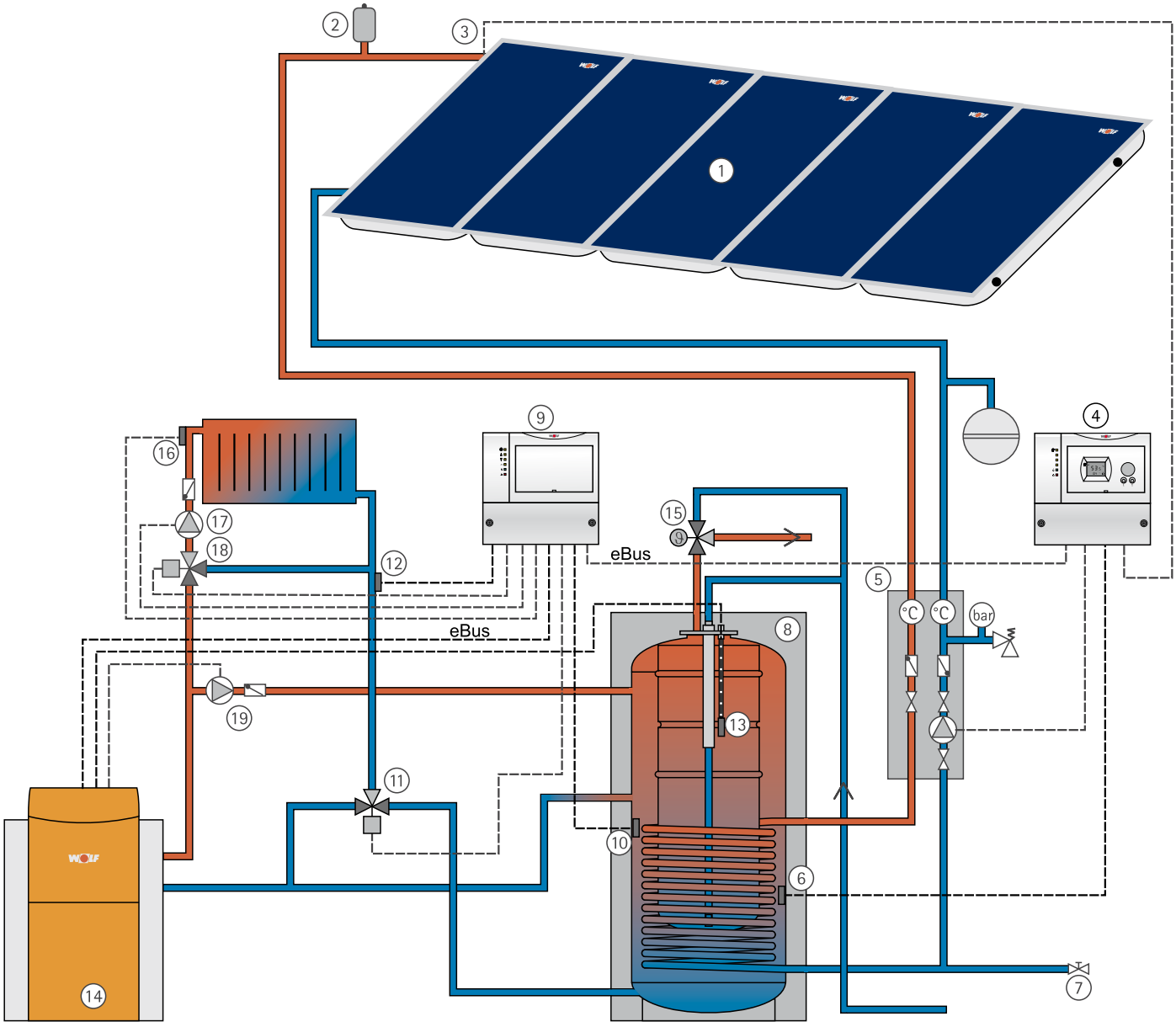




Dual cylinder	Type	SED-750/250
Total cylinder capacity	litres	750
DHW cylinder capacity	litres	250
Constant DHW cylinder rating 80/60-10/45°C	kW - l/h	18 - 446
Performance factor	NL_{60}	2,9
Overall height	A mm	2005
Thermometer	B mm	1635
Diameter excl. thermal insulation	C mm	750
Diameter incl. thermal insulation	D mm	950
Heating backup return	E mm	155
Solar return	F mm	260
Solar circuit cylinder sensor	G mm	625
Solar circuit flow	H mm	990
Cylinder sensor for solar return temperature raising facility SRTA	J mm	990
Heating backup flow / DHW re-heating return	K mm	1100
DHW re-heating flow	L mm	1635
Internal flange diameter	M mm	110
Height when tilted, incl. thermal insulation	mm	2200
Height of unit when tilted, excl. thermal insulation	mm	2020
Solar flow	Rp	1"
Solar return	Rp	1"
DHW re-heating flow	Rp	1"
Heating backup flow / DHW re-heating return	Rp	1"
Heating backup return	Rp	1"
Top flange, cold water connection	Rp	1"
Top flange, DHW connection	Rp	1"
Top flange, DHW circulation	Rp	1"
Thermometer	Rp	½"
Cylinder sensor for SRTA	Rp	½"
Solar circuit cylinder sensor	Rp	½"
Indirect coil area	m²	2,5
Coil content	litres	15
Max. operating pressure, DHW	bar	10
Max. operating pressure, heating water	bar	3
Max. operating temperature	°C	95
Weight	kg	250

Pipework layout

Solar DHW heating and central heating backup with dual cylinder SED-750/250



1. Collector array
2. Air vent trap
3. Collector sensor
