
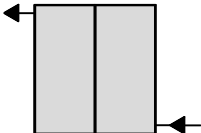
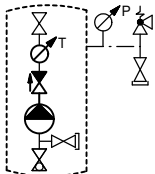
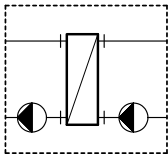




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SolKit® aqua HT
MultiVal ERR (400,500)
Solar armature group

Hoval SolKit® aqua HT

Solar system with MultiVal ERR calorifier and unpressurised solar circuit.
Heating with heat generator, e.g. oil/gas condensing boiler

Consisting of:

Multival ERR (400,500)

- Calorifier made of steel, enamelled on the inside, with 2 enamelled plain-tube heat exchangers, permanently installed
- Magnesium protection anode built in
- Flange for maintenance
- Thermal insulation made from polyurethane rigid foam, directly foam-lined on the calorifier
- Removable foil casing in red
- Sensor channel
- With thermometer
- Sleeve 1½" for installation of a screw-in electric heating element

Solar armature group

Solar armature group integrated into the unpressurised solar circuit.

- Circulating pump
- FlowRotor flow rate
- Safety valve (6 bar)
- Pressure gauge
- Purging and filling unit
- Solar armature group hood

Delivery

- Calorifier installed with foil casing and solar armature group
- TopTronic® E solar module delivered in separate packaging

On site

- Solar controller installation

Option

- Screw-in electrical immersion heater for MultiVal ERR
- Pressure conversion kit SAG20FR-SK-B to extend SolKit® aqua into a pressure system
- TopTronic® E control module
Delivered separately packaged, installation on site



SolKit® aqua LT
MultiVal ESRR (500)
Solar armature group

Hoval SolKit® aqua LT

Solar system with MultiVal ESRR calorifier and unpressurised solar circuit.
Ideal for heating up with heat pumps thanks to large heat exchanger at the top.

Consisting of:

Multival ESRR (500)

- Calorifier made of steel, enamelled on the inside, with 2 enamelled plain-tube heat exchangers, permanently installed
- Magnesium protection anode built in
- Flange for maintenance
- Thermal insulation made from polyurethane rigid foam, directly foam-lined on the calorifier
- Removable foil casing in red
- Sensor channel
- With thermometer
- Sleeve 1½" for installation of a screw-in electric heating element

Solar armature group

Solar armature group integrated into the unpressurised solar circuit.

- Circulating pump
- FlowRotor flow rate
- Safety valve (6 bar)
- Pressure gauge
- Purging and filling unit
- Solar armature group hood

Delivery

- Calorifier installed with foil casing and solar armature group
- TopTronic® E solar module delivered in separate packaging

On site

- Solar controller installation

Option

- Screw-in electrical immersion heater for MultiVal ESRR
- Pressure conversion kit SAG20FR-SK-B to extend SolKit® aqua into a pressure system
- TopTronic® E control module
Delivered separately packaged, installation on site

Solar system for domestic hot water



Hoval SolKit® aqua HT

for solar water heating

Efficient compact solar system for water heating in single-family homes with unpressurised solar circuit.

Consisting of:

- 1 MultiVal ERR calorifier, enamelled steel with 2 heat exchangers
- 1 solar armature group incl. casing and pump
- 1 TopTronic® E solar module

SolKit® aqua HT (400)

SolKit® aqua HT (500)

Part No.

6045 943

6045 944



Hoval SolKit® aqua LT

for solar water heating

Efficient compact solar system for water heating in single-family homes with unpressurised solar circuit.

Suitable for heating with heat pump.

Consisting of:

- 1 MultiVal ESRR calorifier, enamelled steel with 2 heat exchangers
- 1 solar armature group incl. casing and pump
- 1 TopTronic® E solar module

SolKit® aqua LT (500)

6045 945

Notice on system limits

With the unpressurised standard version, the following limitations must be observed:

- Max. cable length (flow and return): 40 m
- Min. cable length: 10 m
- Max. system height: 10 m
- Hoval copper solar cables DN 15, D15x0.8/D43
- Min. cable inner diameter: 12.0 mm
- Max. cable inner diameter: 13.4 mm
- Minimum cable downward slope not necessary.
- Corrugated tube cable not suitable.
- SolKit® aqua only in connection with UltraSol® 2
 - Min. number of collectors: 1
 - Max. number of collectors: 2

Solar collectors and installation sets

see chapter "Solar collectors"

TopTronic® E control module



TopTronic® E control module black

- For operation of all controller modules connected to the bus system (basic, solar, buffer module, etc.)
- Connection to the Hoval bus system via RJ45 plug connection or plug terminals (max. 0.75 mm²)
- Flat design with flexible installation options
- Installation
 - in the control panel of the heat generator
 - in the Hoval wall casing
 - in the front of the control panel
- Colour touchscreen 4.3 inch with black high-gloss trim
- Customer-specific configuration of the start screen
- Display of the current weather or weather forecast (only possible in combination with HovalConnect)

Consisting of:

- TopTronic® E control module black
- Clamping device set control module
- RJ45 - Rast-5 CAN cable, L=500

Notice

Take account of additional accessories for alternative installation!

Part No.

6043 844

Accessories



Pressure conversion kit SAG20FR-SK-B

to extend SolKit® aqua into a pressure system

Consisting of:

- 1 air vent
- 2 gravity brakes
- 1 thermometer
- 1 holder for attaching a pressure expansion tank
- flexible cable for expansion tank
- hydraulic coupling for expansion tank



SolKit® aqua filling set

for quick filling of unpressurised standard design SolKit® aqua

Consisting of:

- Adapter for frost protection canister
- 2 hoses with fast coupling
- 2 fast couplings for storage



Copper solar cable DN 15, 15 m

2 copper pipes for solar circuit completely insulated incl. sensor cable max. operating pressure: 10 bar Length 15 m, DN 15, D15x0.8/D43



Copper solar cable DN 15, 20 m

2 copper pipes for solar circuit completely insulated incl. sensor cable max. operating pressure: 10 bar Length 20 m, DN 15, D15x0.8/D43

Notice:

With the unpressurised standard version, the SolKit® aqua must be installed with the copper solar line DN 15, D15x0.8.



Armature group connection set FL/RT VS15-SK-A

for connecting the copper solar line DN 15 to the SolKit® aqua Metallic sealing on solar line side. With flat seal on armature group side (PTFE, Teflon resistant to 260 °C).



Collector connection set FL/RT VS15-SK-K

for connecting the copper solar line DN 15 to the collector screw connection 3/4" external thread flat-sealing. Metallic sealing on solar line side. With flat seal on armature group side (PTFE, Teflon resistant to 260 °C).



Hydraulics basic set GS 18-3/4" ET FS90

for hydraulic connection of a collector field to connection fitting 3/4" external thread flat-sealing. Consisting of:

- 2 connection fittings 90°, 18-3/4" external thread flat-sealing
 - 1 vent plug
 - 1 dummy plug
 - 2 flat seals
- Collector connections:
- Ø 18 mm Cu round pipe

Part No.

6046 118

6046 122

2069 642

2069 643

6046 154

6046 155

6051 314

Accessories



Connection coupling VS15-SK-L
to copper solar cable DN 15
for extending the copper solar cable

6046 156



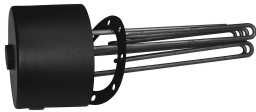
Screw-in electrical heat insets
made of Incoloy® alloy 825,
with temperature controller and safety temper-
ature limiter
Delivered separately, installation on site.
Not suitable for exclusively electric heating.

Type	Heat output [kW]	Voltage [V]	Install. length [mm]
------	---------------------	----------------	-------------------------

Can only be mounted at top.

EP-2.5	2.35	3 x 400	390
EP-3.5	3.6	3 x 400	500

6049 557
6049 558



Flange-mounted electric heating elements
With temperature controller and safety temper-
ature limiter
Delivered separately, installation on site

Type	Heat output 3 x 400 V [kW]	changeable to	Install. length [mm]
------	----------------------------------	---------------	----------------------------

Can only be mounted at bottom.

4-180	4.0	2.6 kW/3x400 V	380
		2.0 kW/3x400 V	
		1.3 kW/3x400 V	
		1.3 kW/1x230 V	
6-180	6.0	4.0 kW/3x400 V	460
		3.0 kW/3x400 V	
		2.0 kW/3x400 V	
		2.0 kW/1x230 V	

6049 561

6049 562



Thermostatic water mixer TM200
3-way mixing valve
for controlling the water temperature
Material: brass
Connection size R ¾"
Domestic hot water max. 90 °C
Regulating range 30-60 °C
Flow rate 27 l/min
(with delta p=1 bar)
kvs value 1.62

2005 915

Further types/sizes
see "Solar/Solar armature groups"

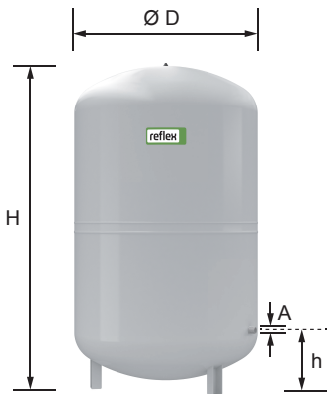
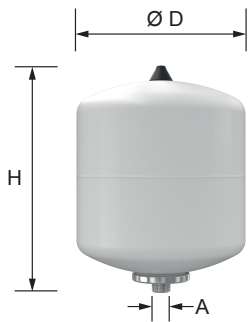
Accessories



Freeze protection mixture
PowerCool DC 923-PXL
on basis propylene glycol
mixed with softened water
with corrosion protection
Frost protection up to -23 °
Content plastic container: 30 kg



Freeze protection mixture
PowerCool DC 923-PXL
on basis propylene glycol
completely mixable with water
with corrosion protection
Frost protection: -20 ° with
mixing ratio of 40 %
Content plastic container: 10 kg



Reflex S
Especially for solar installations and also for heating and cooling water systems.
For anti-freeze additive up to 50 %.
Permissible operating overpressure 10 bar.
Permitted operating temperature of vessel/diaphragm 120 °C/70 °C.
Type S 8-25 for wall installation with clamping band (clamping band see accessories)
Type S 33 for wall installation with lugs
Type S 50-600 with feet.

Reflex Type	Ø D mm	H mm	h mm	A
S8	206	335	-	G 3/4"
S12	280	300	-	G 3/4"
S18	280	410	-	G 3/4"
S25	280	520	-	G 3/4"
S33	354	455	-	G 3/4"
S50	409	469	158	R 3/4"
S80	480	565	166	R 1"

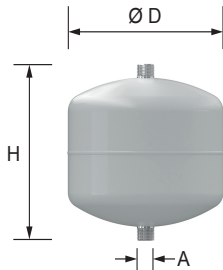
Part No.

2054 403

2009 987

2006 634
2006 635
2006 636
2006 637
2006 638
2006 639
2006 640

Accessories

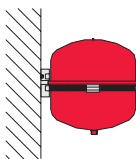


Reflex V
Intermediate tank made of sheet steel, from
Reflex V 40 on feet.
Designed for operating pressures up to 10 bar
Type V 6-20 for wall installation with clamping
band (clamping band see accessories)

Reflex Type	Ø D mm	H mm	h mm	A
V 6	206	244	-	R ¾"
V12	280	287	-	R ¾"
V 20	280	360	-	R ¾"

Part No.

2032 084
2032 085
2032 086



Console with clamping band
for Reflex NG 8-25, S 8-25, V 6-2
vertical installation
container connection upwards or
downwards

242 878

Notice
With an unpressurised solar circuit, a pres-
sure expansion tank must not be used.

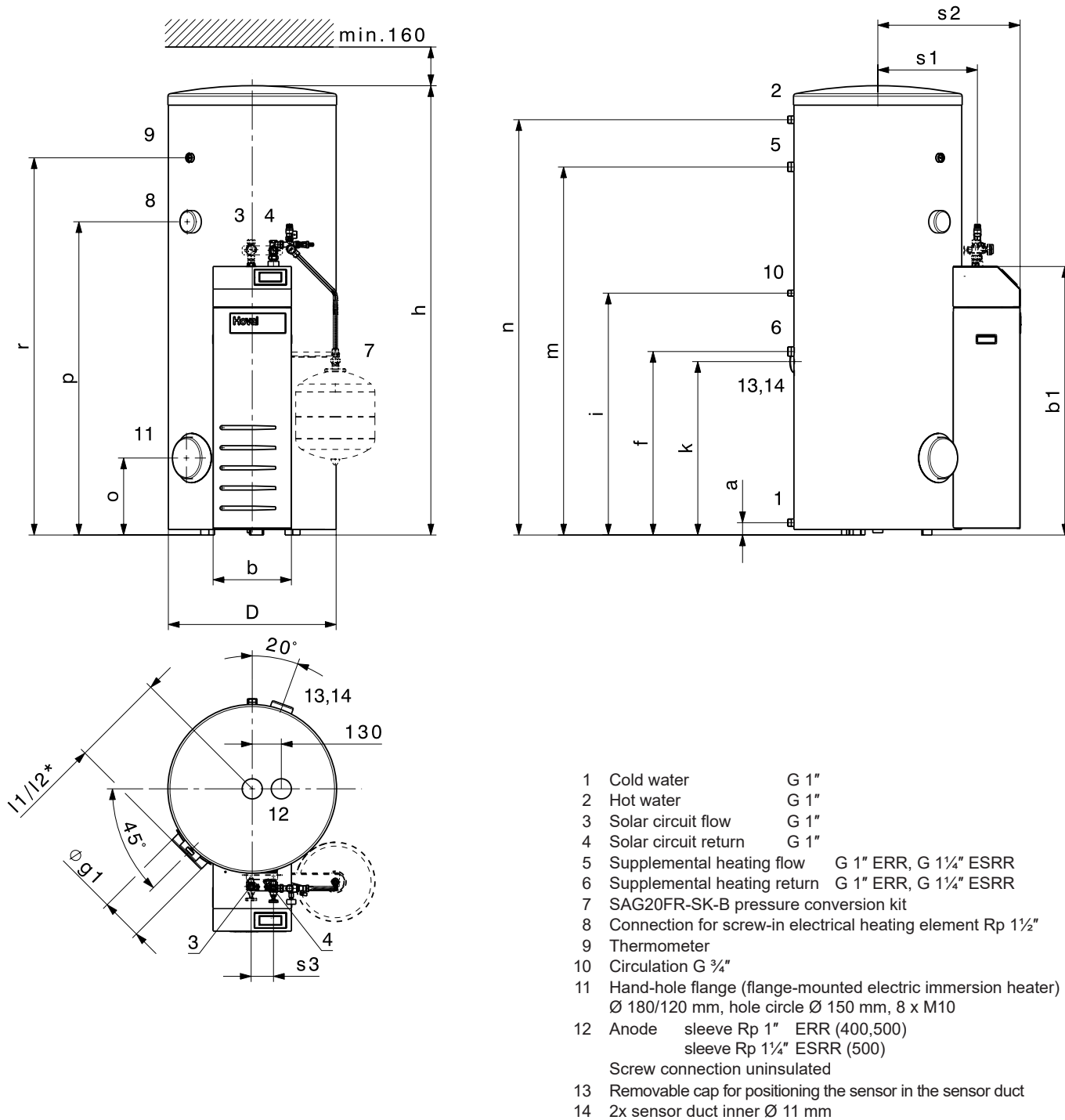
Calorifier

Type		ERR (400)	ERR (500)	ESRR (500)
• Volume	litres	381	471	463
• Volume (upper heating coil)	litres	126	181	235
• Operating pressure/test pressure SVGW	bar	6/12	6/12	6/12
• Maximum operating temperature	°C	95	95	95
• Thermal insulation polyurethane rigid foam, foam-lined	mm	75	75	75
• Polyester fibre fleece thermal insulation	mm	-	-	-
• Fire protection class		B2	B2	B2
• Heat loss at 65 °C	W	69	78	81
• Weight	kg	148	170	207
Dimensions		See dimensional drawing		
Lower heating coil				
• Heating surface	m²	2.15	2.15	2.15
• Heating water	dm³	15.1	15.1	15.1
• Flow resistance for water	z value	3.6	3.6	3.6
• Flow resistance for water/glycol 50 %	z value	3.9	3.9	3.9
• Operating pressure/test pressure SVGW	bar	8/13	8/13	8/13
• Maximum operating temperature	°C	110	110	110
Upper heating coil				
• Heating surface	m²	1.00	1.30	4.3
• Heating water	litres	6.95	8.9	30.1
• Flow resistance ¹⁾	z value	8	9	8
• Operating pressure/test pressure SVGW	bar	8/13	8/13	8/13
• Maximum operating temperature	°C	110	110	110

¹⁾ Flow resistance of heating coil in mbar = flow rate (m³/h)² x z

SolKit® aqua HT/LT

(Dimensions in mm)



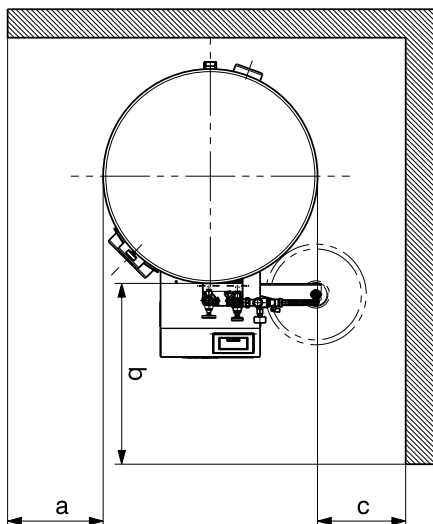
SolKit® aqua HT/LT Type	D	Ø g1	l1	l2*	s1	s2	s3
ERR (400)	750	180	416	456	445	636	100
ERR/ESRR (500)	750	180	416	456	445	636	100

* When using a flange electrical heating element

SolKit® aqua HT/LT Type	a	b	b1	f	h	i	k	m	n	o	p	r	Tilting dimension
ERR (400)	55	350	1200	1007	1621	1112	817	1355	1526	344	958	1356	1731
ERR (500)	55	350	1200	1115	1951	1265	775	1605	1856	344	1040	1686	2029
ESRR (500)	55	350	1200	820	1951	1081	775	1645	1856	344	1400	1686	2029

Space requirements

- The operating side must be easily accessible.
- Wall clearance for installation and removal of the electric immersion heater: (a)
- Space required for installation or removal of the casing: (b)
- Space required for installation or removal of the pressure expansion tank: (c)



SolKit® aqua HT/LT Type	a	b	c
(400,500)	≥ 700	≥ 800	≥ 500

■ Engineering

Installation

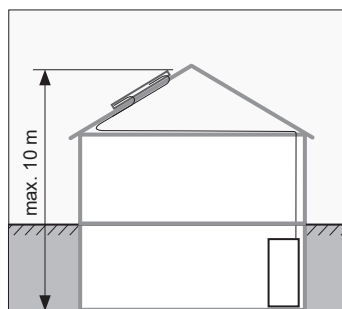
Unpressurised solar circuit version

- Route the lines between the collector array and the SolKit® aqua as short and straight as possible
- Use Hoval solar copper lines
- The height difference between the highest point of the collector field and the connecting line connection point of the SolKit® aqua must be min. 1 m and max. 10 m.
- The maximum length (one-way trip) of connecting lines of 20 m must not be exceeded
- The collector connection line should always be routed sloping downwards (max. height increase of 20 cm possible)
- Collector array only for use with UltraSol® 2, with max. 2 collectors

Pressurised solar circuit version

When the SolKit® aqua is extended to create a pressurised system, the standard layout should be used (collector, expansion tank, etc.)

The max. height does not apply for this version.

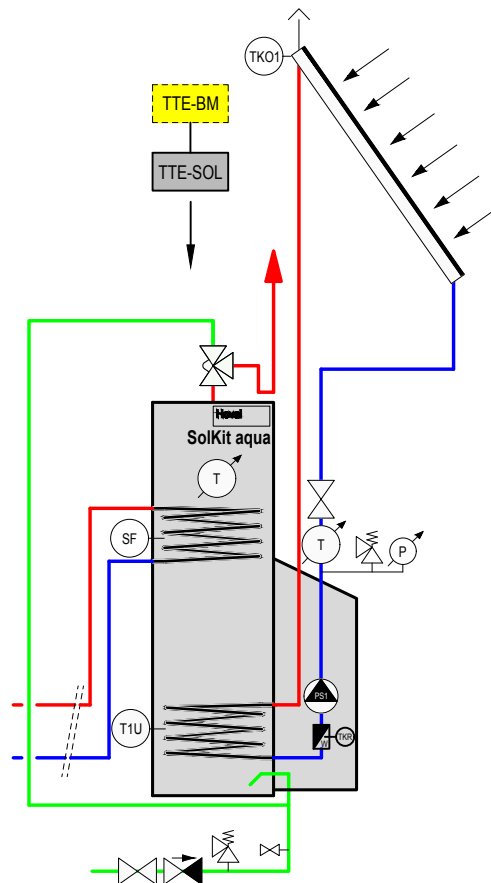


SolKit® aqua

Solar system for domestic hot water with

- Calorifier
- Solar armature group
- TopTronic® E solar module

Hydraulic schematic BAAE050



Important notes

- The example schematics merely show the basic principle and do not contain all information required for installation. Installation must be carried out according to the conditions on site, dimensioning and local regulations.
- With underfloor heating, a flow temperature monitor must be installed.
- Shut-off devices to the safety equipment (pressure expansion tank, safety valve, etc.) must be secured against unintentional closing!
- Install pockets to prevent single-pipe gravity circulation!