4. Temperature differential control (e.g. SM1)
5. Pump/fitting assembly
6. Solar control unit cylinder sensor
7. Fill & drain valve
8. Dual cylinder SED-750/250
9. Mixer module MM (config. 4)
10. Buffer sensor
11. Three-way diverter valve
12. Return temperature sensor
13. Cylinder sensor, heating water
14. Boiler with control R2
15. Thermostatic DHW mixing valve
16. Flow sensor mixing valve circuit
17. Mixing valve circuit pump
18. Mixing valve motor
19. Cylinder charging pump, heating water

Freestanding cylinder SEM-1

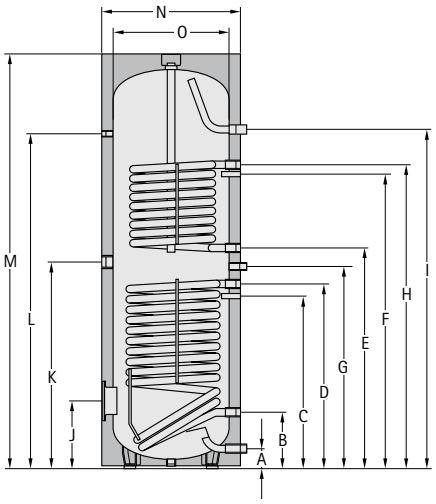
with two indirect coils

Freestanding steel cylinder with quality certificate,
heating water max. 110°C and 10 bar, DHW max. 95°C and 10 bar

Benefits of the Wolf SEM-1:

- Solar cylinder made from steel with two enamel-coated indirect coils to DIN 4753
- Highly-effecitve thermal insulation and low thermal losses through high-grade hard PU foam insulation below the cylinder foil casing
- Thermal insulation (CFC free)
- The interior of the cylinder and the indirect coils are protected by enamel coating and a protective magnesium anode
- Large heat exchanger areas ensure a short heat-up time and a high constant DHW output
- Side flange for additional indirect coils and simple maintenance
- Optimised ratio between diameter and height for good temperature stratification
- 5 year warranty on the freestanding cylinder,
  2 year warranty on all electrical and moving parts

Specification

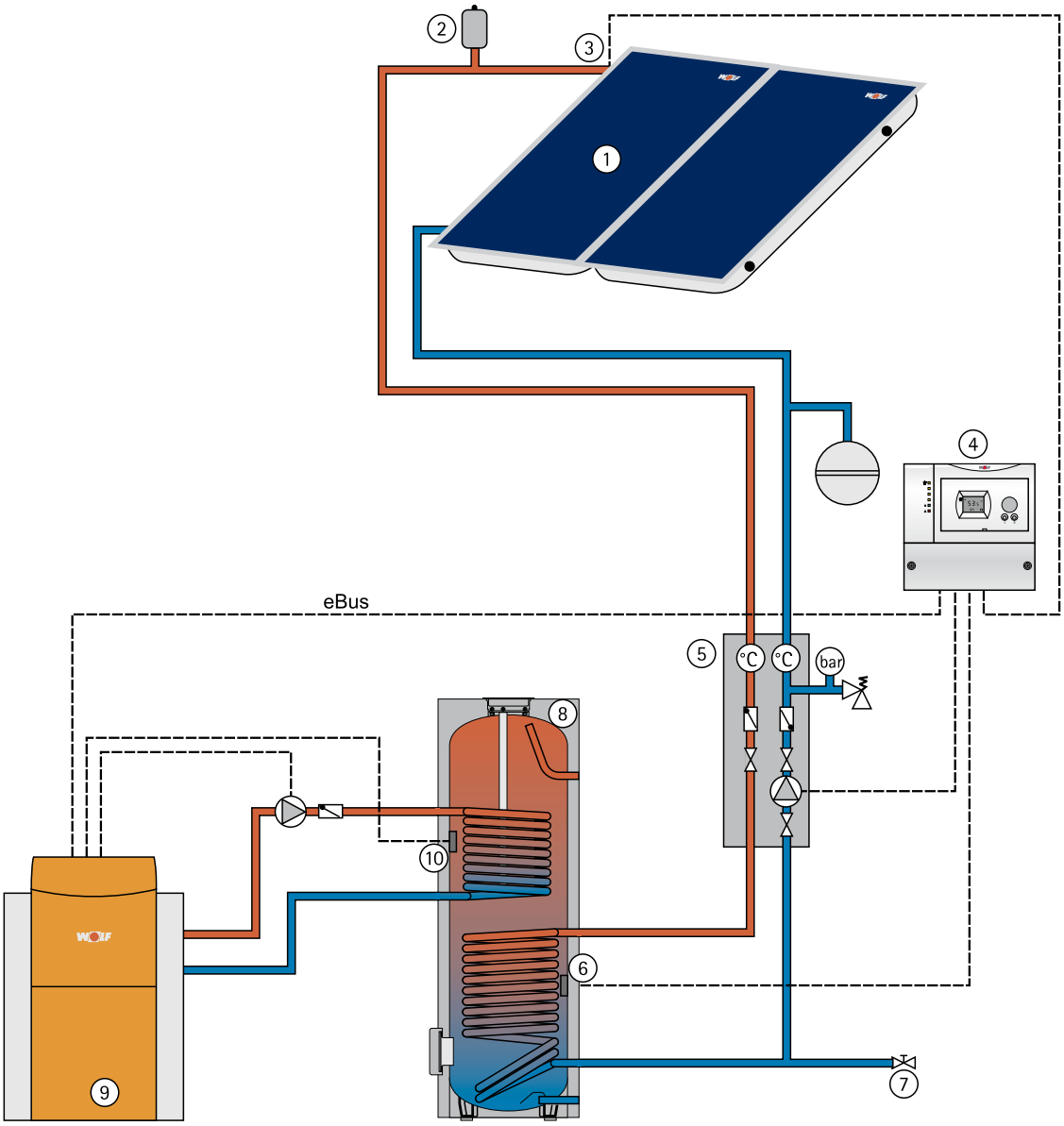


DHW cylinder	Type SEM-1	300	400	500	750	1000
Cylinder capacity	litres	300	400	500	750	1000
Constant DHW cylinder output 80/60-10/45°C (heating)	kW - Ltr./h	20-490	20-490	20-490	50-1200	50-1200
Performance factor (heating)	NL_{60}	2,3	4,8	6	13,5	18
Cold water connection	A mm	90	85	99	220	220
Solar return	B mm	253	320	304	345	345
Solar cylinder sensor	C mm	491	350-910*	586	603	603
Solar flow	D mm	806	880	865	920	975
Central heating return	E mm	974	1100	985	1025	1340
Cylinder sensor, heating water	F mm	1154	1090-1490*	1160	1185	1500
DHW circulation	G mm	1077	1000	1195	1290	1605
Central heating flow	H mm	1334	1415	1335	1475	1790
DHW connection	I mm	1728	1525	1451	1590	1940
Flange (bottom)	J mm	324	345	335	384	384
Electric immersion heater	K mm	887	1000	949	970	1145
Thermometer	L mm	1504	1521	1404	1460	1810
Overall height	M mm	1794	1800	1780	1830	2180
Diameter incl. thermal insulation	N mm	600	670	760	940	940
Diameter excl. thermal insulation	O mm	500	-	650	800	800
Height tilted, incl. thermal ins.	mm	1898	1920	1935	2057	2374
Heating water (primary)	bar/°C	10/110	10/110	10/110	10/110	10/110
DHW (secondary)	bar/°C	10/95	10/95	10/95	10/95	10/95
Internal flange diameter	mm	110	120	114	114	114
Cold water connection	G (IG)	1" **	1" **	1"	1¼"	1¼"
Heating/solar flow	G (IG)	1"	1"	1"	1¼"	1¼"
Heating/solar return	G (IG)	1"	1"	1"	1¼"	1¼"
DHW circulation	G (IG)	¾"	¾" **	¾"	1"	1"
DHW connection	G (IG)	1" **	1" **	1"	1¼"	1¼"
Electric immersion heater	G (IG)	1½"	1½"	1½"	1½"	1½"
Thermometer	G (IG)	½"	½"	½"	½"	½"
Heat exchanger area (heating)	m²	0,95	0,95	0,95	1,45	1,45
Heat exchanger area (solar)	m²	1,34	1,8	1,8	2,1	2,4
Heat exchanger content (heating)	litres	6	6,7	6,1	12,5	12,5
Heat exchanger content (solar)	litres	8,8	11,6	11,5	16	18
Weight	kg	130	159	182	290	350