TTE-SOL	TopTronic® E solar module
SF	Calorifier sensor
TKO1	Collector sensor 1
T1U	Calorifier sensor
PS1	Solar circuit pump
TKR	Return sensor

<i>Optional</i>	
BM	TopTronic® E control module

Hoval UltraSol® 2

Flat collector

- High-performance flat collector, glazed, for thermal utilisation of solar energy
- Vertical and horizontal design
- For surface-mounted, flat roof or in-roof installation
- Stable frame made of aluminium extruded sections
- Structured toughened safety glass (ESG) with anti-reflective coating on one side
- Aluminium full-surface absorber with highly-selective coating
- Serpentine manifold made of copper with 4 connections
- Collector connections and connectors with compression fitting
- Thermal insulation made of mineral wool (20 mm)
- High annual yield (Würzburg 50 °C) 1055 kWh/collector

Delivery UltraSol®, UltraSol® eco

- *max. 10 pcs. upright on each pallet*

Installation sets

- On-roof installation parallel and elevated (0°, 20°, 30°, 45°) vertical and horizontal consisting of:
 - substructure and hydraulic
 - roof connection
 Substructure suitable for the following roof connections:
 - interlocking tile
 - plain tile
 - slate, Eternit
 - tin roof clamp
 - hanger bolts
 - on-site roof connection with quick-mount adapter
- Flat roof mounting with concrete base 45°
 - for horizontal collectors
- Roof inlay mounting
 - for vertical and horizontal collectors

Solar cable SL

- Stainless steel corrugated tube for solar heating circuits, material 1.4404.
- Low-noise, pressure-resistant and diffusion-tight.
- Pipe insulation made of synthetic rubber, CFC-free.
- Silicone cable for temperature sensor integrated.
- Weatherproof, UV-stable and PVC-free protective sleeve.
- Pipe system for endless laying, for quick and easy installation.

Delivery

Solar cables completely packed.



Certifications

*Hoval
UltraSol® 2*

*Solar Keymark
011-7S2954 F*

Model range

UltraSol® 2

Type	Installation	Gross collector surface area m ²	Absorber surface area/ Aperture surface m ²
UltraSol® 2 V	vertical	2,53	2,33
UltraSol® 2 H	horizontal	2,53	2,33

Connection set

- Connection set for connecting the Hoval UltraSol® and UltraSol® eco flat collectors to a solar fitting group ¾" using solar cables (e.g. SAG20).
- Connection screw fittings matching R ¾"/ Rp ¾".

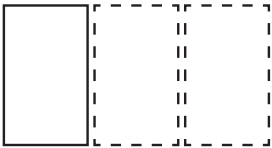
Delivery

Collector connection set separately packed.

Flat-panel collectors



- Hoval UltraSol®**
- High-performance flat collector for solar systems with water/glycol mixture as heat transfer medium
 - Structured toughened safety glass (ESG) with anti-reflective coating on one side
 - Highly-selective coated absorber
 - High annual yield (Würzburg 50 °C) 1055 kWh/collector



Flat collector - vertical installation type

UltraSol® type	Collector surface area		Number of collectors units
	Gross m²	Absorber m²	
1V	2.53	2.33	1
2V	5.06	4.66	2
3V	7.59	6.99	3
4V	10.12	9.32	4
5V	12.65	11.65	5
6V	15.18	13.98	6
7V	17.71	16.31	7
8V	20.24	18.64	8
9V	22.77	20.97	9
10V	25.30	23.30	10

6050 633
6050 634
6050 635
6050 636
6050 637
6050 638
6050 639
6050 640
6050 641
6050 642



Flat collector - horizontal installation type

UltraSol® eco type	Collector surface area		Number of collectors units
	Gross m²	Absorber m²	
1H	2.53	2.33	1
2H	5.06	4.66	2
3H	7.59	6.99	3
4H	10.12	9.32	4
5H	12.65	11.65	5
6H	15.18	13.98	6
7H	17.71	16.31	7
8H	20.24	18.64	8
9H	22.77	20.97	9
10H	25.30	23.30	10

6050 643
6050 644
6050 645
6050 646
6050 647
6050 648
6050 649
6050 650
6050 651
6050 652

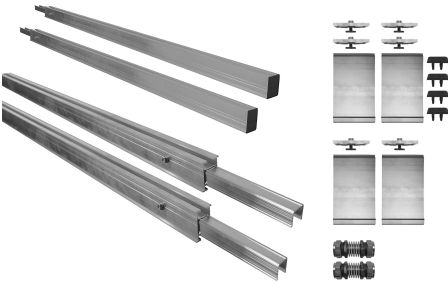
Installation set
See following pages

Installation sets for on-roof installation
side-by-side, vertical and horizontal 0°



On-roof installation

Metal tiles and roof bushings for concrete, clay and plain tiles see collector accessories



Substructure and hydraulic collector connections

(without roof connection and collector connections of collector)

Substructure and hydraulic collector connections for on-roof mounting vertical and horizontal 0°

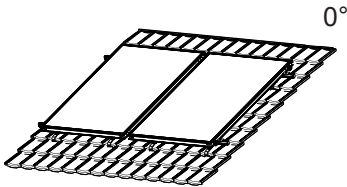
- for Hoval flat collectors UltraSol® 2 for on-roof installation parallel with the roof
- Substructure suitable for
 - interlocking tile
 - plain tile
 - slate, Eternit
 - tin roof clamp
 - hanger bolts
- Roof pitch min. 22°

Consisting of:

- complete fitting accessories (without roof connection and collector connections)
- hydraulic collector connectors

Notice

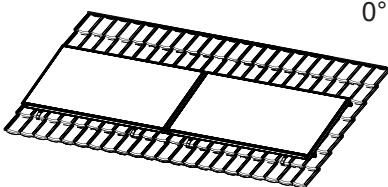
Collector connections and roof connection of collector, see following pages



0°

for number of collectors vertical per collector field units	Installation set
1	AD0V-1
2	AD0V-2
3	AD0V-3
4	AD0V-4
5	AD0V-5
6	AD0V-6
7	AD0V-7
8	AD0V-8

6051 243
6051 244
6051 245
6051 246
6051 247
6051 248
6051 249
6051 250



0°

for number of collectors horizontal per collector field units	Installation set
1	AD0H-1
2	AD0H-2
3	AD0H-3
4	AD0H-4
5	AD0H-5
6	AD0H-6

6051 251
6051 252
6051 253
6051 254
6051 255
6051 256

Part No.

Installation sets for on-roof installation
side-by-side, vertical and horizontal 20°,30°,45°



On-roof installation

Metal tiles and roof bushings for concrete,
clay and plain tiles see collector accessories

Substructure and hydraulic
collector connections

(without roof connection and
collector connections of collector)

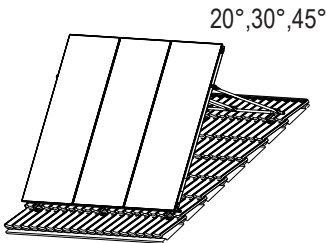
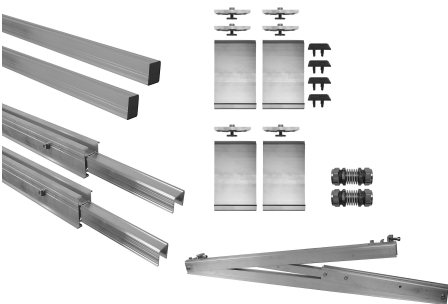
Substructure and hydraulic collector
connections for on-roof mounting
vertical and horizontal 20°, 30°, 45°

- for Hoval flat plate collectors UltraSol® 2
- for on-roof installation elevated 20°, 30°, 45°
in relation to the roof
- Substructure suitable for
 - interlocking tile
 - plain tile
 - slate, Eternit
 - tin roof clamp
 - hanger bolts

- Consisting of:
- complete fitting accessories (without
roof connection and collector connections)
 - hydraulic collector connectors
 - Adjustable elevation angle 20°, 30°, 45°
 - Wind bracing

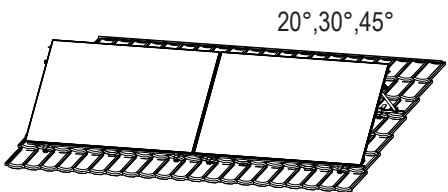
Notice

Collector connections and roof connection
of collector, see following pages



for number of collectors vertical per collector field units	Installation set
1	AD20-45V-1
2	AD20-45V-2
3	AD20-45V-3
4	AD20-45V-4
5	AD20-45V-5
6	AD20-45V-6
7	AD20-45V-7
8	AD20-45V-8

6051 257
6051 258
6051 259
6051 260
6051 261
6051 262
6051 263
6051 264



for number of collectors horizontal per collector field units	Installation set
1	AD20-45H-1
2	AD20-45H-2
3	AD20-45H-3
4	AD20-45H-4
5	AD20-45H-5
6	AD20-45H-6

6051 265
6051 266
6051 267
6051 268
6051 269
6051 270

Elevation horizontal 60° see accessories

Part No.

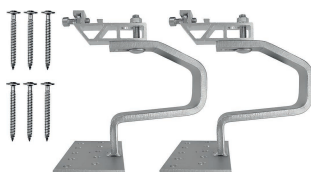
Roof connections for on-roof installation

Determining the number of roof connection sets
see chapter Engineering/Table 1 and 2



Roof bar set adjustable tile
for attaching the carrier profiles for
on-roof attachment of UltraSol® 2
Consisting of:
- 2 roof bars
- Screw set US2-SHS

6037 731



Roof bar set adjustable heavy duty
for elevated static requirements
for attaching the carrier profiles for
on-roof attachment of UltraSol® 2
Consisting of:
- 2 roof bars HD
- Screw set US2-SHS

6037 764



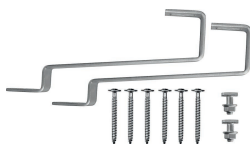
Packing plate 2mm
for levelling the roof bars

2061 367



Packing plate 3mm
for levelling the roof bars

2061 368



Roof bar set plain tile
for attaching the carrier profiles for
on-roof attachment of UltraSol® 2
Consisting of:
- 2 roof bars
- Screw set US2-SHS
- Installation set T-head bolt
can only be used in conjunction with
metal tiles.

6037 767



Roof bar set slate / Flat Eternit
for attaching the carrier profiles for
on-roof attachment of UltraSol® 2
Consisting of:
- 2 roof bars
- Screw set US2-SHS
- Installation set T-head bolt
can only be used in conjunction with
metal tiles.

6037 769

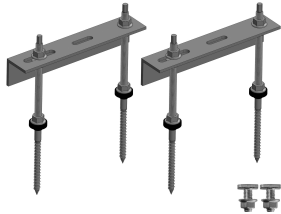


Clamp set tin roof clamp
for attaching the carrier profiles for
on-roof attachment of UltraSol® 2
Consisting of:
- 2 tin roof clamps
- Installation set T-head bolt

6037 770



Hanger bolt set individual
for attaching the carrier profiles for
on-roof attachment of UltraSol® 2
Consisting of:
- 2 hanger bolts M12
- 2 quick-mount adapters M12 cpl.



Double level screw set
for attaching the carrier profiles for
on-roof attachment of UltraSol® 2
Consisting of:
- 2 double level screws US-Dss
- Installation set T-head bolt



Screw set concrete base
for attaching the carrier profiles for
on-roof attachment of UltraSol® 2
Consisting of:
- 2 threaded rod M10x150
- 2 quick-mount adapters M10 cpl.

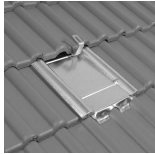
Part No.

6037 771

6037 772

6037 775

**Metal tiles and roof bushings
for concrete, clay and plain tiles**



Metal tiles, type concrete
for exchanging a concrete pantile
(e.g. interlocking tile)
galvanised version

2057 258



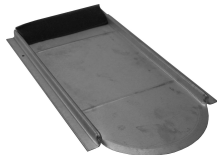
Roof bushing, type concrete
for tube bushing (1 tube) through
the roof cladding of a concrete pantile
(e.g. interlocking tile)
galvanised version, 2 pieces

2057 259



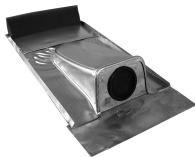
Metal tiles, type clay 260
for exchanging the roof tile
(e.g. variable-gauge tiles)
galvanised version

2057 260



Metal tiles, type plain
for exchanging the roof tile
(e.g. plain tile)
galvanised version

2057 262



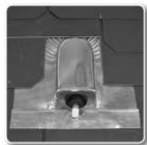
Roof bushing, type clay 260
for tube bushing (1 tube) through
the roof cladding (e.g. variable-
gauge tiles and plain tile)
galvanised version, 2 pieces

2057 261



Metal tiles, type slate
for protecting the roof tile
(e.g. Eternit slabs, slate slabs)
galvanised version

2057 264



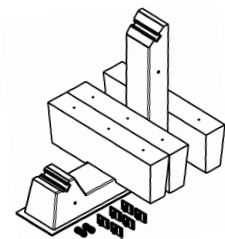
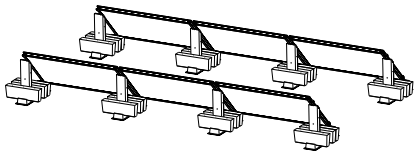
Roof bushing, type slate
for tube bushing (1 tube) through the
roof cladding (e.g. Eternit slabs,
slate slabs)
galvanised version, 2 pieces

2057 265

Installation sets
Flat roof installation concrete base
side-by-side, horizontal



Flat roof-mounting
Concrete base



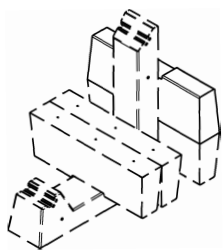
- Flat roof - concrete base
45°, horizontal**
- for Hoval flat collectors UltraSol® 2 H,
UltraSol® eco H
 - for flat roof installation 45°
 - with concrete base

- Comprising:
- Two-part concrete base (approx. 92 kg)
incl. 3 additional weights (of approx. 50 kg)
Total weight: 242 kg
 - Protective mat with aluminium lining
 - complete fitting accessories
(without collector connections)
 - hydraulic collector connectors

Notice
Collector connections, see following pages

for number of collectors per collector field units	Installation set
1	FDBS45H-1
2	FDBS45H-2
3	FDBS45H-3
4	FDBS45H-4
5	FDBS45H-5
6	FDBS45H-6
7	FDBS45H-7
8	FDBS45H-8

- 6051 271
- 6051 272
- 6051 273
- 6051 274
- 6051 275
- 6051 276
- 6051 277
- 6051 278



- Additional weight for concrete base**
for UltraSol® 2 H flat plate collector
for increasing loading weight
in areas with increased wind loads
or on high buildings.
incl. 3 M8 threaded sleeves
Installation space L/W: approx. 200/100
L/W/H: 740/130/250
Additional weight approx. 50 kg

2075 124

Notice
The configuration of the ballast (permitted
roof load, wind load, snow load ...) for the
particular application must be selected ac-
cording to the specifications in the project
planning instructions and be checked by a
static engineer/construction engineer.

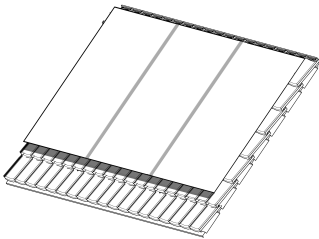
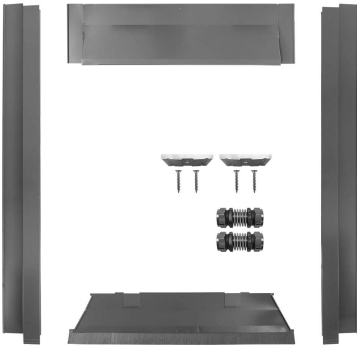
Installation sets

Roof inlay mounting

side-by-side, vertical



Roof inlay mounting



In-roof - side-by-side, vertical

- for Hoval flat collectors UltraSol® 2 V, UltraSol® eco V
- for in-roof installation
- Sheet-metal flashing in a tiled roof (e.g. interlocking tiles, sliding tile, plain tiles)
- minimum roof pitch 25° (sheet metal)
- leaktight subroof necessary

Comprising:

- complete fitting accessories for attachment on cross battens (without collector connections)
- hydraulic collector connectors
- Complete sheet-metal flashing made from coated aluminium, RAL 7016

Notice

Collector connections, see following pages

for number
of collectors
per collector
field units

Installation set

1	IDNV-1
2	IDNV-2
3	IDNV-3
4	IDNV-4
5	IDNV-5
6	IDNV-6
7	IDNV-7
8	IDNV-8

Part No.

6051 279
6051 280
6051 281
6051 282
6051 283
6051 284
6051 285
6051 286

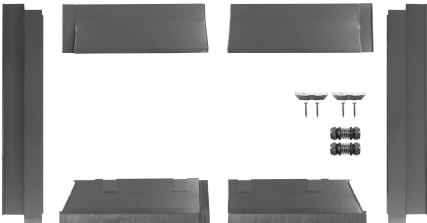
Installation sets

Roof inlay mounting

side-by-side, horizontal



Roof inlay mounting



In-roof - side-by-side, horizontal

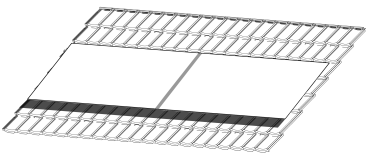
- for Hoval flat collectors UltraSol® 2 H, UltraSol® eco H
- for in-roof installation
- Sheet-metal flashing in a tiled roof (e.g. interlocking tiles, sliding tile, plain tiles)
- minimum roof pitch 25° (sheet metal)
- leaktight subroof necessary

Comprising:

- complete fitting accessories for attachment on cross battens (without collector connections)
- hydraulic collector connectors
- Complete sheet-metal flashing made from coated aluminium, RAL 7016

Notice

Collector connections, see following pages



for number
of collectors
per collector
field units

Installation set

1	IDNH-1
2	IDNH-2
3	IDNH-3
4	IDNH-4
5	IDNH-5
6	IDNH-6

Part No.

6051 287
6051 288
6051 289
6051 290
6051 291
6051 292



Flexible stainless steel corrugated tube for solar heating circuits, material 1.4404, ready-insulated. Silicone cable for temperature sensor integrated. Weatherproof, UV-stable and PVC-free protective sleeve.

Solar cable Type	Nominal pipe width	Length m
SL 1515	DN 15	15
SL 1520	DN 15	20
SL 1525	DN 15	25
SL 2015	DN 20	15
SL 2020	DN 20	20
SL 2025	DN 20	25
SL 2515	DN 25	15
SL 2520	DN 25	20
SL 2525	DN 25	25

Part No.

2054 140
2054 141
2054 142
2054 143
2054 154
2054 155
2054 156
2054 157
2054 158

Individual hydraulic sets



Hydraulics basic set GS 18
for hydraulic connection of a collector field with stainless steel corrugated pipe
Consisting of:
- 2 connection fittings 90°
- 1 air vent plug
- 1 dummy plug
Collector connections:
- Cu round pipe Ø 18 mm

Solar line size
DN 15
DN 20
DN 25

6051 315
6051 316
6051 317



Hydraulics basic set
GS 18-3/4" FD90



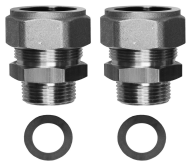
Hydraulics basic set
GS 18-3/4" FD

Hydraulics basic set GS 18-3/4"
for hydraulic connection of a collector field to screw connection
3/4" external thread flat-sealing
Consisting of:
- 2 connection fittings
- 1 air vent plug
- 1 dummy plug
- 2 flat seals
Collector connections:
- Cu round pipe Ø 18 mm

Designation	Connection fitting
FD90	90°
FD	straight

6051 314
6051 313

Solar cables



Connection set armature group flow/return
for connecting the Hoval solar cables
to a solar armature group ¾"
(e.g. SAG 20 or equalising valve DN 20).
Solar cable side with metal sealing.
Armature group side with flat seal (PTFE,
Teflon resistant to temperatures up to 260 °C).

Size solar cable	Connection fitting
DN 15	R ¾"
DN 20	R ¾"
DN 25	R ¾"

Part No.