* vertical sensor position variable
** R (AG)

Pipework layout

Solar DHW heating with the SEM-1 solar cylinder



1. Collector array
2. Air vent trap
3. Collector sensor
4. Temperature differential control unit (e.g. SM1)
5. Pump/fitting assembly
6. Solar control unit cylinder sensor
7. Fill & drain valve
8. SEM-1 solar cylinder
9. Boiler with control R2
10. Cylinder sensor, heating water

Accessories

TopLine solar technology

Pump/fitting assembly
Comprising:
2 x multi-valves with gravity brake, may be installed with an air passage, display thermometer, safety valve 6 bar, pressure gauge 10 bar, flow rate regulation with fill & drain valve, air separator with manual air vent valve, mounting plate, wall retainer and installation material, insulation EPP, resistant to 130 °C (short term up to 180 °C).
Including integral pump, with cable. Rated voltage 230 V AC.

Pump/fitting assembly 10; pump UPS 25-60
For up to 10 flat-plate collectors at 50 l flow rate per hour and collector.

Power consumption $P_{el.\ pump}$	stage 1	45W
	stage 2	65W
	stage 3	90W

Pump/fitting assembly 20; pump UPS 25-80
For up to 20 flat-plate collectors at 50 l flow rate per hour and collector.

Power consumption $P_{el.\ pump}$	stage 1	140W
	stage 2	210W
	stage 3	245W

Calorimeter kit for SM1 and SM2*
for yield measurement;
consisting of:
- flow meter
- return sensor (contact type)
- Union nut fittings

* applicable for configurations 1/3/4/5/6

Pump/fitting assembly E *
For the easy water connection of a second DHW cylinder.

* Pumps as for the pump fitting assemblies 10/20

Flow rate regulation
For the accurate control of the heat transfer medium. This achieves the best possible system yield, making it easier to obtain government subsidies [check local regulations].

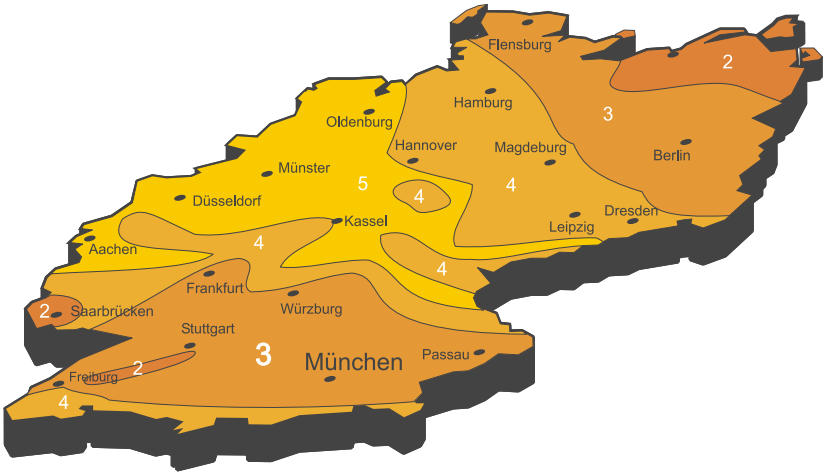
Return temperature raising facility for MM
For tying the solar energy into the heating circuit, comprising of:
- three-way diverter valve
- return contact sensor
- cylinder sensor
- sensor well for cylinder sensor