6026 411
6026 412
6026 413



Solar branch kit FL/RT
for connecting several collector fields
to a shared Hoval solar line.
Metallically sealing.
3 connections
Consisting of:
- 2 T-pieces

DN 15
DN 20
DN 25

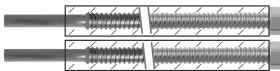
6042 233
6042 234
6042 235



Connection coupling
for extending the solar cable

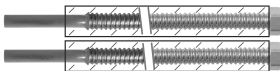
Type	
VKSL15	to solar cable DN 15
VKSL20	to solar cable DN 20
VKSL25	to solar cable DN 25

2054 159
2054 160
2054 161



Connection set type WES DN 20
for connecting a collector field
(with connecting angles) to a
pipeline created by the customer.
2 stainless steel corrugated pipes with
13 mm PE heat insulation, incl. screw
connection, ¾" or 22 x 1 x 100 mm
copper solder bush, L: 1000 mm

2054 162



Connection set type WES DN 20
for connecting a collector field
(with connecting angles) to a
pipeline created by the customer.
2 stainless steel corrugated pipes
with 13 mm PE heat insulation,
incl. screw connection, ¾" or
22 x 1 x 100 mm copper solder bush,
L = 3000 mm

2062 006



**Transition screw connection
to connection set WES**
Compression fitting ¾" external thread
fits 22 x 1 mm copper end piece for
further installation with steel pipe
Price includes 2 pieces

2054 163

Part No.



Hydraulic connection
for collector field distance max. 30 cm
Consisting of:
2 corrugated tubes DN 20 insulated L = 500 mm on both sides ¾" connection with seal 2 connection brackets 90° ¾"

6051 202



Hydraulic extension set ESN
for hydraulic connection of the collectors side by side.
Consisting of:
- 2 elastic collector connections with squeezing ring screw connections (compensator), incl. insulation

6051 318



Hydraulic extension set ESU-ID
for serial hydraulic connection of collectors/collector rows lying one above the other (in-roof).
Max. number of elbows:
- 1 per collector field
Max. number of collectors:
- 4 per collector field
Consisting of:
- 1 elastic connection bracket 90° with squeezing ring screw connections
Pipe axis distance: 300 mm
- 2 dummy plugs

6051 319



Lock set VS-US2
for hydraulic closure of a collector field.
- 1 vent plug
- 1 dummy plug
Collector connections:
- ø 18 mm Cu round pipe

6051 232



Connection set AS-US2 18
for hydraulic connection of a collector field to the stainless steel corrugated pipe
Consisting of:
- 2 connection fittings 90°
Collector connections:
- Cu round pipe Ø 18 mm

Solar line
size

DN 15
DN 20
DN 25

6051 322
6051 323
6051 324



Connection set
AS-US2 18-¾" FD90



Connection set
AS-US2 18-¾" FD

Connection set AS-US2 18-¾"
for hydraulic connection of a collector field to screw connection
¾" external thread flat-sealing
Consisting of:
- 2 connection fittings
- 2 flat seals
Collector connections:
- Cu round pipe Ø 18 mm

Designation	Connection fitting
FD90	90°
FD	straight

6051 321
6051 320



Balancing valve TN			
As a regulating and shut-off valve with direct display of the volume flow on the bypass. Max. operating temperature 185 °C			
DN	Measuring range l/min	Connection Rp x Rp	kvs
20	2-12	¾" x ¾"	2.2
20	8-30	¾" x ¾"	5.0
25	10-40	1" x 1"	8.1
32	20-70	1¼" x 1¼"	17.0

Part No.

2038 034
2038 035
2038 036
2038 037

Accessories



Freeze protection mixture
PowerCool DC 923-PXL
on basis propylene glycol
mixed with softened water
with corrosion protection
Frost protection: up to -23 °C
Content plastic container: 30 kg

2054 403



Freeze protection concentrate
PowerCool DC 924-PXL
on basis propylene glycol
completely mixable with water
with corrosion protection
Frost protection: -20 °C with
40 % mixture ratio
Content plastic container: 10 kg

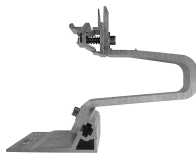
2009 987



Hand refractometer
for measuring the cloud point of
water-propylene glycol mixtures,
water-ethylene glycol mixtures,
and water-ethanol mixtures
Coolant HighSOL refractive index nD20

2066 933

Individual sets / further installation sets



Roof bar US2-DBAV - adj. tile
for attaching the carrier profiles for
on-roof attachment of UltraSol® 2
1 pce w/o screw set US2-SHS

6037 730



Roof bar US2-DBCV - tile HD
for attaching the carrier profiles for
on-roof attachment of UltraSol® 2
1 pce w/o screw set US2-SHS
Version stainless steel high load

6037 763



Screw set roof bars US2-SHS
6x wood screws Torx 8x80 st. steel

6037 732



Packing plate 2mm
for levelling the roof bars

2061 367



Packing plate 3mm
for levelling the roof bars

2061 368



Hanger bolt US2-ss - individual
M12x300 incl. quick-mount adapter
incl. EPDM seal

2061 347



Double level screw US2-Dss
2x M12x300 incl. mounting plate
incl. EPDM seals

2061 348



Roof bar US2-DBC - type plain
for attaching the carrier profiles for
on-roof attachment of UltraSol® 2
1 pce w/o screw set US2-SHS

2061 344



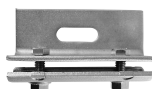
Roof bar US2-DBC - slate
for attaching the carrier profiles for
on-roof attachment of UltraSol® 2
1 pce w/o screw set US2-SHS

2061 398



Installation set T-head bolt
2x bolt and nut

6037 766



Clamp US2-BFK - tin joint

6037 795



Quick-mount adapter M10 cpl.
for attaching the carrier profiles

6037 773



Quick-mount adapter M12 cpl.
for attaching the carrier profiles

6037 774



Hanger bolt M12x300 CR
incl. EPDM seal,
nut and locknut

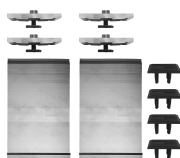
2053 051

		Part No.
	Carrier profile ADKBV cpl. 1360 mm On-roof short base - vertical	6050 655
	Carrier profile ADLBV cpl. 1986 mm On-roof base long - vertical	6050 656
	Carrier profile ADKEV cpl. 1252 mm On-roof expansion short - vertical incl. profile connector 45 cpl.	6050 657
	Carrier profile ADLEV cpl. 1878 mm On-roof expansion long - vertical incl. profile connector 45 cpl.	6050 658
	Carrier profile ADBH cpl. 2260 mm On-roof base - horizontal	6050 659
	Carrier profile ADEH cpl. 2152 mm On-roof expansion - horizontal incl. profile connector 45 cpl.	6050 660
	Profile connector 45 cpl. incl. self-tapping screws	6037 787
	Elevation 20, 30, 45° V cpl. Vertical version incl. 4 cross connectors cpl.	6050 661
	Elevation 20, 30, 45° H cpl. horizontal version incl. 4 cross-connectors cpl.	6037 790
	Elevation 60° H cpl. horizontal version incl. 4 cross-connectors cpl.	6042 143
	Wind bracing H/V cpl. for horizontal or vertical elevation	6037 762



Cross-connector cpl.
for attaching the elevation
with the carrier profiles

6037 788



Mounting set 5-US2 ADGS
Collector fastening basic set
On-roof mounting
Consisting of:
- 4 US2 collector end clamps cpl.
- 4 end caps 45 Hoval
- 2 anti-slip protections

6050 662



Mounting set 5-US2 ADES
Collector fastening extension set
On-roof mounting consisting of:
- 2 US2 collector middle clamps cpl.
- 2 anti-slip protections

6050 663



Mounting set 5-US2 BSGS
Collector fastening basic set
Flat roof mounting concrete base
Consisting of:
- 4 US2 collector end clamps cpl.

6050 664



Mounting set 5-US2 BSES
Collector fastening extension set
Flat roof mounting concrete base
Consisting of:
- 2 US2 collector middle clamps cpl.

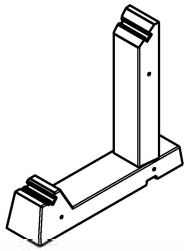
6050 665



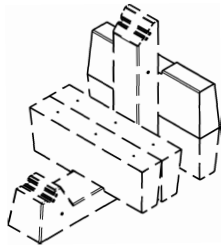
Fastening set 5-US2 IDKS
Collector fastening in-roof
Consisting of:
- 2 US2 collector clamps
- 4 chipboard screws 5x35 TX25
UltraSol® 2 V in-roof mounting:
- 6 US2 collector clamps per
collector side (end and middle clamp)
UltraSol® 2 H in-roof mounting:
- 4 US2 collector clamps per
collector side (end and middle clamp)

6050 666

Individual sets concrete base



Concrete base 45° cpl.
for Hoval UltraSol® 2 H
flat plate collector
2-piece, slope 45° with cast-in
retaining tube profile for
collector fastening
incl. folding split pin
6/40/33 galvanised
for protection against lifting off
incl. support turn protector
L/W/H: 930/190/865 mm
Weight: approx. 92 kg



Additional weight for concrete base
for UltraSol® 2 H flat plate collector
for increasing loading weight
in areas with increased wind loads
or on high buildings.
incl. 3 M8 threaded sleeves
Installation space L/W: approx. 200/100
L/W/H: 740/130/250
Additional weight approx. 50 kg



Protective mat with aluminium lining
for concrete base
for protecting the roof cladding
and compensating irregularities
L/W/H: 1000/260/6 mm

Notice

The configuration of the ballast (permitted roof load, wind load, snow load ...) for the particular application must be selected according to the specifications in the engineering instructions and be checked by a static engineer/construction engineer.

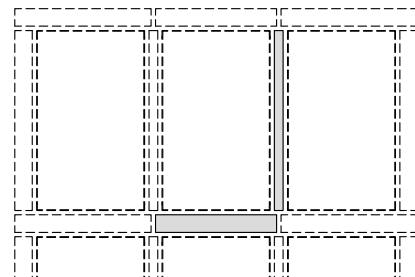
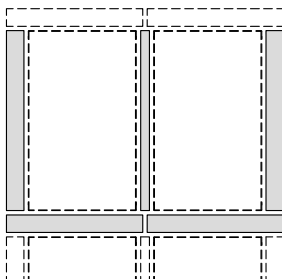
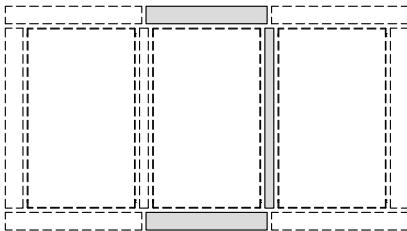
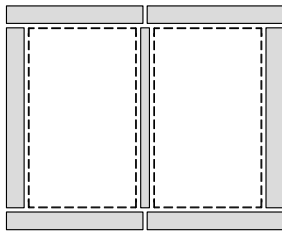
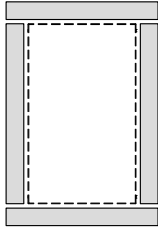
Part No.

6050 805

2075 124

2061 579

Individual sets "in-roof" without hydraulic connections



Notice

You will find examples of how to assemble the variants following the individual sets.

Basic set in-roof 2-BLGS 1V

Set for in-roof mounting of

1 UltraSol® 2 V flat plate collector

Consisting of:

- Mounting material for fastening of the collector on the cross battens
- Collector stop single collector
- Ridge sheet single collector incl. supports
- Eaves plate single collector
- Side plates left and right

Basic set in-roof 2-BLGS 2VN

Set for in-roof mounting of

2 UltraSol® 2 V flat plate collectors side by side

Consisting of:

- Mounting material for fastening of the collectors on the cross battens
- Collector stops for 2 collectors
- Ridge plates for 2 collectors incl. supports
- Eaves plates for 2 collectors
- Side plates left and right
- Intermediate plate

Extension set in-roof 2-BLES 1VN

Set for in-roof mounting of an additional UltraSol® 2 V flat plate collector side by side

Consisting of:

- Mounting material for fastening of the collector on the cross battens
- Collector stop middle
- Ridge sheet middle incl. supports
- Eaves sheet middle
- Intermediate plate

Extension set in-roof 2-BLES 2VU

Set for in-roof mounting of two additional UltraSol® 2 V flat plate collectors one above the other

Consisting of:

- Mounting material for fastening of the collectors on the cross battens
- Spacers
- Centre plates including connectors
- Side plates left and right
- Intermediate plate

Extension set in-roof 2-BLES 1VUN

Set for in-roof mounting of an additional UltraSol® 2 V flat plate collector one above the other and side by side

Consisting of:

- Mounting material for fastening of the collectors on the cross battens
- Spacers
- Centre plates including connectors
- Intermediate plate

Part No.

6051 293

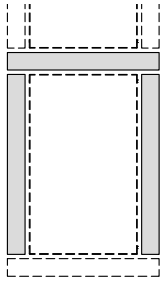
6051 294

6051 295

6051 296

6051 297

Part No.


Extension set in-roof 2-BLES 1VU

Set for in-roof mounting of an additional UltraSol® 2 V flat plate collector one above the other

Consisting of:

- Mounting material for fastening of the collector on the cross battens
- Spacers
- Centre plates including connectors
- Side plates left and right

6051 298

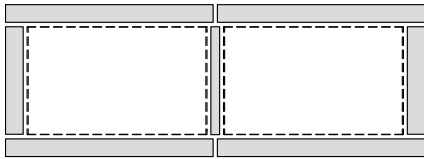

Basic set in-roof 2-BLGS 1H

Set for in-roof mounting of 1 UltraSol® 2 H flat plate collector

Consisting of:

- Mounting material for fastening of the collector on the cross battens
- Collector stop single collector
- Ridge sheet single collector incl. supports
- Eaves plate single collector
- Side plates left and right

6051 299

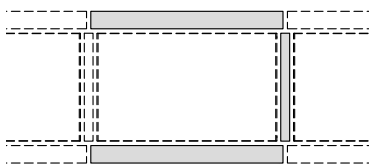

Basic set in-roof 2-BLGS 2HN

Set for in-roof mounting of 2 UltraSol® 2 H flat plate collectors side by side

Consisting of:

- Mounting material for fastening of the collectors on the cross battens
- Collector stops for 2 collectors
- Ridge plates for 2 collectors incl. supports
- Eaves plates for 2 collectors
- Side plates left and right
- Intermediate plate

6051 300

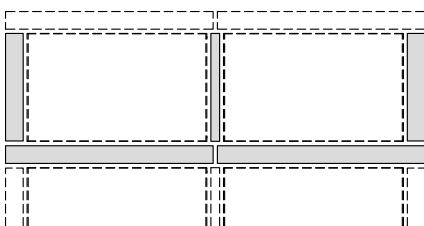

Extension set in-roof 2-BLES 1HN

Set for in-roof mounting of an additional flat plate collector UltraSol® 2 H side by side

Consisting of:

- Mounting material for fastening of the collector on the cross battens
- Collector stop middle
- Ridge sheet middle incl. supports
- Eaves sheet middle
- Intermediate plate

6051 301


Extension set in-roof 2-BLES 2HU

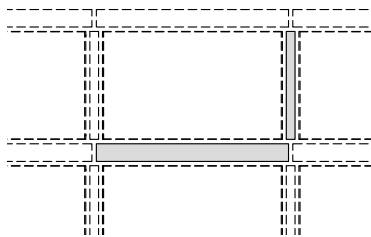
Set for in-roof mounting of two additional flat plate collectors UltraSol® 2 H one above the other

Consisting of:

- Mounting material for fastening of the collectors on the cross battens
- Spacers
- Centre plates including connectors
- Side plates left and right
- Intermediate plate

6051 302

Part No.

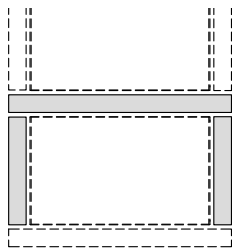


Extension set in-roof 2-BLES 1HUN

Set for in-roof mounting of an additional flat plate collector UltraSol® 2 H one above the other and side by side
Consisting of:

- Mounting material for fastening of the collectors on the cross battens
- Spacers
- Centre plates including connectors
- Intermediate plate

6051 303



Extension set in-roof 2-BLES 1HU

Set for in-roof mounting of an additional flat plate collector UltraSol® 2 H one above the other
Consisting of:

- Mounting material for fastening of the collector on the cross battens
- Spacers
- Centre plates including connectors
- Side plates left and right

6051 304



Intermediate plate, vertical
vertical covering strip for covering between 2 collectors

2075 478



Intermediate plate, horizontal
horizontal covering strip for covering between 2 collectors

2075 479



Eaves sheet panel V
vertical eaves sheet panel for covering the collector end face

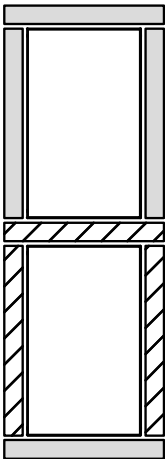
6051 721



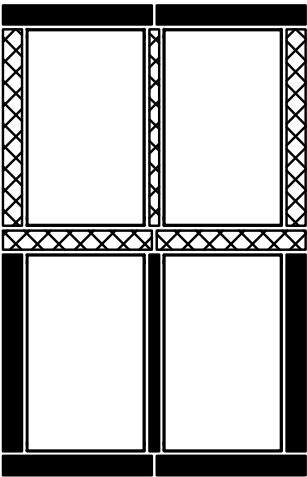
Eaves sheet panel H
horizontal eaves sheet panel for covering the collector end face

6051 722

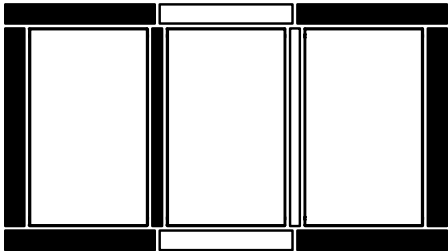
Examples for individually arranged in-roof sets for different collector surfaces



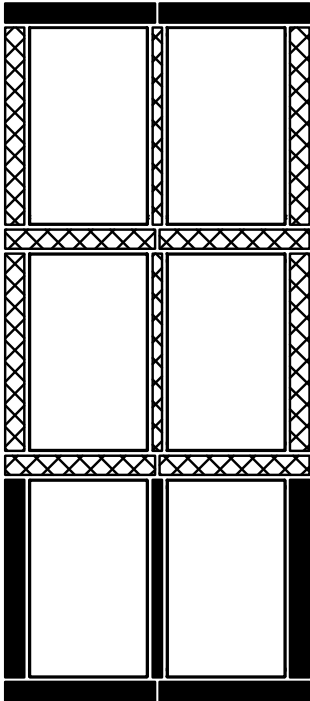
- to be ordered:
- 1 x 6051 293 **basic set in-roof BLGS 1V**
 - 1 x 6051 298 **expansion set in-roof BLES 1VU**



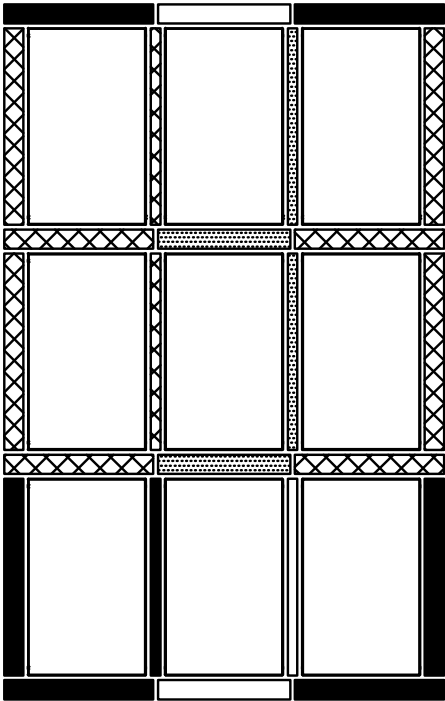
- to be ordered:
- 1 x 6051 294 **basic set in-roof BLGS 2VN**
 - 1 x 6051 296 **expansion set in-roof BLES 2VU**



- to be ordered:
- 1 x 6051 294 **basic set in-roof BLGS 2VN**
 - 1 x 6051 295 **expansion set in-roof BLES 1 VN**



- to be ordered:
- 1 x 6051 294 **basic set in-roof BLGS 2VN**
 - 2 x 6051 296 **expansion set in-roof BLES 2VU**



- to be ordered:
- 1 x 6051 294 **basic set in-roof BLGS 2VN**
 - 1 x 6051 295 **expansion set in-roof BLES 1VN**
 - 2 x 6051 296 **expansion set in-roof BLES 2VU**
 - 2 x 6051 297 **expansion set in-roof BLES 1VUN**

UltraSol® 2

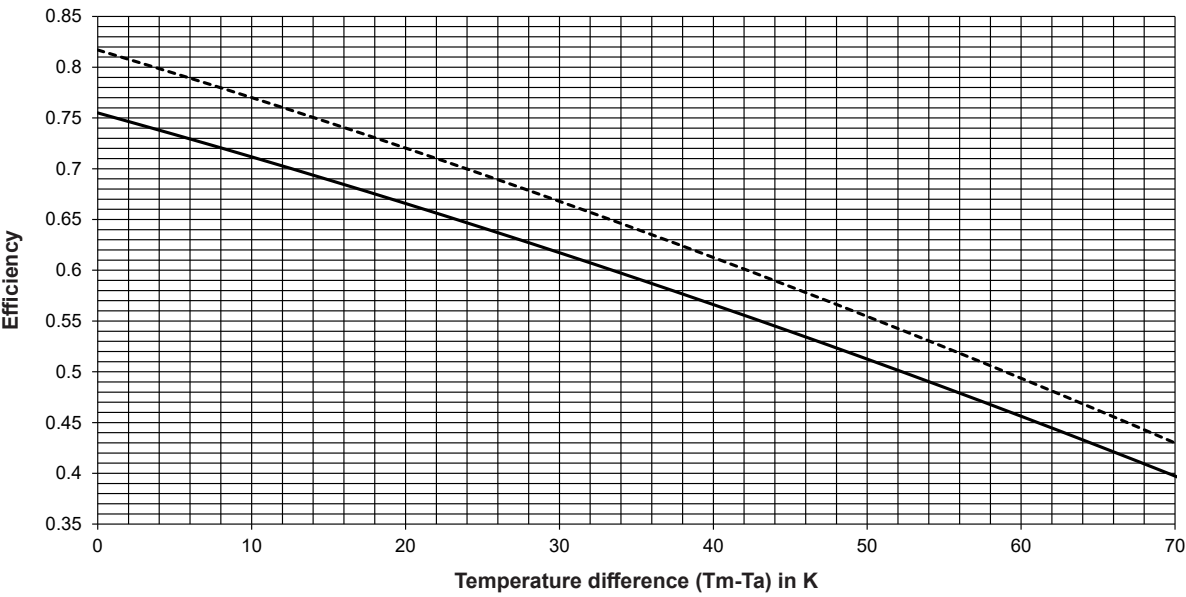
Type		UltraSol® 2	
		V	H
Optical efficiency (aperture surface) $\eta_{0,b}^{2)}$	%	81.7	81.7
$a_1^{2)}$	W/(m ² K)	4.55	4.55
$a_2^{2)}$	W/(m ² K ²)	0.014	0.014
Optical efficiency (gross area) $\eta_{0,b}^{1)}$	%	75.5	75.5
$a_1^{1)}$	W/(m ² K)	4.2	4.2
$a_2^{1)}$	W/(m ² K ²)	0.013	0.013
Reference surfaces			
• Total surface area	m ²	2.53	2.53
• Aperture surface	m ²	2.33	2.33
• Absorber surface	m ²	2.33	2.33
Collector/casing			
• Design		Extruded sections	
• Length, width, height		see dimensional drawing	
• Material		Aluminium	
• Weight	kg	43	43
Absorber			
• Absorber area coating		selective	
• Solar absorption level	%	95	95
• Hemispheric emissions level	%	5	5
• Heat transfer medium content	l	1.5	1.7
• Flow shape		Serpentine manifold	
• Number of connections		4	
• Configuration of connections		Compression fittings - CU round pipe Ø 18 mm	
Glass cover (transparent cover)			
• Product name		Structured toughened safety glass (ESG)	
• Transmission level	%	with anti-reflective coating on one side	
• Thickness	mm	94	94
		3.2	
Thermal insulation			
• Material		Mineral wool	
• Heat conductivity	W/(m ² K)	0.039	0.039
• Thickness	mm	20	20
• Hail resistance class		HW 3 (hailstones of ø up to 30 mm)	
Application limits			
• Standard standstill temperature	° C	180	180
• Max. perm. operating pressure	bar	10	10
• Permitted heat transfer medium		Glycol/water mixture	
• Specific flow rate approx.	l/(h m ²)	15-50	15-50
• Nominal flow per collector approx.	l/h	40-100	40-100
• Min. collector pitch		22°	
• Max. collector pitch		90° ³⁾	

¹⁾ Peak efficiency of the collector (η_b at $T_m^* = 0$), with reference to T_m^* , based on the direct irradiation intensity G_b (reference area: gross area of 2.53 m²)

²⁾ Peak efficiency of the collector (η_b at $T_m^* = 0$), with reference to T_m^* , based on the direct irradiation intensity G_b (reference area: aperture surface with 2.33 m²)

³⁾ Due to the specifications of the German Institute for Building Technology (DIBT), the collectors can be used in Germany up to a maximum inclination of 75°. This regulation is also partly applied in Austria.

Efficiency characteristic curve UltraSol® 2

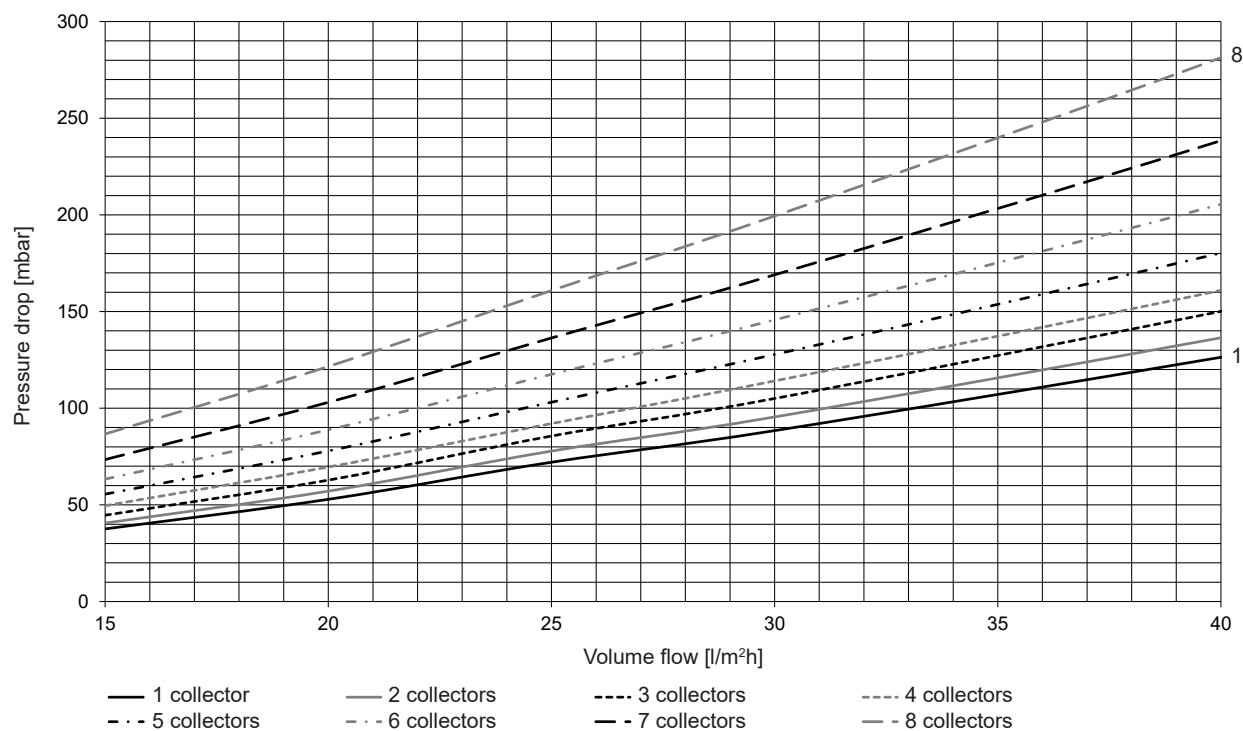


— UltraSol® 2 (Gross area)
----- UltraSol® 2 (Aperture surface)

T_m = average collector temperature)
 T_a = Ambient temperature

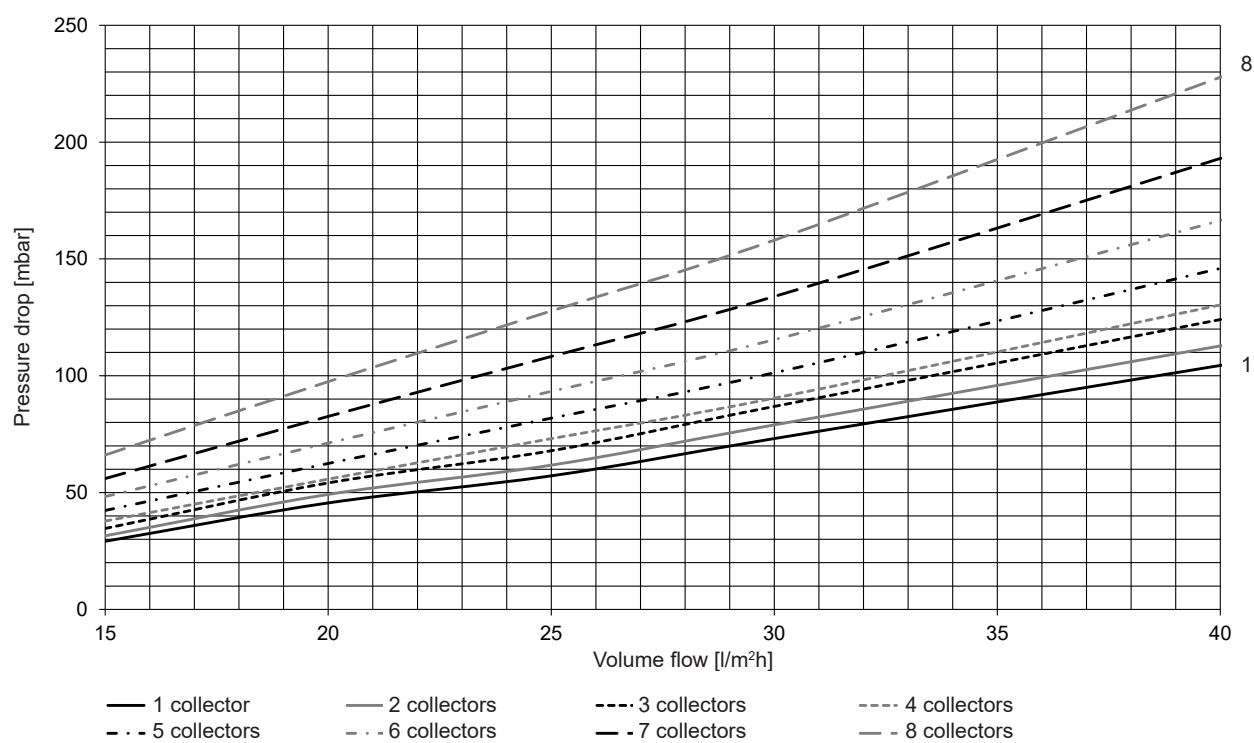
Pressure drop - UltraSol® 2, vertical

Water-Glycol mixture - temp. 20 °C



Pressure drop - UltraSol® 2, horizontal

Water-Glycol mixture - temp. 20 °C

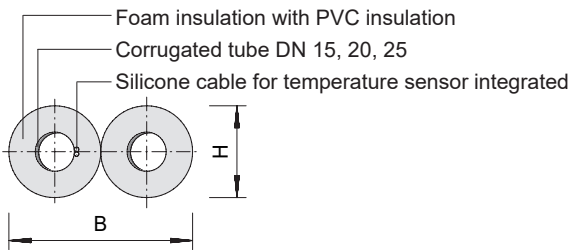


Solar cable SL

- Flexible stainless steel corrugated tube, material 1.4404.
- Max. pressure at 200 °C: 10 bar
- Operating temperature for stainless steel 100-600 °C

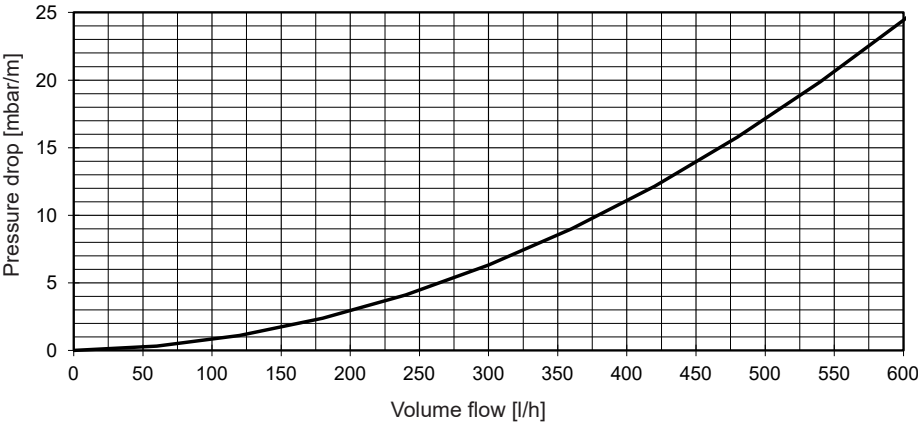
Type	Nominal pipe width DN	Internal diameter mm	External diameter mm	Bending radius min. mm	Burst pressure bar	Weight g/m	Wall thickness mm	Content l/m
SL 15	15 R ½"	16.6	21.4	25	44	140	0.18	0.28
SL 20	20 R ¾"	20.6	26.2	30	36	195	0.18	0.42
SL 25	25 R 1"	25.6	31.6	35	28	235	0.20	0.65

Type	DN		B mm	H mm	Insulation thickness mm
SL 15	15	R ½"	105	53	17
SL 20	20	R ¾"	135	68	19
SL 25	25	R 1"	155	80	14

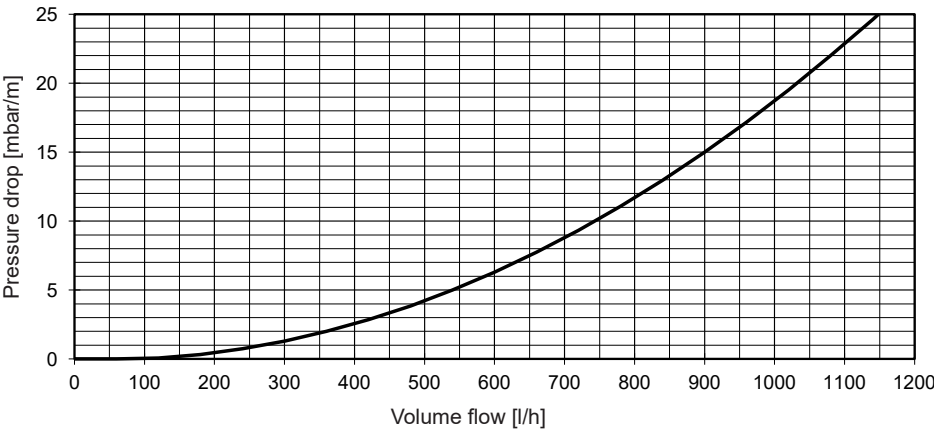


Specific pressure drop value (per metre individual pipe)
Glycol/water mixture 40/60 % and 40 °C

DN 15

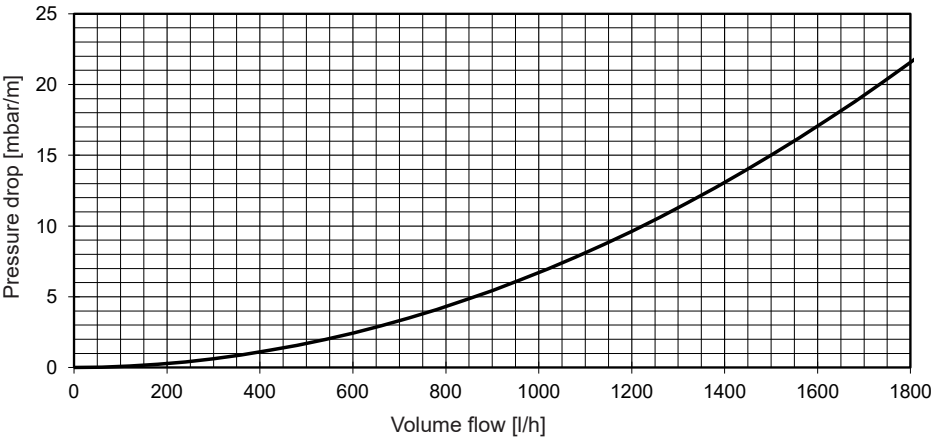


DN 20



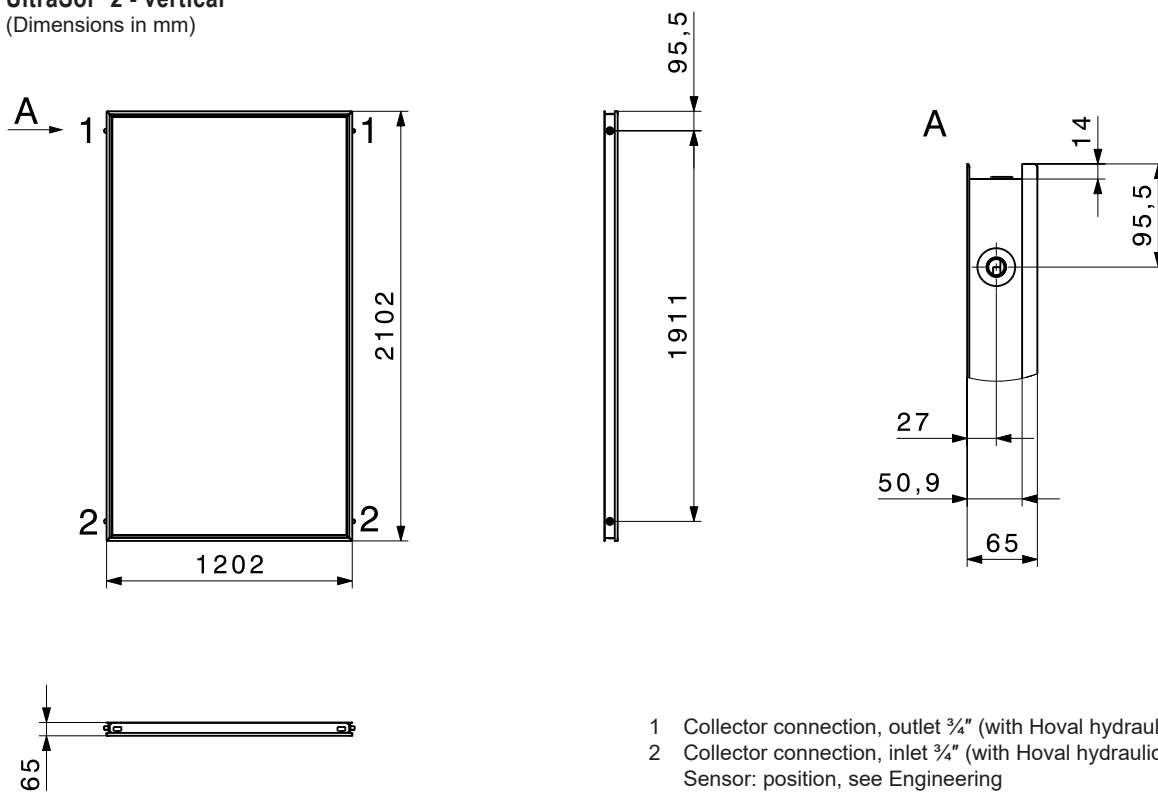
1 mbar = 100 Pa = 0.1 kPa

DN 25



UltraSol® 2 - vertical

(Dimensions in mm)

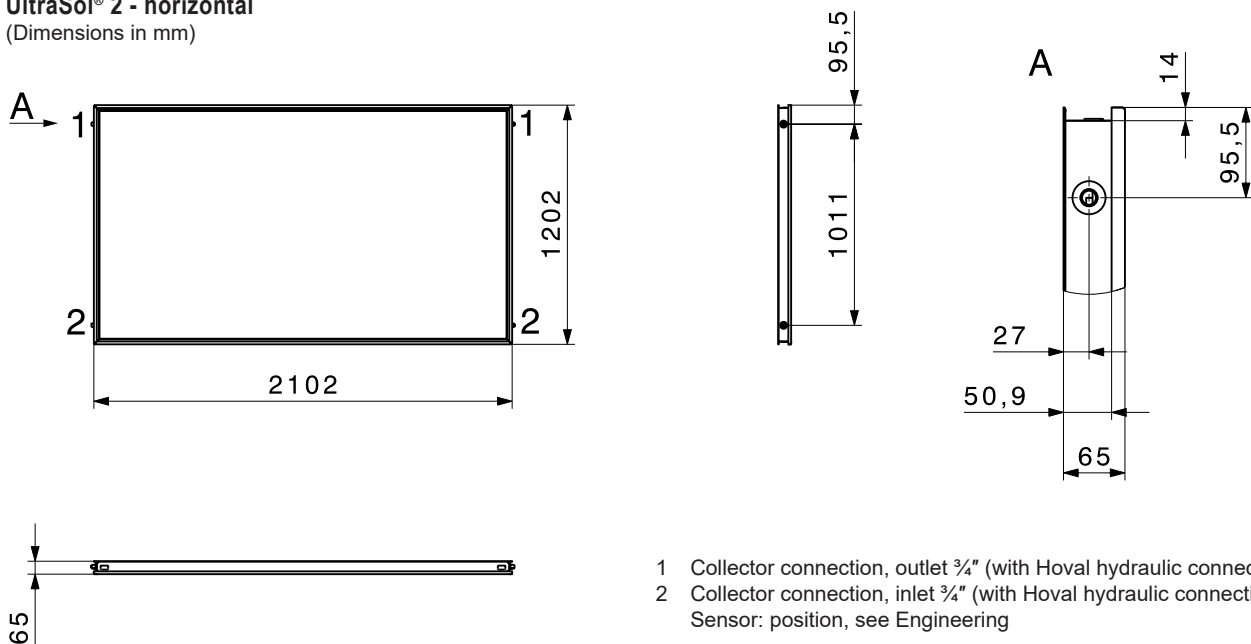


- 1 Collector connection, outlet 3/4" (with Hoval hydraulic connection brackets)
 - 2 Collector connection, inlet 3/4" (with Hoval hydraulic connection brackets)
- Sensor: position, see Engineering