Expansion vessel [litres]										
Collector type	**F3-1 / F3-Q**					**CFK-1 / CRK**				
Pipe-Ø	**12x1**	**15x1**	**18x1**	**22x1**	**28x1,5**	**12x1**	**15x1**	**18x1**	**22x1**	**28x1,5**
2 collectors	12 / 18	18 / 25	18 / -	-	-	12 / -	12 / 35	- / 35	-	-
3 collectors	-	18 / 25	25 / 25	-	-	12 / -	18 / -	18 / 50	-	-
4 collectors	-	25 / 25	25 / 35	35 / 35	-	18 / -	18 / -	25 / 80	-	-
5 collectors	-	35 / 35	35 / 35	35 / 50	-	-	25 / -	25 / 80	-	-
6 collectors	-	35 / 50	35 / 50	50 / 50	-	-	25 / -	25 / 80	35 / -	-
7 collectors	-	50 / 50	50 / 50	50 / 50	80 / 80	-	-	35 / 105	35 / -	-
8 collectors	-	50 / 50	50 / 50	50 / 80	80 / 80	-	-	35 / 105	35 / -	-
9 collectors	-	-	50 / 80	80 / 80	80 / 80	-	-	35 / -	50 / -	50 / -
10 collectors	-	-	80 / 80	80 / 80	80 / 80	-	-	-	50 / -	50 / -

The selection is based on max. line lengths resulting from the max. residual height of the pump/fitting assembly

Technical information for solar DHW heating with flat-plate collectors

Example:
Climate zone Munich
Roof inclination 45°, collector orientation SE
DHW demand (approx. 75 l / person / day)
Number of occupants: 4



Climate zone

Climate zone	Minimum hours of sunshine	Factor
1	1900 - 2000	0,8
2	1800 - 1900	0,9
3	1700 - 1800	**1,0**
4	1600 - 1700	1,1
5	1500 - 1600	1,2

→ Factor: **1,0**

Roof orientation

Roof inclination	Collector orientation		
	S	**SE**/SW	E/W
15°	1,2	1,2	1,3
25°	1,1	1,2	1,4
35°	1,0	1,2	1,5
45°	1,0	**1,1**	1,5
55°	1,1	1,2	1,6
65°	1,2	1,3	1,7
75°	1,3	1,4	1,8

→ Factor: **1,1**

Hot water requirement

Low		Standard		High
0,6	0,8	**1,0**	1,2	1,5

→ Factor: **1,0**

Number of flat-plate collectors

Factor Climate zone		Factor Roof orientation		Factor DHW demand		Number House Occupants				Number Collectors *
1,0	x	**1,1**	x	**1,0**	x	**4**	x	0,4	=	**1,76** ≙ **2 collectors**

* All details relate to a solar DHW coverage rate of 60%.
The coverage rate can be increased or reduced by rounding up or down.

Required cylinder size

Number House occupants		Factor DHW demand				Cylinder size
4	x	**1,0**	x	e.g. 75 l	=	**300 l**

Technical information for solar DHW heating with collectors

System sizing

All details are recommendations and may differ from system to system.

Number of coll. / array	Collector type	Array pressure drop * [mbar]
1 – 3	F3-1	65 - 75
	F3-Q	83 - 105
	CFK1	12
	CRK	7 - 22
4 – 6	F3-1	82 - 110
	F3-Q	100 - 125
	CFK-1	35
	CRK	38 - 58
7 – 10	F3-1	123 - 150
	F3-Q	130 - 175
	CFK-1	85
7 – 8	CRK	70 - 100

*(90 l/h*coll., acc. to EN 12975)

Expansion vessel

The diaphragm expansion vessel is designed for three functions when using solar circuits:
1. To accomodate the incoming liquid resulting from the thermal expansion inside the solar circuit
2. To accomodate the liquid seal
3. To accomodate the incoming liquid resulting from the steam generated inside the collector

Calculation according to the following formula:

$$V_N > \frac{V_G \times 0{,}1 + V_A \times 1{,}1}{N}$$

V_N = Nominal volume of the diaphragm expansion vessel
V_G = Total liquid content inside the solar circuit in litres
V_A = Liquid volume inside the collector array in litres
N = Efficiency

$$N = \frac{P_e - P_0}{P_e + 1}$$

P_0 = Vessel inlet pressure in bar
P_e = System pressure in bar

Recommendation: P_e = Response pressure of the safety valve - 0,5 bar.

Copper pipe content l/m

Cu pipe	Ø mm	DN 10x1	DN 12x1	DN 15x1	DN 18x1	DN 22x1
Contents	l/m	0,055	0,079	0,133	0,201	0,314

Example:

System comprising:
2 TopSon F3-1 collectors; 20 m Cu riser 15x1;
Solar cylinder type SEM-1-300
with indirect coils, 8,8 l content; safety valve 6 bar; vessel inlet pressure (static head) 2,5 bar;

$$N = \frac{(6 \text{ bar} - 0{,}5 \text{ bar}) - 2{,}5 \text{ bar}}{(6 \text{ bar} - 0{,}5 \text{ bar}) + 1} = 0{,}46$$

Total system volume (V_G) in litres

2	TopSon F3-1 collectors	1,7 Ltr. x 2	3,40 litres
20 m	Riser 15x1	0,133 Ltr. x 20	2,66 litres
1	Indirect coil	8,8 Ltr. x 1	8,80 litres
			14,86 litres

Total system volume (V_G):

$$V_N > \frac{14{,}86 \times 0{,}1 + 3{,}4 \times 1{,}1}{0{,}46} = 11{,}36 \text{ litres}$$

Selected: diaphragm expansion vessel with 12 l capacity and 2,5 bar inlet pressure.