- One-sided connection left or right possible (not Tichelmann)
- Connection on alternating sides possible (Tichelmann)

UltraSol® 2 - horizontal

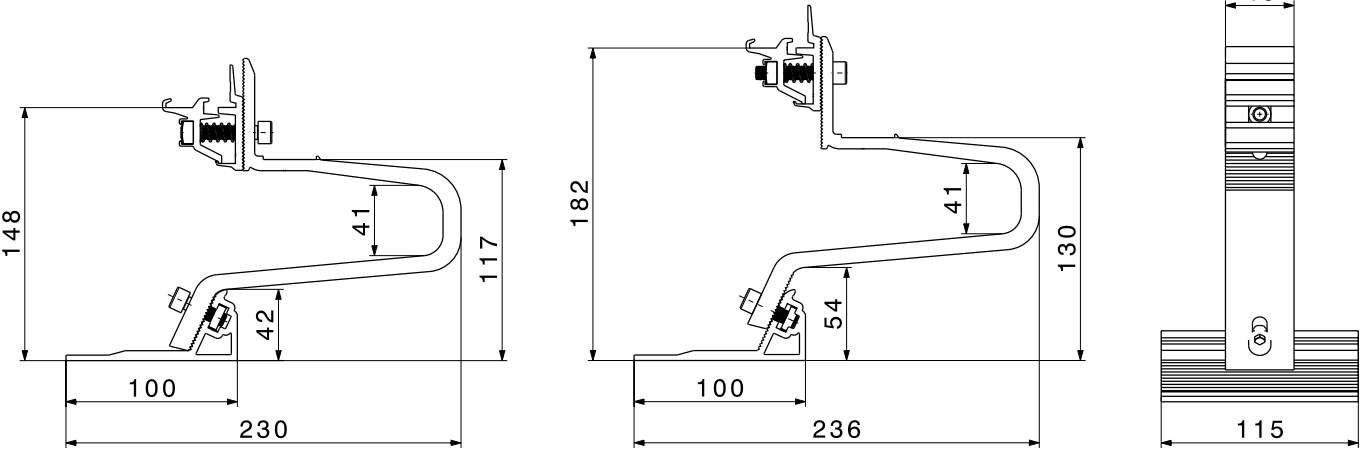
(Dimensions in mm)



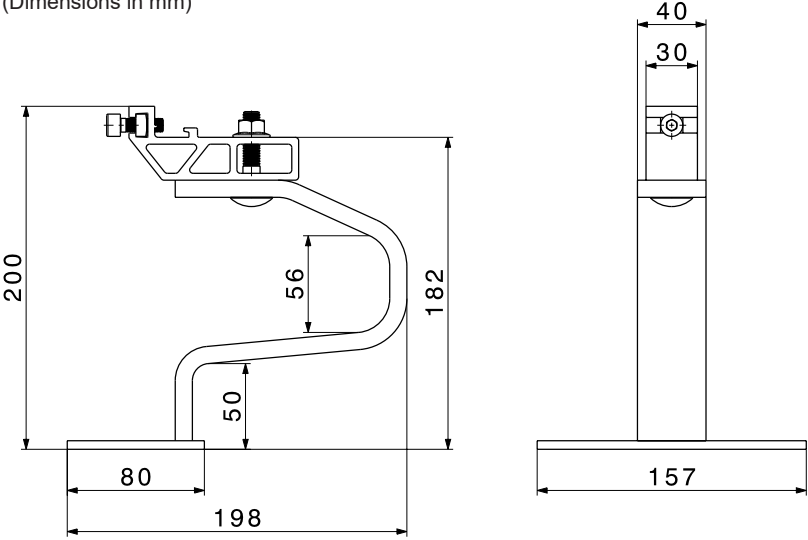
- 1 Collector connection, outlet 3/4" (with Hoval hydraulic connection brackets)
 - 2 Collector connection, inlet 3/4" (with Hoval hydraulic connection brackets)
- Sensor: position, see Engineering

- One-sided connection left or right possible (not Tichelmann)
- Connection on alternating sides possible (Tichelmann)

Roof bar tile adjustable - for on-roof installation
(Dimensions in mm)

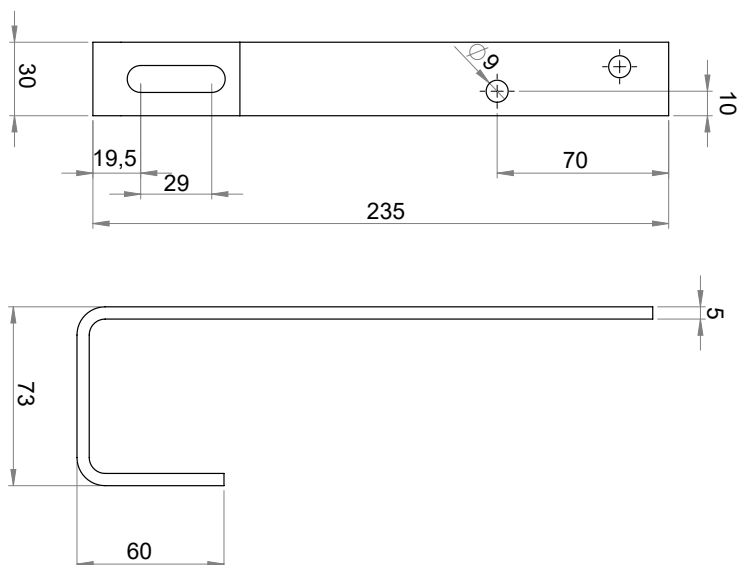


Roof bar tile heavy duty - for on-roof installation
(Dimensions in mm)



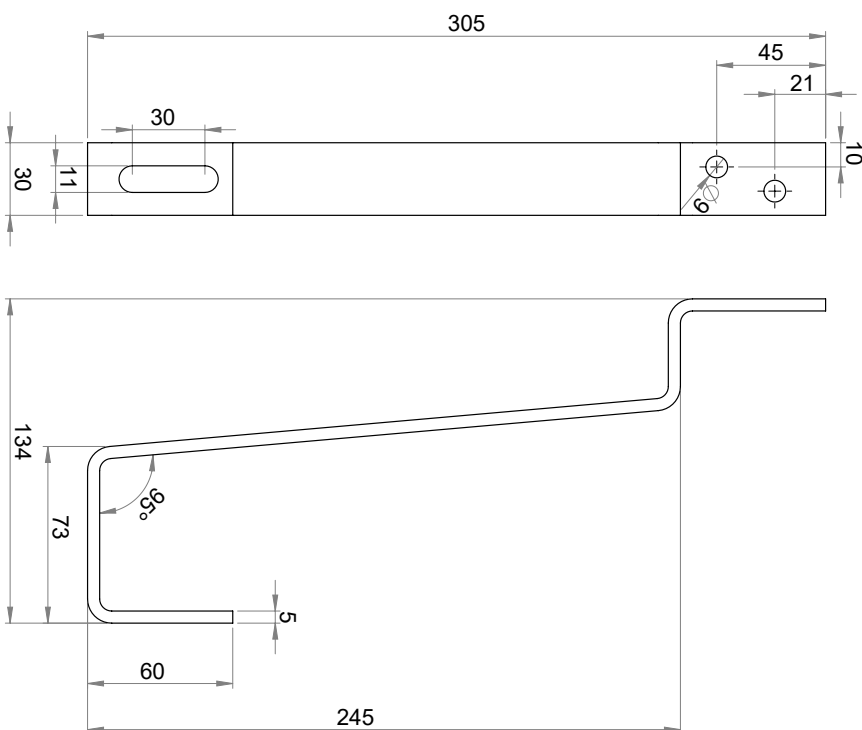
Roof bar slate - for on-roof installation

(Dimensions in mm)



Roof bar plain tile - for on-roof installation

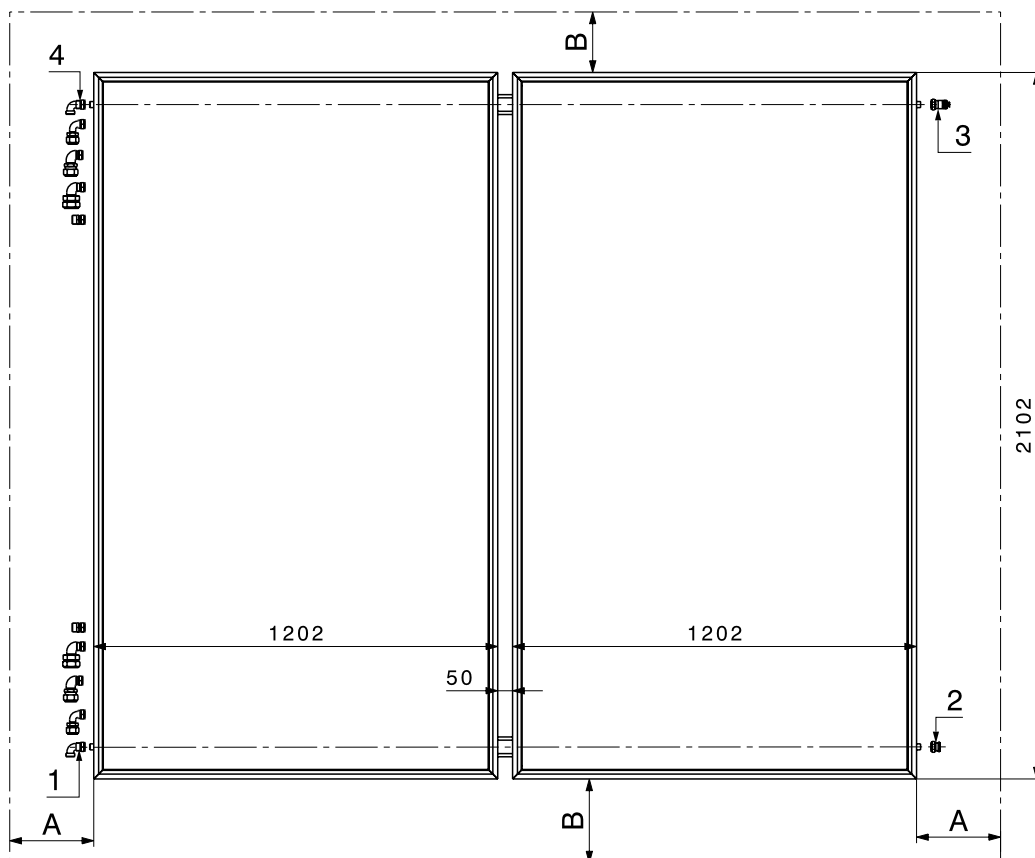
(Dimensions in mm)



Space requirements

UltraSol® 2 - vertical

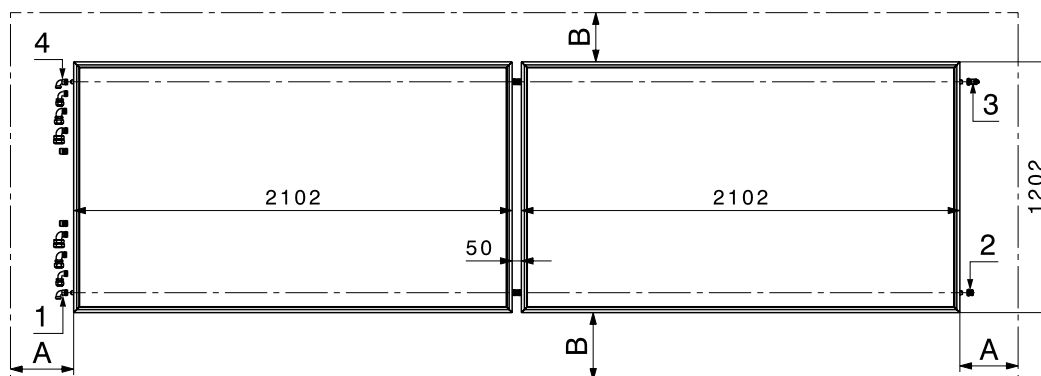
(Dimensions in mm)



Inverted configuration of the connections is also possible.

UltraSol® 2 - horizontal

(Dimensions in mm)



- 1 Inlet/collector return; connection Ø 18 mm CU round pipe
- 2 Dummy plug
- 3 Dummy plug with integrated manual vent
- 4 Outlet/collector flow hot; connection Ø 18 mm CU round pipes
Select short line routing
Sensor: position, see Engineering

A Space for installation/removal of connection brackets and collectors 250 mm.

B top At least one tile length distance from the gable!

B bottom At least one tile length distance from the end of the roof (eaves).

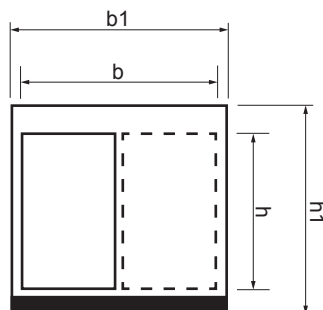
Also comply with local regulations relating to snow safety (number of snow holders).

Space requirements

Collector field - Roof inlay mounting, horizontal

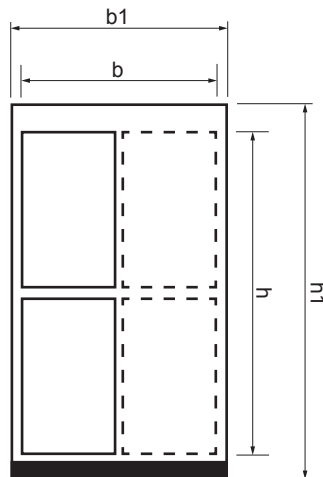
(Dimensions in cm)

1-row



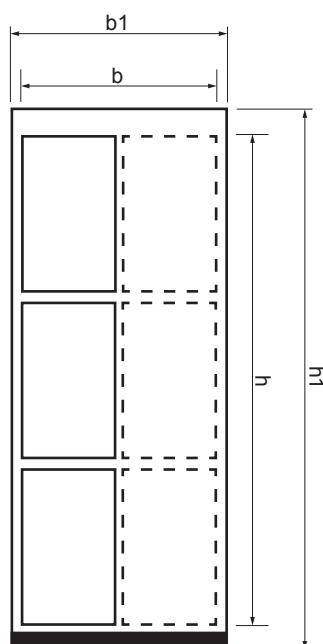
Number of collectors	Height h cm	Height h1 Outer dim. sheet metal cm	Width b collectors cm	Width b1 Outer dim. sheet metal cm
1			120	153
2			245	278
3			371	404
4			496	529
5	210	272	621	654
6			746	779
7			871	604
8			997	1030

2-row



Number of collectors Total	per row	Height h cm	Height h1 Outer dim. sheet metal cm	Width b collectors cm	Width b1 Outer dim. sheet metal cm
2	1			120	153
4	2			245	278
6	3			371	404
8	4			496	529
10	5	430	492	621	654
12	6			746	779
14	7			871	904
16	8			997	1030

3-row



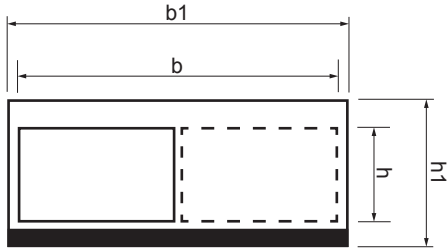
Number of collectors Total	per row	Height h cm	Height h1 Outer dim. sheet metal cm	Width b collectors cm	Width b1 Outer dim. sheet metal cm
3	1			120	153
6	2			245	278
9	3			371	404
12	4			496	529
15	5	651	712	621	654
18	6			746	779
21	7			871	904
24	8			997	1030

Space requirements

Collector field - Roof inlay mounting, horizontal

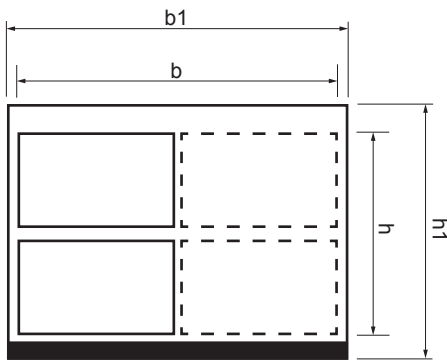
(Dimensions in cm)

1-row



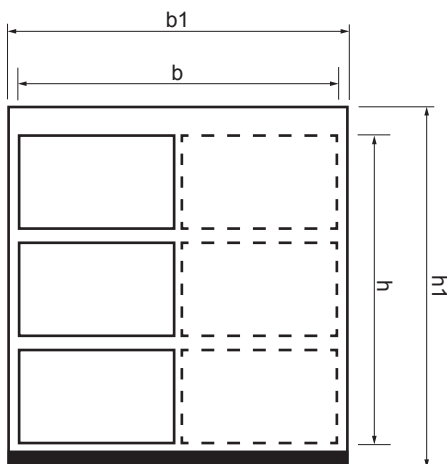
Number of collectors	Height h	Height h1 Outer dim. sheet metal	Width b collectors	Width b1 Outer dim. sheet metal
	cm	cm	cm	cm
1			210	243
2			425	458
3			641	674
4			856	889
5	120	182	1071	1104
6			1286	1319
7			1501	1534
8			1717	1750

2-row



Number of collectors	Height h	Height h1 Outer dim. sheet metal	Width b collectors	Width b1 Outer dim. sheet metal
Total per row	cm	cm	cm	cm
2 1			210	243
4 2			425	458
6 3			641	674
8 4			856	889
10 5	250	312	1071	1104
12 6			1286	1319
14 7			1501	1534
16 8			1717	1750

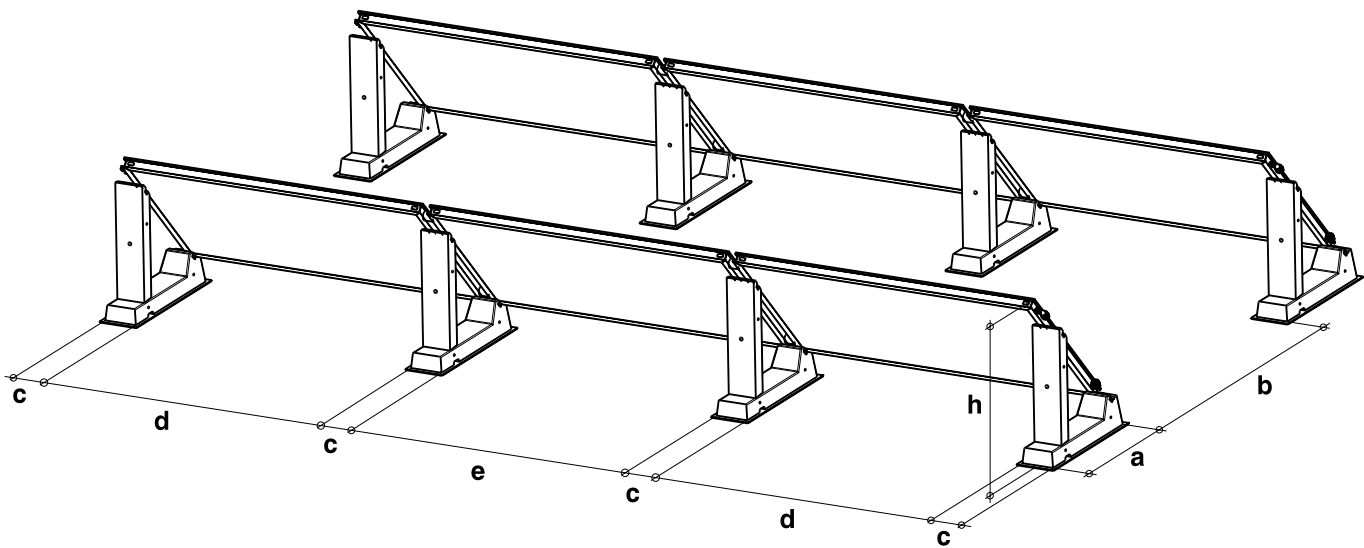
3-row



Number of collectors	Height h	Height h1 Outer dim. sheet metal	Width b collectors	Width b1 Outer dim. sheet metal
Total per row	cm	cm	cm	cm
3 1			210	243
6 2			425	458
9 3			641	674
12 4			856	889
15 5	381	442	1071	1104
18 6			1286	1319
21 7			1501	1534
24 8			1717	1750

Space requirements

Concrete base - installation
(Dimensions in mm)



Type	Installation angle	h	a	b	c	d	e
UltraSol® 2	45°	*1083	930	min. 1100	215	1897	1937

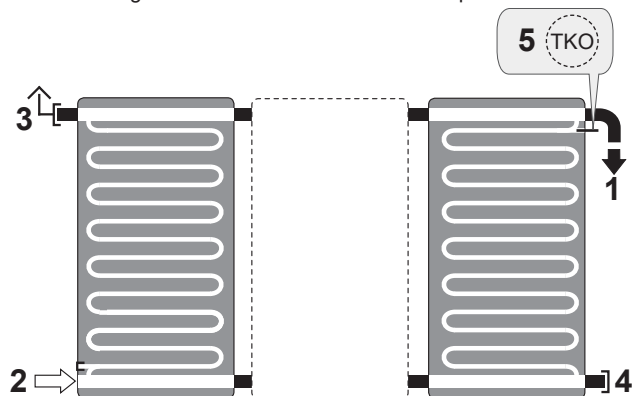
* With protective mat

Piping of the collector series

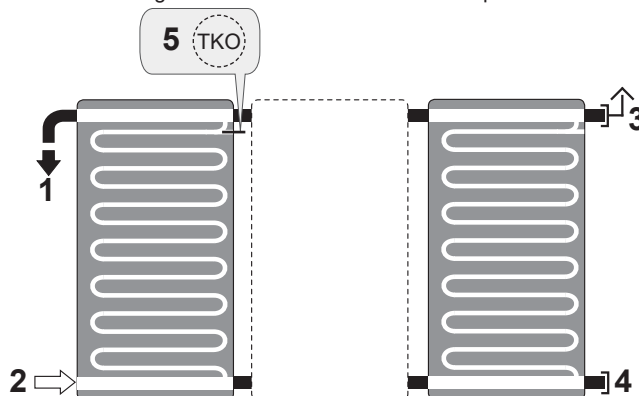
Connection example for collector series

UltraSol® 2 V (collector vertical)

Connection variant: Tichelmann, max. 8 collectors/row
Inverted configuration of the connections is also possible.

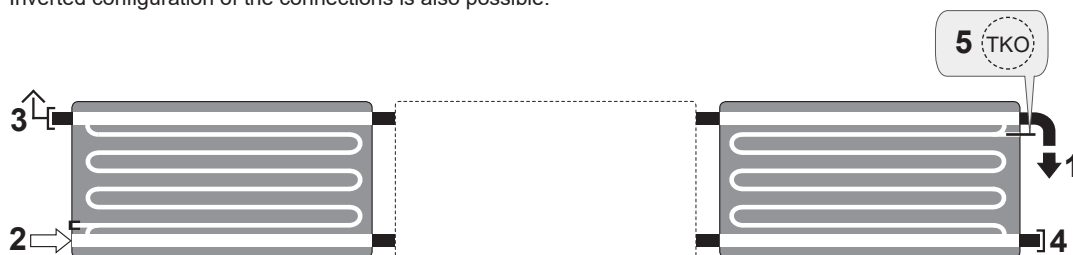


Connection variant: non-Tichelmann, max. 8 collectors/row
Inverted configuration of the connections is also possible..



UltraSol® 2 H (collector horizontal)

Connection variant: Tichelmann, max. 8 collectors/row
Inverted configuration of the connections is also possible.



Connection variant: non-Tichelmann, max. 8 collectors/row
Inverted configuration of the connections is also possible.



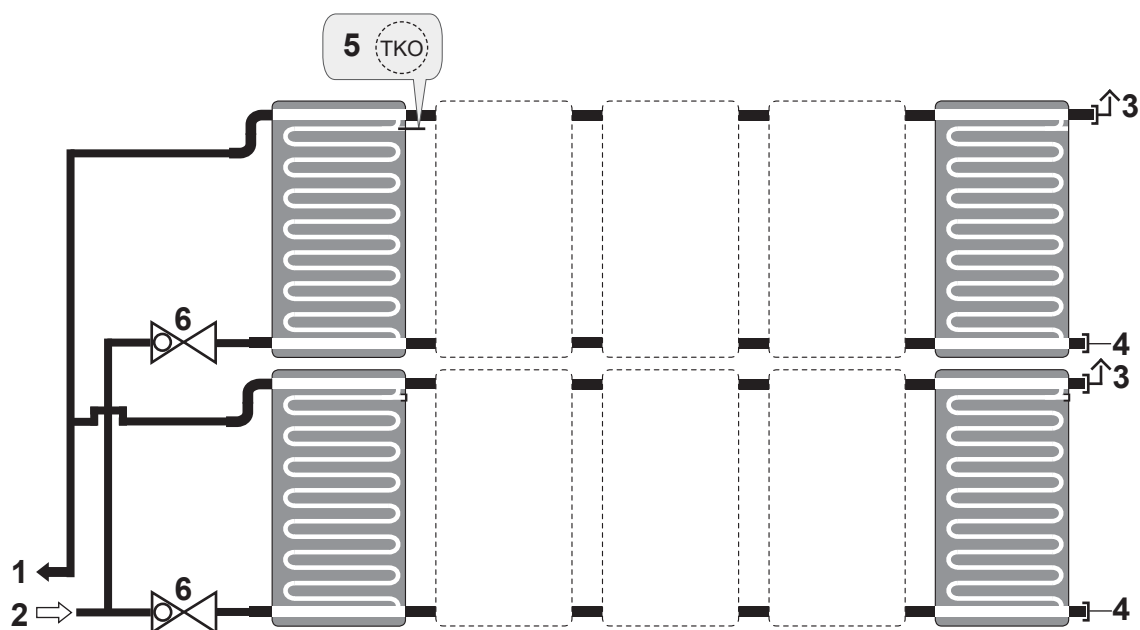
- 1 ← Line from collector field (collector flow, warm)
select short line routing
- 2 ← Line to collector field (collector return)
- 3 ↗ Dummy plug with integrated manual vent

- 4 ┐ Dummy plug
- 5 (TKO) Immersion sleeve
Differential control sensor or solar sensor

UltraSol® 2 V (collector vertical)

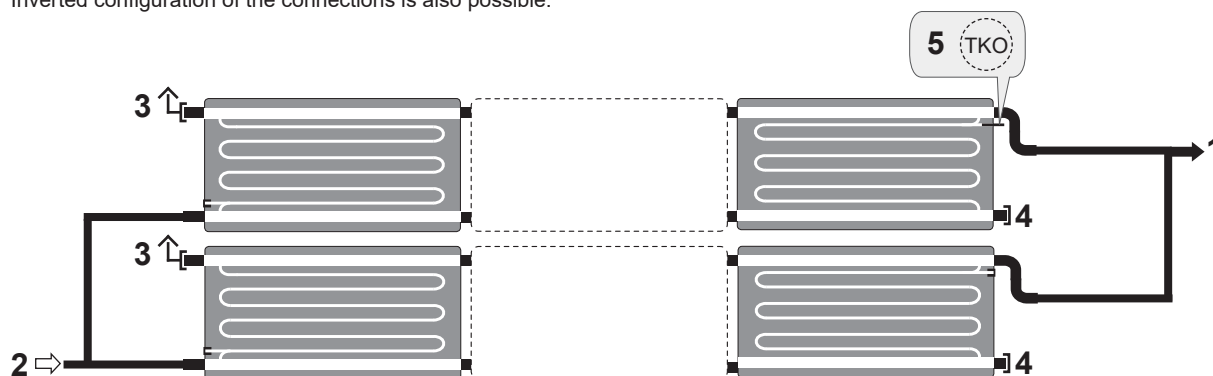
Connection variant: non-Tichelmann, max. 8 collectors/row

Inverted configuration of the connections is also possible.

**UltraSol® 2 H (collector horizontal)**

Connection variant: non-Tichelmann, max. 8 collectors/row

Inverted configuration of the connections is also possible.



- 1 Line from collector field (collector flow, warm)
select short line routing
- 2 Line to collector field (collector return)
- 3 Dummy plug with integrated manual vent
- 4 Dummy plug
- 5 Immersion sleeve
Differential control sensor or solar sensor
- 6 Control valve

Static dimensioning aid

The following requirements and directives must be complied with:

- Regionally applicable standards and regulations
- The installer is responsible for ensuring compliance with the relevant standards and local regulations.

Germany/Austria:

- The load bearing capacities of building coverings are prescribed ÖNORM B 1991.
- ÖNORM M 7778 (Installation planning and installation of thermal solar collectors)
- Both the Austrian as well as the German regulation is based on European standard EN 1991-1-3. They are valid up to altitudes of 1500 m. Any altitudes above that are regulated by special national appendices.

Switzerland:

- SIA 261 applies.

General information on statics

- Installation is only permissible on roof areas or substructures of sufficient load-bearing capacity. It is essential for the static load-bearing capacity of the roof or the substructure to be checked by the local statics engineer before the collectors are installed.
- The examination of the entire collector structure according to DIN 1055 Parts 4 and 5 is required by the local statics engineer, in particular in areas subject to high snowfall or high wind speeds. Attention in this must be paid to all special features of the installation site (foehn winds, venturi effects, eddy formation etc.) that can lead to increased load.

Roof-mounted systems

- With roof-mounted systems, particular attention must be paid to the quality of the wood in the substructure with regard to the durability of the screw connections for attaching collector installation fixtures. The selection and also the number of roof connections must be adapted to the local snow and wind loads. Binding statements about the wind and snow loads as well as building altitudes about seal level must be obtained from the relevant authorities in the regions.
- If the roof anchors are exposed to maximum load, their geometry means that deformation will be unavoidable and contact between the roof anchor and the tiles can often not be prevented. As a result, it is recommended for metal tiles to be used if there will be high snow and wind loads.
- The significant number of roof connection sets is based on the calculated minimum number of attachment points for the planned number of collectors without taking account of the building-specific anchoring conditions of the roof covering and the building structure. The local force application via roof connection sets has been provided. The transmission of forces via the screw connection to the building structure does not form part of this calculation and must be verified separately.
- To prevent impermissible wind suction loads, the collectors must not be installed near the edges of the roof. The relevant standards must be observed in this case. When elevators are used, the upper edge of the collector must not project beyond the ridge of the roof. Collectors must not be installed under a height change, in order to avoid increased loads due to windblown or slipping snow from the higher section of the roof onto the collector array. If snow guards are mounted on the more elevated roof for this reason, the statics of this roof must be inspected.

Personal protection

- In order to carry out work on the roof, safety equipment for personal protection must be included in the planning. For pitched roofs, these are safety roof hooks and for flat roofs, suitable attachment points or cable systems.

Germany/Austria:

- Regarding work on the roof, the AUVA regulations must be observed in Austria and DGUV1 regulations in Germany.

Switzerland:

- Regarding work on the roof, the SUVA regulations must be observed.

On-roof connection

Table 1 shows the maximum permitted snow and wind load depending on the rafter distances. The values must be checked according to local conditions and calculated by a recognised statics/structural engineer. Consequently, no legal claims can be asserted on this basis.

Table 1	Rafter spacing 1000 mm		Rafter spacing 900 mm		Rafter spacing 700-800 mm		Rafter spacing 500-600 mm	
	max. snow load [kN/m ²]	max. wind load [kN/m ²]	max. snow load [kN/m ²]	max. wind load [kN/m ²]	max. snow load [kN/m ²]	max. wind load [kN/m ²]	max. snow load [kN/m ²]	max. wind load [kN/m ²]
Roof bar set tile adjustable								
AD0V	1.0	0.6	1.0	0.7	1.3	0.7	1.0	0.7
AD20-45V		not permissible			1.2	0.7	1.0	0.7
AD0H	1.0	0.5	0.5	0.5	1.1	0.7	0.7	0.7
AD20-45H		not permissible			1.0	0.7	0.7	0.7
Roof bar set tile heavy duty								
AD0V	1.0	1.0	1.4	1.0	2.3	1	2.8	1.0
AD20-45V		not permissible			1.7	0.8	2.0	0.8
AD0H	1.8	1.0	0.8	1.0	1.8	1	2.0	1.0
AD20-45H		not permissible			1.5	0.8	1.5	0.8
Roof bar set slate								
AD0V		not permissible			1.1	0.7	1.0	0.7
AD0H		not permissible			0.8	0.7	0.9	0.7
Roof bar set plain tile								
AD0V		not permissible			0.2	0.7	0.1	0.7
AD0H		not permissible			0	0.6	0.1	0.7
Hanger bolts								
AD0V		not permissible			0.6	0.7	0.6	0.7
AD0H		not permissible			0.6	0.7	0.6	0.7

Table 2 shows the calculated minimum number of roof connection sets for the planned number of collectors without taking account of the building-specific anchoring conditions of the roof covering and the building structure. The values must be checked according to local conditions and the status of the roof construction and be calculated by a recognised statics/structural engineer. Consequently, no legal claims can be asserted on this basis.

Lengthwise expansion

Due to high temperature differences between summer and winter, the lengthwise expansion of the profiles must be considered. The carrier profiles must be divided with a gap (min. 4 cm) after every 12 m. Consequently, a maximum of 8 vertical collectors or 6 horizontal collectors can be juxtaposed. The distance between the collector fields is minimum 10 cm.

Table 2: Minimum number of roof connection sets (1 set = 2 attachment points)

UltraSol® 2 V	Number of collectors							
	1	2	3	4	5	6	7	8
Rafter spacing 1000 mm	2	3	4	5	7	8	9	10
Rafter spacing 900 mm	2	3	5	6	7	9	10	12
Rafter spacing 800 mm	2	4	5	7	8	10	12	13
Rafter spacing 700 mm	2	4	6	8	9	11	13	15
Rafter spacing 600 mm	2	5	7	9	11	13	15	17
Rafter spacing 500 mm	3	6	8	11	13	16	18	21

UltraSol® 2 H	Number of collectors					
	1	2	3	4	5	6
Rafter spacing 1000 mm	3	5	7	10	12	14
Rafter spacing 900 mm	3	5	7	9	11	13
Rafter spacing 800 mm	2	4	6	7	8	10
Rafter spacing 700 mm	3	4	6	8	10	12
Rafter spacing 600 mm	2	4	6	8	10	12
Rafter spacing 500 mm	3	5	7	9	11	13

Snow load

Example for determining the snow load on the collector depending on the collector angle:

AT-6353 Going am Wilden Kaiser, altitude 785 m

1. Determination of the characteristic value of snow load S_k [kN/m²] according to EN 1991-1-3

Example for *Austria*:

<https://www.dlubal.com/de/schnee-wind-erdbeben-lastzonen/schnee-onorm-b-1991-1-3.html> or

<https://www.hora.gv.at/>

For AT-6353 Going am Wilden Kaiser, a characteristic snow load of **$S_k = 4.08 \text{ kN/m}^2$** can be expected

For example for *Germany*:

<https://www.dlubal.com/de/schnee-wind-erdbeben-lastzonen/schnee-din-en-1991-1-3.html>

2. Example for determining the snow load on the collector depending on the collector angle (α).

Example for *Austria and Germany*:

<http://www.renewable-energy-concepts.com/german/sonnenenergie/basiswissen-solarenergie/schneelasten-windlasten.html>

Calculation method:

$\alpha \leq 30^\circ$: $S_k(\text{roof}) = S_k(\text{floor}) * 0.8$

$30^\circ < \alpha \leq 60^\circ$: $S_k(\text{roof}) = S_k(\text{floor}) * [0.8 * (60^\circ - \alpha) / 30^\circ]$

$\alpha > 60^\circ$: $S_k(\text{roof}) = 0 \text{ kN/m}^2$

At 20° collector angle: $4.08 \text{ kN/m}^2 * 0.8 = 3.26 \text{ kN/m}^2$

At 30° collector angle: $4.08 \text{ kN/m}^2 * 0.8 = 3.26 \text{ kN/m}^2$

At 35° collector angle: $4.08 \text{ kN/m}^2 * [0.8 * (60^\circ - 35^\circ) / 30^\circ] = 2.72 \text{ kN/m}^2$

At 45° collector angle: $4.08 \text{ kN/m}^2 * [0.8 * (60^\circ - 45^\circ) / 30^\circ] = 1.63 \text{ kN/m}^2$

At 60° collector angle: $4.08 \text{ kN/m}^2 * [0.8 * (60^\circ - 60^\circ) / 30^\circ] = 0 \text{ kN/m}^2$

characteristic value of the snow load s_k [kN/m ²] according to EN 1991-1-3:		1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
Snow load on the collector	at collector angle less than 30° :	0.8	1.0	1.1	1.3	1.4	1.6	1.8	1.9	2.1	2.2	2.4	2.6	2.7	2.9	3.0	3.2	3.4	3.5	3.7	3.8	4.0
	at 30° collector angle:	0.8	1.0	1.1	1.3	1.4	1.6	1.8	1.9	2.1	2.2	2.4	2.6	2.7	2.9	3.0	3.2	3.4	3.5	3.7	3.8	4.0
	at 35° collector angle:	0.7	0.8	0.9	1.1	1.2	1.3	1.5	1.6	1.7	1.9	2.0	2.1	2.3	2.4	2.5	2.7	2.8	2.9	3.1	3.2	3.3
	at 40° collector angle:	0.5	0.6	0.7	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.5	2.6	2.7
	at 45° collector angle:	0.4	0.5	0.6	0.6	0.7	0.8	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.4	1.5	1.6	1.7	1.8	1.8	1.9	2.0
	at 50° collector angle:	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3
	at 55° collector angle:	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7
	at 60° collector angle:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	at collector angle greater than 60° :	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

The values from Table 1 On-roof connection can be increased by 40 % (up to max. 4.1 kN/m^2) by inserting an additional carrier profile (3 carrier profiles in total) as the basic carrier and as the collector carrier.

Flat roof systems

Wind load calculation according to DIN EN 1991-1-3 and -4 for free-standing flat roof systems

In general, calculation in accordance with standard DIN EN 1991-1-3 and -4 applies for the detailed wind load calculation. The existing recommendation should cover the standard cases and ease handling in daily use. However, this recommendation does not release the planning authority from carefully examining the local conditions and having a designated specialist (structural engineer/civil engineer) make a detailed calculation. Consequently, no liability claims can be asserted on this basis.

The following points are decisive for the design of the wind load:

- Collector angle
- Backpressure zone/wind zone
- Terrain category/location
- Height of building above terrain
- Building dimensions/shape
- Roof edge height (attic)
- Distance from collectors to roof edge
- Number of collectors in a row

The more exposed, the more free-standing the building is, the higher are the expected wind loads. In city areas, the buildings are often protected from wind by other neighbouring buildings.

Minimum requirement - number of additional weights

Table 3 shows the additional weights for the UltraSol® 2 concrete base system. The information in the table only refers to these isolated cases. The values do not apply for every situation and must be checked and adjusted to the local situation. Consequently, no legal claims can be asserted on this basis. Higher backpressures and wind speeds must be determined and calculated in accordance with DIN EN 1991-1-3 and -4.

At total heights above 10 m, additional anchoring is recommended (safety level 2 or 3). Since the collectors can tilt at higher wind loads, it is especially important that the first row of collectors facing the wind be braced.

The reference value of the backpressure corresponds to the top speed (gusts of a few seconds). Its return period is 50 years. For constructions at locations with unusual wind conditions, for example peaks or ridges, increasing the values should be examined on a case-by-case basis.

Table 3: minimum requirement - number of additional weights

Base speed pressure q _{b,0} ¹⁾	Backpressure	Peak speed (gust speed) v _p ²⁾		Number of UltraSol® 2 H per collector row (angle 45°)						
				Up to 2 collectors	Up to 3 collectors	Up to 4 collectors	Up to 5 collectors	Up to 6 collectors	Up to 7 collectors	Up to 8 collectors
kN/m²	kN/m²	m/s	km/h	Number of additional weights with 50 kg each ³⁾						
0.19	0.4	25.3	91	3	3	3	4	4	4	4
0.24	0.5	28.3	102	4	4	5	5	5	5	6
0.29	0.6	31.1	112	5	6	6	7	7	7	7
0.34	0.7	33.6	121	6	7	Detailed determination necessary by structural engineer				
0.38	0.8	35.8	129	Detailed determination necessary by structural engineer						
0.43	0.9	38.7	139	Detailed determination necessary by structural engineer						
0.48	1	40.8	147	Detailed determination necessary by structural engineer						

¹⁾ Base speed pressure $q_{b,0}$ according to EN 1991-1-3 and -4

²⁾ Peak speed (gust speed) v_p according to ÖNORM B 1991-1-4

³⁾ Specification of additional weights applies per concrete base

Calculation valid for: attic height > 200 mm; coefficient of friction of underlay mat 0.65; roof distances > 1.5 m

Austria**1. Calculating the wind load**

Calculation of the base speed pressure according to ÖNORM B 1991-1-4:

Example for AT: <https://www.dlubal.com/de/schnee-wind-erdbeben-lastzonen/wind-onorm-b-1991-1-4.html>

Germany**1. Calculating the wind load**

Base speeds and speed pressures:

Wind zone	Base wind speed $v_{b,0}$ in m/s	Base speed pressure q_0 in kN/m ²
1	< 22.5	0.32
2	< 25.0	0.39
3	< 27.5	0.47
4	< 30.0	0.56

Example for DE: <https://www.dlubal.com/de/schnee-wind-erdbeben-lastzonen/wind-din-en-1991-1-4.html>

Determining the terrain category (TC)

Terrain categories according to DIN EN 1991-1-4:

Terrain category (TC)	Definition
Terrain category I	Open sea; lakes with at least 5 km open area in wind direction; level, flat land without obstacles (not for Austria)
Terrain category II	Terrain with hedges, individual farms, houses or trees, e.g. agricultural area
Terrain category III	Suburbs, industrial or commercial areas; woodland
Terrain category IV	Urban areas where at least 15% of the area is occupied by buildings with an average height exceeding 15 m

2. Determination of the maximum gust speed

Gust speed in wind zone 1:

Reference height in metres	GK I in km/h	GK II in km/h	GK III in km/h	GK IV in km/h
0	112	105	100	93
10	136	124	103	93
16	136	124	111	93
20	139	128	115	98

Gust speed in wind zone 2:

Reference height in metres	GK I in km/h	GK II in km/h	GK III in km/h	GK IV in km/h
0	124	117	111	104
10	145	131	114	104
16	152	138	123	104
20	155	142	127	109

Gust speed in wind zone 3:

Reference height in metres	GK I in km/h	GK II in km/h	GK III in km/h	GK IV in km/h
0	137	129	122	114
10	159	144	126	114
16	167	152	135	114
20	170	156	140	119

Gust speed in wind zone 4:

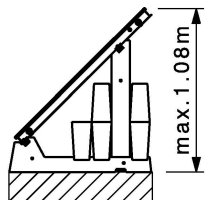
Reference height in metres	GK I in km/h	GK II in km/h	GK III in km/h	GK IV in km/h
0	149	140	133	124
10	174	157	137	124
16	182	166	148	125
20	186	170	153	130

3. Determination of the minimum number of additional weights per concrete base according to Table 3

With the value of the maximum gust speed, the number of required additional weights (50 kg each) per concrete base can be calculated. The value in the tables must be above the maximum gust speed of the location.