Wolf TopLine Solar technology

High performance flat-plate collector TopSon F3-1 for „portrait" installation / F3-Q for „landscape" installation

Flate-plate collector testet to EN 12975.
With highly selective coating, collector housing made from weather-resistant aluminium, 3,2 mm safety glass, hail-proof. Self-supporting housing. Weather and temperature resistant collector. Single piece grip moulding, pressed onto the sealing frame. With integral distribution line and connecting fittings. Expansion joints in the connection fittings.

				No.	Price eacht	Total price
Collector type	.....	Dimensions: (see page 2)				
Make	Wolf	Height:	mm			
		Width:	mm			
		Area:	m²			
		Weight:	kg			

High performandce flat-plate collector CFK-1 for „portrait" installation

Flate-plate collector tested to EN 12975 part 2.
With highly selective coating, collector housing made from weather-resistant aluminium, 3,0 mm safety glass, hail-proof. Self-supporting housing. Weather and temperature-resistant collector. Single piece grip moulding, pressed onto the sealing frame. With integral distribution line with connection fittings. Expansion joints in the connection fittings.

Collector type	CFK-1	Dimensions: (see page 2)				
Make	Wolf	Height:	mm			
		Width:	mm			
		Area:	m²			
		Weight:	kg			

High performance vacuum tube collector CRK

Vacuum tube collector tested to EN 12975.
Direct flow collector designed similar to a Thermos flask. The absorbers are in the vacuum and are therefore protected against ageing and contamination. Borosilicate glass, resistant to chemicals and temperature fluctuations. Hail-proof to EN 12 975

Collector type	CRK	Dimensions: (see page 3)				
Make	Wolf	Height:	mm			
		Width:	mm			
		Area:	m²			
		Weight:	kg			

Swimming pool absorber

UV and weather-resistant plastic absorber with high energy utilisation

Swimming pool absorber		Dimensions: (see page 4)				
Make	Wolf	Height:	mm			
		Width:	mm			
		Area:	m²			
		Weight:	kg			

Control units for high performance solar collectors:

Solar module SM1 Extension module for the regulation of one solar circuit in conjunction with Wolf boilers			
Solar module SM2 Extension module for the regulation of a solar system including up to 2 cylinders and 2 collector fields in conjunction with Wolf boilers			
Programming module BM-Solar required for a solar module SM1 or SM2 when used as an independent solar control (Stand-Alone operation)			

Wolf Solar technology

Solar cylinder SEM-1 made from steel
With two enamel-coated indirect coils.
Additional corrosion protection through magnesium anode.
Highly effective thermal insulation through high-grade hard foam insulation.

				No.	Price each	Total price
Freestanding cylinders	SEM-1-_____	Dimensions: (see page 6)				
		Ø casing:	mm			
		Ø cylinder:	mm			
		Height:	mm			
		Heating surface, central heating:	m²			
		Heating surface, solar:	m²			
		Weight:	kg			

Dual cylinder SED-750/250 made from steel. Total capacity 750 l
Buffer cylinder, 500 l with internal indirect coil for solar heating and one DHW cylinder with 250 l capacity.
The interior of the DHW cylinder is protected against corrosion by a two-layer enamel coating and a protective magnesium anode.
Highly effective thermal insulation through high-grade soft foam insulation.

Dual cylinder	SED-750/250	Dimensions:				
		Ø casing:	950 mm			
		Ø cylinder:	750 mm			
		Height:	2005 mm			
		Heating surface, solar:	2,5 m²			
		Weight:	250 kg			

Buffer cylinder SPU-2 / SPU-2-W made from steel
With indirect steel coils for the SPU-2-W
Max. operating pressure 6 bar.
Water capacity 500 to 1500 l
Highly effective thermal insulation through high-grade soft foam insulation.