Safety levels for fastening and installation conditions

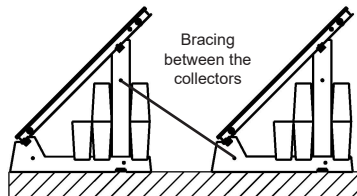
Depending on the building height and situation, the safety of the system must also be increased. The bracing must be created with stable rails or with steel cables.



Safety level 1

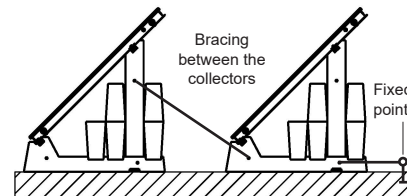
- Increase in dead weight with number of additional weights

M8 threads are moulded on the sides of the concrete base for bracing the collector rows.



Safety level 2

- Increase in dead weight with number of additional weights
- Additional fastening of the rows among one another
- Bracing (e.g. perforated rail)
- Recommended if height of building more than 10 m above terrain
- The bracing must be attached to the edge of the collector field. If there are 4 or more collectors in a row, additional bracing must be fitted in the middle of the array



Safety level 3

- Increase in dead weight with number of additional weights
- Additional fastening of the rows among one another
- Fastening of rows to a stable fixed point (on-site)
- On-site bracing (e.g. perforated rail)
- Recommended with backpressure of 1.3 kN/m² or more, or without roof edge (< 20 cm)

Substructure of the roof/statics

Before the weights are positioned on the roof, the statics of the roof must be checked. The responsible structural engineer must be consulted. The compressive strength of the substructure must also be checked. Not every type of insulation is suitable for high point loads. If pallets are delivered to the roof, the permissible loads on the roof must be observed. The following table shows the weights per concrete base depending on the number of additional weights.

Table 4 relates to

- the total weight of the concrete base
- additional weights and
- collector divided by the number of collectors installed in a row

Weights

Concrete base: 92 kg
Additional weight: 50 kg
Collector: 43 kg
Concrete base contact surface: 0.2 m²

The following number of concrete bases are included in the calculation per row: Number of collectors + 1

If the point load on the structure is too high, the weight can be distributed over a larger area using a load distribution plate under the base.

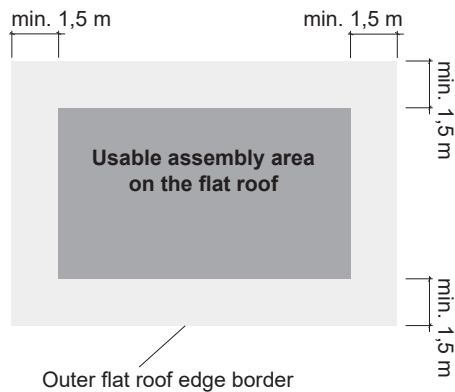
Table 4

	Number of collectors/row							
	Weight per collector in a row in kg							
	1	2	3	4	5	6	7	8
with 3 additional weights	527	406	366	346	333	325	320	315
with 4 additional weights	627	481	432	408	393	384	377	372
with 5 additional weights	727	556	499	471	453	442	434	428
with 6 additional weights	827	631	566	533	513	500	491	484
with 7 additional weights	927	706	632	596	573	559	548	540

Flat roof edge border zones

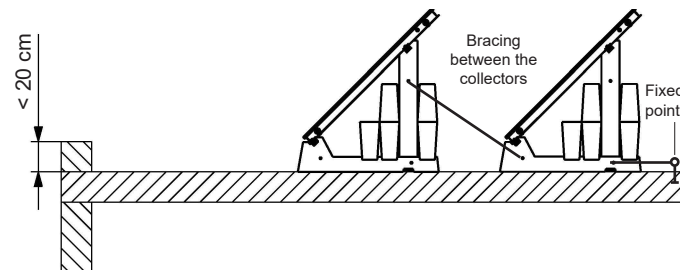
To prevent impermissible wind suction loads, the collectors must not be installed near the edges of the roof. The relevant standards must be observed in this case.

When installing solar collectors, the critical areas near the edge must not be used as assembly areas.



Flat roof systems without roof edge border

In systems that have no or little flat roof edge border (height less than 20 cm), particular caution is recommended. In this case, the entire construction is exposed to the complete wind forces. That is why we recommend safety level 3 (bracing rows and fastening to a stable fixed point).



Protection of the roof layer

The flat roof must be protected against damage. Damage to the roof cladding is time-consuming and very cost-intensive to repair. The roof must therefore be thoroughly cleaned before installation. Especially pointed objects such as stones, shards and tools must be removed. The gravel covering must be completely removed in the area of the concrete base. Under the base, the roof cladding must be protected with an insulating mat (e.g. foam rubber mat).

Recommended pipe dimension (copper or stainless steel pipe)

for monopropylene glycol/water mixture 40/60 % and 50 °C

Volume flow		DN 10 12 x 1 mm		DN 12 15 x 1 mm		DN 15 18 x 1 mm		DN 20 22 x 1 mm		DN 25 28 x 1.5 mm		DN 32 35 x 1.5 mm		DN 40 42 x 1.5 mm	
[l / h]	[l/min]	v [m/s]	Δp [mbar/m]	v [m/s]	Δp [mbar/m]	v [m/s]	Δp [mbar/m]	v [m/s]	Δp [mbar/m]	v [m/s]	Δp [mbar/m]	v [m/s]	Δp [mbar/m]	v [m/s]	Δp [mbar/m]
125	2.08	0.44	3.10	0.26	1.10	0.17	0.50	0.11	0.20	0.07	0.10	0.04	0.00	0.03	0.00
150	2.50	0.53	6.70	0.31	1.30	0.21	0.60	0.13	0.20	0.08	0.10	0.05	0.00	0.03	0.00
175	2.92	0.62	8.70	0.37	1.50	0.24	0.70	0.15	0.30	0.10	0.10	0.06	0.00	0.04	0.00
200	3.33	0.71	10.90	0.42	3.20	0.28	0.80	0.18	0.30	0.11	0.10	0.07	0.00	0.05	0.00
250	4.17	0.88	15.90	0.52	4.60	0.35	1.70	0.22	0.40	0.14	0.20	0.09	0.10	0.06	0.00
300	5.00	1.06	21.70	0.63	6.30	0.41	2.40	0.27	0.80	0.17	0.20	0.10	0.10	0.07	0.00
350	5.83	1.24	28.30	0.73	8.20	0.48	3.10	0.31	1.10	0.20	0.20	0.12	0.10	0.08	0.00
400	6.67	1.41	35.60	0.84	10.30	0.55	3.90	0.35	1.40	0.23	0.50	0.14	0.10	0.09	0.00
450	7.50	1.59	43.60	0.94	12.60	0.62	4.70	0.40	1.70	0.25	0.60	0.16	0.10	0.10	0.00
500	8.33	1.77	52.40	1.05	15.10	0.69	5.70	0.44	2.00	0.28	0.70	0.17	0.20	0.12	0.10
600	10.00	2.12	71.90	1.26	20.70	0.83	7.80	0.53	2.70	0.34	0.90	0.21	0.30	0.14	0.10
700	11.67	2.48	94.10	1.46	27.10	0.97	10.10	0.62	3.50	0.40	1.20	0.24	0.40	0.16	0.20
800	13.33	2.83	118.90	1.67	34.10	1.11	12.70	0.71	4.40	0.45	1.50	0.28	0.50	0.19	0.20
900	15.00	3.18	146.20	1.88	41.90	1.24	15.60	0.80	5.40	0.51	1.90	0.31	0.60	0.21	0.20
1000	16.67	3.54	175.90	2.09	50.40	1.38	18.80	0.88	6.50	0.57	2.30	0.35	0.70	0.23	0.30
1200	20.00	4.24	242.60	2.51	69.30	1.66	25.80	1.06	8.90	0.68	3.10	0.41	1.00	0.28	0.40
1500	25.00	5.31	360.20	3.14	102.70	2.07	38.10	1.33	13.20	0.85	4.60	0.52	1.40	0.35	0.60
1750	29.17	6.19	473.70	3.66	134.80	2.42	50.00	1.55	17.30	0.99	6.00	0.60	1.90	0.41	0.70
2000	33.33	7.07	601.00	4.19	170.70	2.76	63.30	1.77	21.80	1.13	7.60	0.69	2.30	0.47	0.90
2250	37.50	7.96	741.90	4.71	210.40	3.11	77.90	1.99	26.90	1.27	9.30	0.78	2.90	0.52	1.10
2500	41.67	8.84	896.00	5.23	253.70	3.45	93.90	2.21	32.30	1.41	11.20	0.86	3.50	0.58	1.40
2750	45.83	9.73	1063.00	5.76	300.70	3.80	111.10	2.43	38.20	1.56	13.20	0.95	4.10	0.64	1.60
3000	50.00	10.61	1243.00	6.28	351.20	4.14	129.70	2.65	44.60	1.70	15.40	1.04	4.70	0.70	1.90

V = Flow speed [m/s]

Δp = Pressure drop [mbar/m]

= Recommended pipe dimension

We recommend using commercially available copper and stainless steel pipe as the pipe raw material,
Heat insulation - depending on installation orientation:

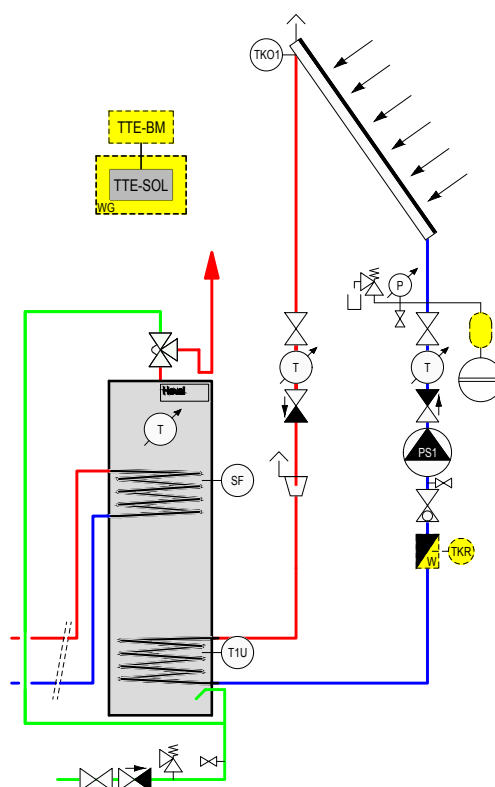
- In the outdoor area, UV radiation resistant and robust (temperature, small animals)
- In the indoor area, depending on requirement, provide with fire and/or with touch protection

Table does not apply for corrugated tube.
Further information see solar cable SL

Solar system for hot water with

- calorifier
- solar return armature group

Hydraulic schematic BAAE020



Important notices

- The example schematics merely show the basic principle and do not contain all information required for installation. Installation must be carried out according to the conditions on site, dimensioning and local regulations.
- With underfloor heating, a flow temperature monitor must be installed.
- Shut-off devices to the safety equipment (pressure expansion tank, safety valve, etc.) must be secured against unintentional closing!
- Mount bags to prevent single pipe gravity circulation!

TTE-SOL	TopTronic® E solar module
SF	Calorifier sensor
TKO1	Collector sensor 1
T1U	Storage tank sensor
PS1	Solar circuit pump

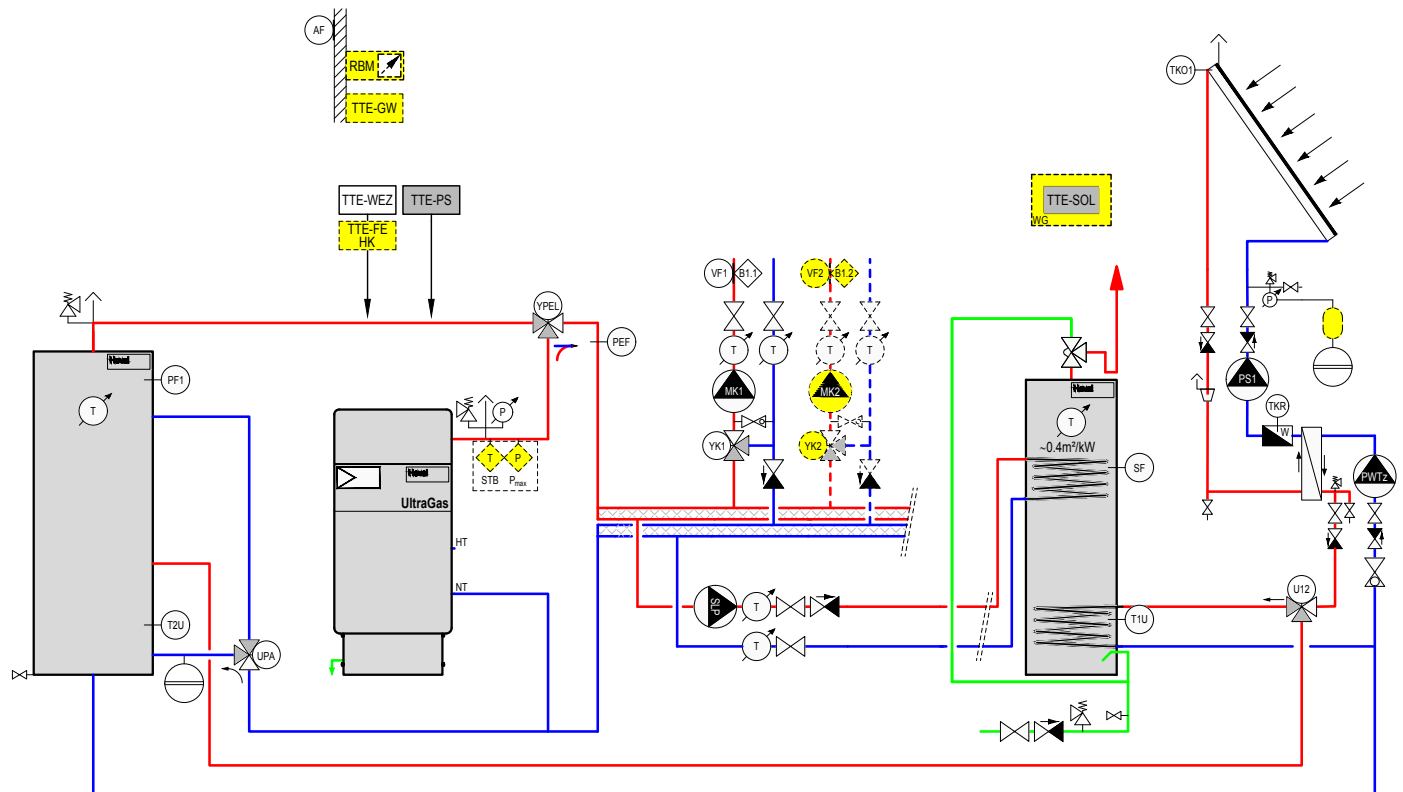
<i>Option</i>	
TTE-BM	TopTronic® E control module
WG	Wall casing
TKR	Return sensor

Partial solar room heating and gas

Solar system for heating and hot water with

- partial solar room heating
- UltraGas®
- discharging mixing valve
- energy buffer storage tank
- calorifier
- 1-2 mixer circuits

Hydraulic schematic HCE010



Important notices

- The example schematics merely show the basic principle and do not contain all information required for installation. Installation must be carried out according to the conditions on site, dimensioning and local regulations.
- With underfloor heating, a flow temperature monitor must be installed.
- Shut-off devices to the safety equipment (pressure expansion tank, safety valve, etc.) must be secured against unintentional closing!
- Mount bags to prevent single pipe gravity circulation!

TTE-WEZ	TopTronic® E basic module heat generator (installed)
TTE-PS	TopTronic® E buffer module
TTE-SOL	TopTronic® E solar module
VF1	Flow temperature sensor 1
B1.1	Flow temperature guard (if required)
MK1	Pump mixer circuit 1
YK1	Actuator mixer 1
AF	Outdoor sensor
SF	Calorifier sensor
TKO1	Collector sensor 1
T1U	Storage tank sensor
PF1	Buffer sensor 1
UPA	Actuator, start load relief (single-wire control)
SLP	Calorifier charging pump
PS1	Solar circuit pump
TKR	Return sensor
PWTz	Pump heat exchanger central
PEF	Buffer discharging sensor
YPEL	Actuator discharging mixer
U12	Switch-over unit storage tank

Option

RBM	TopTronic® E room control module
TTE-GW	TopTronic® E Gateway
WG	Wall casing

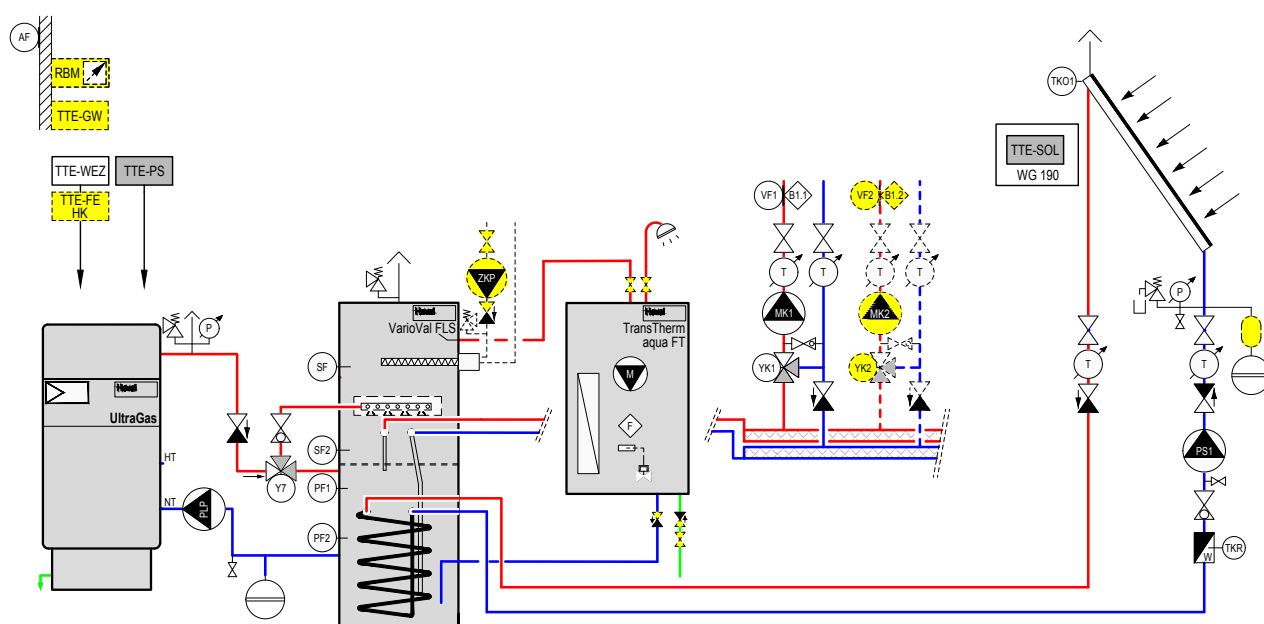
TTE-FE HK	TopTronic® E module expansion heating circuit
VF2	Flow temperature sensor 2
B1.2	Flow temperature guard (if required)
MK2	Pump mixer circuit 2
YK2	Actuator mixer 2

Partial solar room heating and gas

Solar system for heating and domestic hot water with

- partially solar room heating
- UltraGas®
- buffer storage tank integration
- charging control
- VarioVal FLS
- 1-2 mixer circuits
- Solar collectors
- TransTherm aqua FT

Hydraulic schematic HCE110/BABE100



Important notices

- The example schematics merely show the basic principle and do not contain all information required for installation. Installation must be carried out according to the conditions on site, dimensioning and local regulations.
- With underfloor heating, a flow temperature monitor must be installed.
- Shut-off devices to the safety equipment (pressure expansion tank, safety valve, etc.) must be secured against unintentional closing!
- Mount bags to prevent single pipe gravity circulation!