Buffer cylinder	SPU-2-_____	Dimensions: (see page 10)				
		Ø casing:	mm			
		Ø cylinder:	mm			
		Height:	mm			
		Heating surface, solar:	m²			
		Weight:	kg			

Stratification cylinder BSP / BSP-W from steel with fresh water module
Buffer cylinder with plain tube heat exchanger from steel for solar application.
Highly efficient thermal protection due to overall hard foam insulation.

Stratification cylinder	BSP-_____	Dimensions: (see page 12)				
		Ø casing:	mm			
		Ø cylinder:	mm			
		Height:	mm			
		Weight:	kg			

Mixing valve assembly BSP-MK 1 for low temperature circuit (accessory)			
Mixing valve assembly BSP-MK 2 for high temperature circuit (accessory)			
Mixing valve assembly BSP-MK 1 and 2 for both low temperature and high temperature circuit (accessory)			
DHW circulation module for fresh water module (accessory)			

Accessories:	F3-1 CFK-1	F3-Q	CRK	Swimming-pool absorber
Return temperature raising facility MM or SM2 for tying the solar energy into the heating circuit	•	•	•	
Roof integration set for 2 collectors roof integration frames for an architecturally attractive roof integration of the collectors into the tile surface, powder-coated, dark grey RAL 7021.	•			
Extension set for the roof integration set for 1 collector each	•			
"AluPlus" on-roof mounting kit ("portrait" installation) for 1 collector	•			
"AluPlus" on-roof mounting kit ("portrait" installation) for 2 or 3 collectors	•			
"AluPlus" snow load extension ("portrait" installation) required for a surface load from 2,4 kN/m² on, suitable up to a maximum of 4kN/m², for 1, 2 or 3 collectors	•			
"AluFlex" triangle stands („portrait" installation) for roofs with a low pitch to optimized the irradiation angle for 1, 2 or 3 collectors (adjustable to 20°, 30°, 45°)	•			
"AluPlus" on-roof mounting kit ("landscape" installation) for 1 collector		•		
"AluPlus" on-roof mounting kit ("landscape" installation) for 2 or 3 collectors		•		
"AluPlus" snow load extension ("landscape" installation) required for a surface load from 2,4kN/m² on, suitable up to a maximum of 4kN/m², for 1, 2 or 3 collectors		•		
"AluFlex" triangle stands ("landscape" installation) for roofs with a low pitch to optimized the irradiation angle for 1, 2 or 3 collectors (adjustable to 20°, 30°, 45°)		•		
"AluFlex" installing stands („portrait" installation) for 1, 2 or 3 collectors, for the easy and quick installation on horizontal surfaces (adjustable to 20°, 30°, 45°)	•			
"AluFlex" installing stands ("landscape" installation) for 1, 2 or 3 collectors, for the easy and quick installation on horizontal surfaces (adjustable to 20°, 30°, 45°)		•		
Connection kit for on-roof mounting and roof integration for one array of collectors	•	•		
Connection kit for on-roof mounting for one array of collectors	•	•		
Compansator for collector fittings,two pieces are required per collector connection	•	•		
Rooftop fixing set "CRK" ("portrait" installation) for one tube collector			•	
Connection kit for 2 rooftop fixing sets for one tube collector			•	
Connection kit tube collector			•	
Flexible connection kit			•	
Inclination correction kit for roofs with a low pitch to optimize the irradiation angle (adjustable to 0°, 30°, 45°)				
Connection accessories swimming pool absorber per row of collectors (up to 10 absorbers per row)				•
Pump/fitting assembly 10 suitable for up to 10 flat-plate collectors at 50 l flow rate per hour and collector	•	•	•	
Pump/fitting assembly 20 suitable for up to 20 flat-plate collectors as 50 l flow rate per hour and collector	•	•	•	
Pump/fitting assembly 10E, for the connection of a second heat consumer suitable for up to 10 flat-plate collecotrs at 50 l flow rate per hour and collector	•	•	•	
Pump/fitting assembly 20E, for the connection of a second heat consumer suitable for up to 20 flat-plate collectors at 50 l flow rate per hour and collector	•	•	•	
Solar heating expansion vessel, with fixing material, 2,5 bar inlet pressure	•	•	•	
Connection kit for solar heating expansion vessel	•	•	•	
Air vent trap 0,15l, insulated, connection Ø 22 mm, copper	•	•	•	•
Thermostatic water mixing valve with integral non-return valve and anti-scalding protection	•	•	•	•
Heat transfer medium ANRO 10 / 20 / 30 kg	•	•		
Heat transfer medium LS 10 / 20 kg			•	

WOLF

The competence brand for energy saving systems

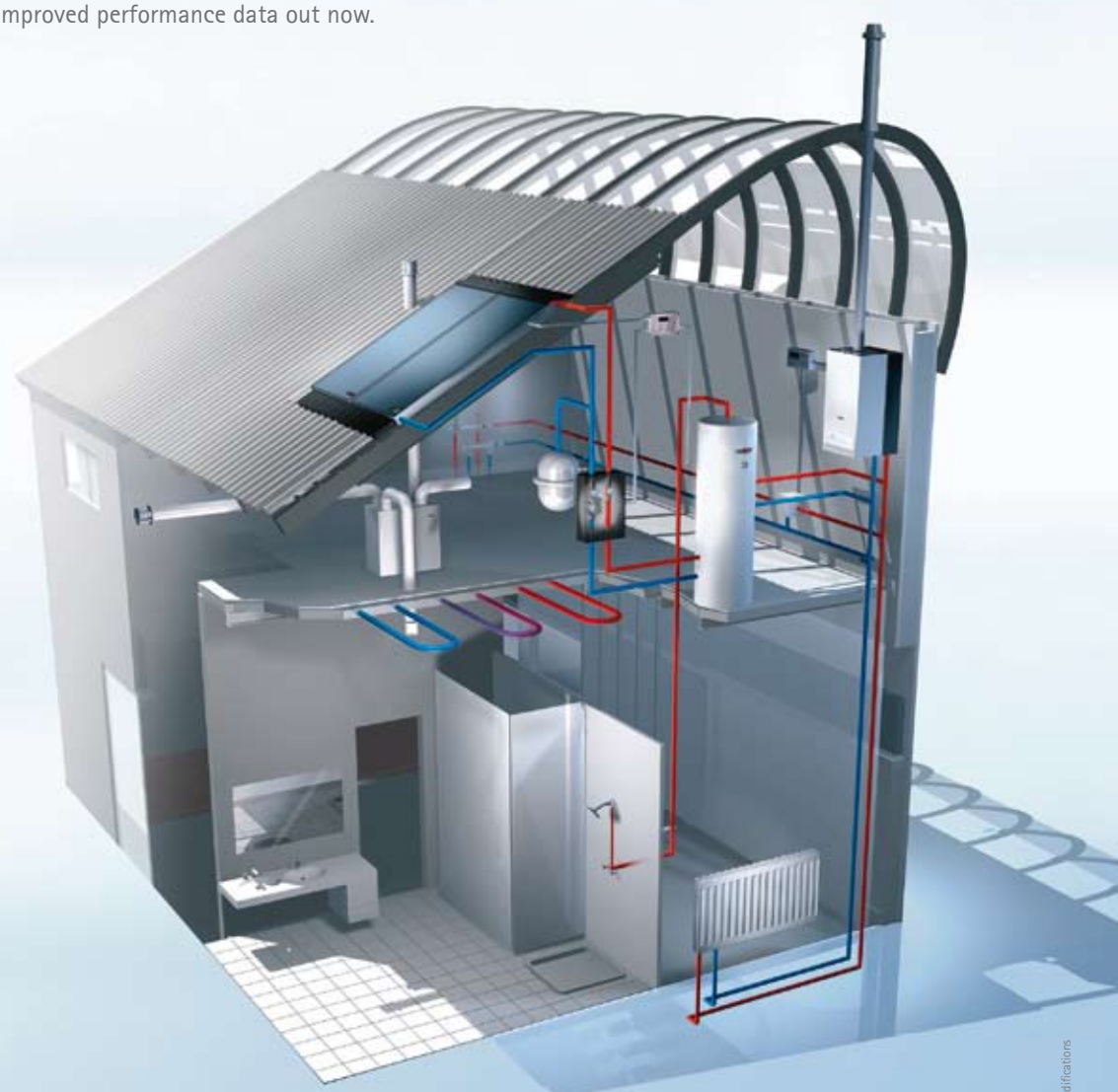
Test result "GUT"! The Wolf solar package:

TopSon F3, solar cylinder SEM-1-300, solar control unit SM-1/BM Solar

INDIVIDUAL TEST RESULTS

ENERGY EFFICIENCY AND COMFORT OF DHW-PREPARATION: "SEHR GUT" (1,5)
(very high degree of solar yield: 40%)
OPERATION AND DURABILITY: "SEHR GUT" (1,3)
FURTHER ENVIRONMENTAL FEATURES: "SEHR GUT" (1,5)
(very low power consumption of the pump: 37 kWh/a)

*Nota: Successor TopSon F3-1 with improved performance data out now.



The brand of competence for energy saving systems

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