TTE-WEZ	TopTronic® E basic module heat generator (installed)
TTE-PS	TopTronic® E buffer module
TTE-SOL	TopTronic® E solar module
VF1	Flow temperature sensor 1
B1.1	Flow temperature guard (if required)
MK1	Pump mixer circuit 1
YK1	Actuator mixer 1
AF	Outdoor sensor
SF	Calorifier sensor 1
SF2	Calorifier sensor 2
TKO1	Collector sensor 1
Y7	Switching valve
PF1	Buffer sensor 1
PF2	Buffer sensor 2
TKR	Return sensor
PS1	Solar circuit pump
PLP	Buffer charging pump
ZKP	Recirculation pump

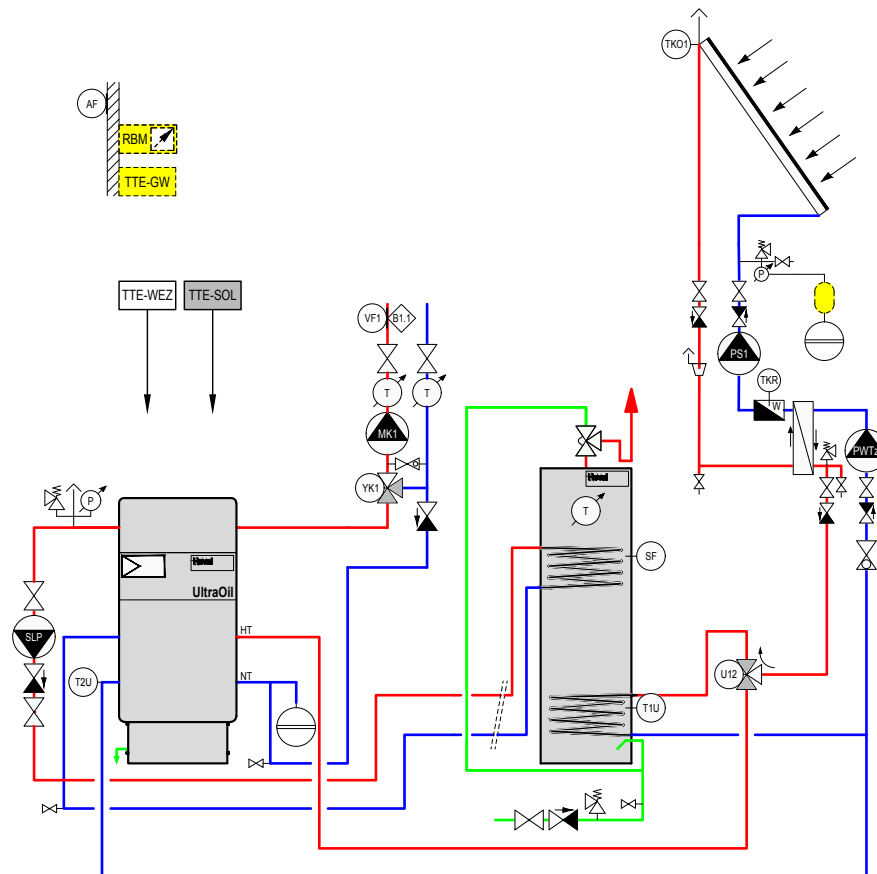
Option

RBM	TopTronic® E room control module
TTE-GW	TopTronic® E Gateway
WG	Wall casing
TKR	Return sensor

TTE-FE HK	TopTronic® E module expansion heating circuit
VF2	Flow temperature sensor 2
B1.2	Flow temperature guard (if required)
MK2	Pump mixer circuit 2
YK2	Actuator mixer 2

Partial solar room heating and gas

Hydraulic schematic BEBE060



Important notices

- The example schematics merely show the basic principle and do not contain all information required for installation. Installation must be carried out according to the conditions on site, dimensioning and local regulations.
- With underfloor heating, a flow temperature monitor must be installed.
- Shut-off devices to the safety equipment (pressure expansion tank, safety valve, etc.) must be secured against unintentional closing!
- Mount bags to prevent single pipe gravity circulation!

TTE-WEZ	TopTronic® E basic module heat generator (installed)
TTE-SOL	TopTronic® E solar module
VF1	Flow temperature sensor 1
B1.1	Flow temperature guard (if required)
MK1	Pump mixer circuit 1
YK1	Actuator mixer 1
AF	Outdoor sensor
SF	Calorifier sensor
TKO1	Collector sensor 1
T1U	Storage tank sensor 1
T2U	Storage tank sensor 2
SLP	Calorifier charging pump
PS1	Solar circuit pump
TKR	Return sensor
PWTz	Pump heat exchanger central
U12	Switch-over unit storage tank
<i>Option</i>	
RBM	TopTronic® E room control module
TTE-GW	TopTronic® E Gateway

Solar armature groups without heat exchanger (direct)

SAG20

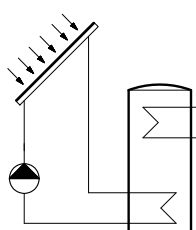
SAG25/32

SAG20 und SAR20

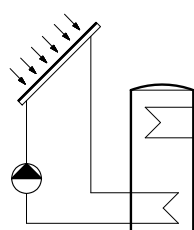

Collector surface	approx. m ²	25	40/100	40
--------------------------	------------------------	----	--------	----

Examples

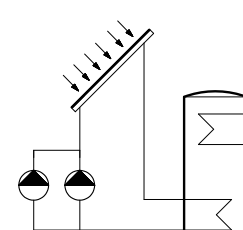
Solar system for hot water



Solar system
with SAG20



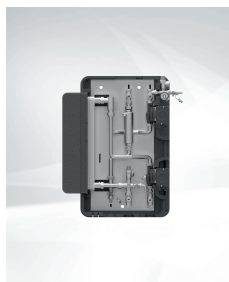
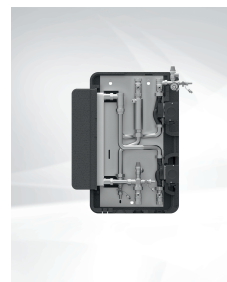
Solar system
with SAG25/32



Solar system
with SAG20 and SAR20
combined for parallel
pump operation

Solar armature groups with heat exchanger

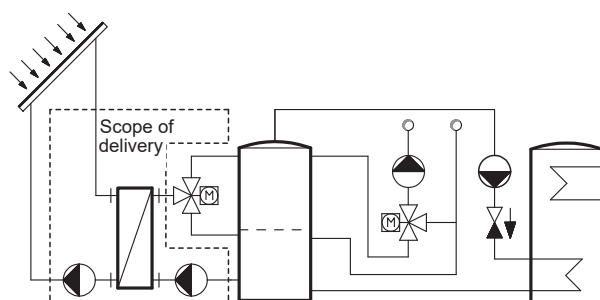
(25)

(50)

(100)

(200)


Collector surface	approx. m ²	25	50	100	150
Heat exchanger	built in	■	■	■	■
Reversing valve	external (option)	■	■	■	■

Example

Solar system for heating and hot water
Storage stratified charge top or centre
with reversing valve



Hoval solar armature group SAG20

- Solar armature group DN 20 (¾")
- Circulating pump included separately
- 2 ball valves (key-operated) with thermometer
- Backflow preventer in the flow and return
- Adjustable flow rate with display (1-20 l/min.) or FlowRotor (0.5-15 l/min.) with PT1000 sensors (only for type FR)
- Permanent air vent AirStop
- Safety device
 - Safety valve (6 bar)
 - Pressure gauge (6 bar)
 - Flexible connection hose made of stainless steel for the pressure expansion tank
- Rinsing and filling unit
- Shapely designed heat damming box made of EPP half shells

Delivery

- Solar armature group packed
- Pump delivered separately packed



**Solar armature/
group/pump**
Type

Continuous flow measurement range
Calibration valve
l/min

FlowRotor
l/min

Speed control



SAG20/SPS 7

1-20

-

• • • •

SAG20/SPS 7 PM2 ¹

1-20

-

• • • •

SAG20FR/SPS 7 PM2 ¹

-

0.5-15

• • • •

¹ Actuation of pump only possible with PWM-capable controller (TopTronic® E)

Hoval solar armature group SAG25/SAG32

- Solar armature group DN 25 (1") / DN 32 (1¼")
- Circulating pump separately packed
- 2 ball valves (key-operated) with thermometer
- Backflow preventer in the flow and return
- Safety device (6 bar)
 - Safety valve (6 bar)
 - Pressure gauge
 - Flexible connection hose made of stainless steel for the pressure expansion tank
- Rinsing and filling unit
- Wall mounting console enclosed separately
- Shapely designed heat damming box made of EPP half shells

Delivery

- Solar armature packed
- Pump delivered separately packed
- Optional calibration valves and air vent available (recommended)



**Solar armature
group/pump**
Type

Continuous flow measurement range
Calibration valve
l/min

FlowRotor
l/min

Speed control



SAG25/SPS 8 PM2

10-40 ¹

1-35 ¹

• • • •

SAG32/SPS 12 PM2

20-70 ¹

5-100 ¹

• • • •

¹ Optional accessory (recommended): calibration valve or FlowRotor

Hoval solar return armature group SAR20

- Solar return armature group DN 20 (¾")
- Circulating pump included separately
- Ball valve (key-operated) with thermometer
- Backflow preventer
- Adjustable flow rate with display (1-20 l/min.) or FlowRotor (0.5-15 l/min.) with PT1000 sensors (only for type FR)
- Safety device
 - Safety valve (6 bar)
 - Pressure gauge (6 bar)
 - Flexible connection hose made of stainless steel for the pressure expansion tank
- Rinsing and filling unit
- Shapely designed heat damming box made of EPP half shells
- Incl. screw connection 1" inner thread for mounting at the calorifier

Delivery

- Solar armature group packed
- Pump delivered separately packed



**Solar return
armature group/pump**
Type

Continuous flow measurement range
Calibration valve
l/min

FlowRotor
l/min

Speed control



SAR20/SPS 7

1-20

-

• • • •

SAR20FR/SPS 7 PM2 ¹

-

0.5-15

• • • •

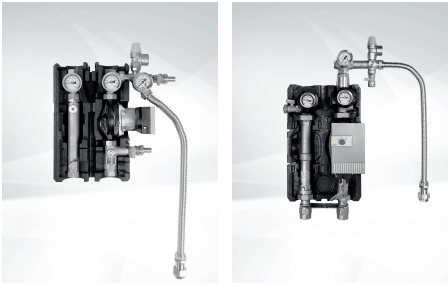
¹ Actuation of pump only possible with PWM-capable controller (TopTronic® E)

FR = integrated volume flow sensor
PWM = variable volume flow possible

Speed control legend

	Δp-v	Variable differential pressure
	ENF	Vent function 10 min.
		PWM control signal solar
	Δp-c	Constant differential pressure

Solar armature groups



Hoval Solar armature groups SAG20/25/32

Solar armature group/pump	Continuous flow measurement range	
	Calibration valve l/min	Flow Rotor l/min
Type		
SAG20/SPS 7	1-20	-
SAG20/SPS 7 PM2 ^{2,3}	1-20	-
SAG20FR/SPS 7 PM2 ^{2,3}	-	0.5-15
SAG25/SPS 8 PM2 ²	10-40 ¹	1-35 ¹
SAG32/SPS 12 PM2 ²	20-70 ¹	5-100 ¹

6049 478
6049 479
6049 480
6040 930
6040 931



Hoval Solar return armature groups SAR20

Solar return armature group/pump	Continuous flow measurement range	
	Calibration valve l/min	Flow Rotor l/min
Type		
SAR20/SPS 7	1-20	-
SAR20FR/SPS 7 PM2 ³	-	0.5-15

6049 481
6049 482

¹ Optional accessory (recommended): calibration valve or FlowRotor
² with PWM interface
³ Actuation of pump only possible with PWM-capable controller (TopTronic® E)

FR = integrated volume flow sensor

Accessories

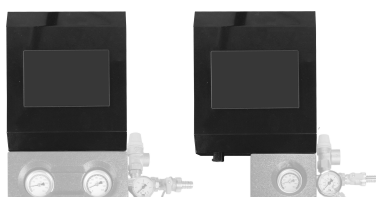


Solar controller set WM complete

for wall mounting
consisting of a black housing incl.
TopTronic® E solar module
1x immersion sensor TF/2P/5/6T, L = 5 m
1x collector sensor TF/1.1P/2.5S/5.5T,
L = 2.5 m
Basic connector set
Blind cover for control module cut-out
incl. wall mounting material

TopTronic® E control module as an option

6027 257



Solar controller set AG complete

for mounting on regulating armature
SAG20 or SAR20
consisting of a black housing incl.
TopTronic® E solar module
1x immersion sensor TF/2P/5/6T, L = 5 m
1x collector sensor TF/1.1P/2.5S/5.5T,
L = 2.5 m
Basic connector set
Blind cover for control module cut-out

TopTronic® E control module as an option

6037 492



TopTronic® E control module black

- For operation of all controller modules connected to the bus system (basic, solar, buffer modules, ecc.)
- Connection to the Hoval Bus system by RJ45 plug connection or plug-in terminals (max. 0.75 mm²)
- Flat design with flexible mounting option
- Mounting
 - in the control panel of the heat generator,
 - in the Hoval wall casing,
 - on the front of the control panel
- Colour touchscreen 4.3 inch with black high-gloss trim
- Customer-specific configuration of the start-up screen
- Display of the current weather or weather forecast (only possible in combination with HovalConnect)

Consisting of:

- TopTronic® E control module black
- clamping device set for control module
- RJ45 Rast-5 CAN cable, L = 500

6043 844

Accessories



Calibration valve TN

As regulating and shut-off valve with direct display of the flow rate on the sight glass.
Max. working temperature: 185 °C

DN	Measuring range [l/min]	Connection Rp x Rp	kvs
20	2-12	3/4" x 3/4"	2.2
20	8-30	3/4" x 3/4"	5.0
25	10-40	1" x 1"	8.1
32	20-70	1 1/4" x 1 1/4"	17.0

2038 034
2038 035
2038 036
2038 037



FlowRotor kit

for performance related control, system monitoring and heat metering
Consisting of:

Proximity-type volume flow sensor and PT1000 sensors

Pre-assembled ready for connection, sensor cable included

Operating temperature: max. 120 °C

DN 20: can be installed in the insulation of an SAG/SAR20

DN25/32: can be installed under an SAG25/32

DN	Measuring range [l/min]	Connection
20	0.5-15	3/4"
25	1-35	1"
32	5-100	1 1/4"

6037 631
6037 632
6037 693



Permanent air vent AirStop

for permanent degassing.

Manual exhaust valve.

Installation in the collector flow.

Connections: top R 3/4", bottom Rp 3/4"

Connections: top R 1", bottom Rp 1"

641 311
641 463



Permanent air vent

With high air separation performance due to filter of stainless steel.

For permanent degassing.

Installation in horizontal pipes of the collector return.

Max. operating temperature 160 °C

Max. operating pressure PN 10

Type	kvs m³/h	Application limit l/min
3/4"	10.0	23
1"	28.1	35
1 1/4"	48.8	58

6014 392
6031 803
6031 804



Solar flow armature group SVS20
to prevent unwanted circulation in the
flow of the solar installations.
Ball valve made of brass with adjustable
gravity brake, thermometer 0-160 °C,
wall mounting set

Part No.

6015 058



Connection set VS-DSA 20
Set for connection (parallel connection)
of two solar armature groups
Consisting of:
- pipe connection
- screwings and insulation

6021 159



Clamping ring connector
for the connection of solar armature groups
DN 20 (¾"), self-sealing with O-ring,
metallic clamping ring and stilt sleeve.
Applicable up to 150 °C.
Connection ¾" outer thread x 15 mm
Connection ¾" outer thread x 18 mm
Connection ¾" outer thread x 22 mm

6010 055
6010 056
6010 057



Straight-way ball valve VAG60..
DN 15-25, PN 16, 120 °C
• Brass straight-way ball valve
with threaded connection
• incl. seals and screw connections

DN	Connection Valve	Connection Fitting	kvs m³/h	Ḃ [m³/h] at ΔP 50 mbar
15	G 1"	Rp ½"	9	2.01
20	G 1¼"	Rp ¾"	17	3.80
25	G 1½"	Rp 1"	22	4.92

6046 579
6046 580
6046 581



<i>Suitable motor drive</i>				
Type	Voltage	Control signal	Actua- tor run time	
GLB341.9E	230 V / 50/60 Hz	2/3-point	150 s	

2070 331

Accessories



Switching ball valve VBI60...L

DN 15-32, PN 40, -10...120 °C

- Ball valve body made of brass
- Connections with internal thread Rp acc. to ISO 7-1
- Leakage rate: 0...0.0001% of Kvs value

DN	Connection	kvs m³/h
15	Rp ½"	5
20	Rp ¾"	9
25	Rp 1"	9
32	Rp 1¼"	13

6052 422
6052 443
6052 444
6052 445



Suitable motor drive

Type	Voltage	Control signal	Actua- tor run time
GLB341.9E	230 V / 50/60 Hz	2-/3-point	150 s

2070 331



Thermostatic water mixer TM200

3-way-mixing valve for regulating of the water temperature

Material: brass

Connection dimension R ¾"

Hot water temperature max. 90 °C

Adjustment range 30-60 °C

Flow rate 27 l/min (at delta p = 1 bar)

Flow coefficient value (kvs) 1.62 m³/h

2005 915



Thermostatic mixing valve JRG

3-way mixing valve, made of brass, for regulating of the water temperature.

Hot water max. 90 °C

Adjusting range 45-65 °C

Factory setting for: 55 °C

Pressure: PN 10

Connections: outer thread (JRG 25-50)

Flanges (JRG 65)

incl. screwed joint

Type	Dimension	Connection size	kvs value m³/h
JRG 25	1"	1½"	4.0
JRG 32	1¼"	2"	8.5
JRG 40	1½"	2¼"	12.0
JRG 50	2"	2¾"	16.0
JRG 65	DN 65	DN 65	28.0

2061 407
2061 408
2061 409
2061 410
2038 638



Freeze protection mixture
PowerCool DC 923-PXL
on basis propylene glycol
mixed with softened water
with corrosion protection
Frost protection: up to -23 °C
Content plastic container: 30 kg

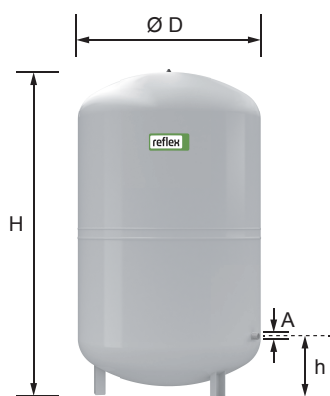
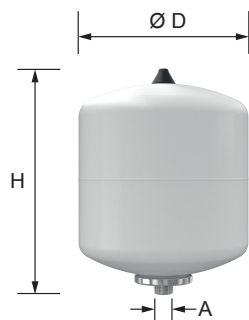
2054 403



Freeze protection concentrate
PowerCool DC 924-PXL
on basis propylene glycol
completely mixable with water
with corrosion protection
Frost protection: -20 °C with
40 % mixture ratio
Content plastic container: 10 kg

2009 987

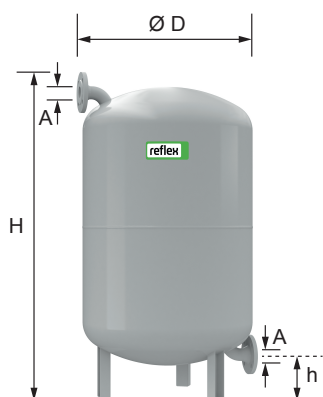
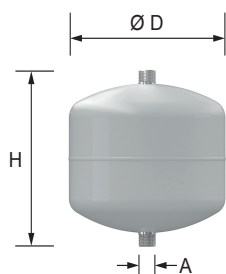
Hoval pressure expansion tanks


Reflex S

Especially for solar installations and also for heating and cooling water systems. For anti-freeze additive up to 50 %. Permitted operating pressure 10 bar. Permitted operating temperature of vessel/diaphragm 120 °C/70 °C. Type S 8-25 for wall installation with clamping band (clamping band see accessories) Type S 33 for wall installation with lugs. Type S 50-600 with feet.

Reflex type	Ø D mm	H mm	h mm	A
S 8	206	335	-	G ¾"
S 12	280	300	-	G ¾"
S 18	280	410	-	G ¾"
S 25	280	520	-	G ¾"
S 33	354	455	-	G ¾"
S 50	409	469	158	R ¾"
S 80	480	565	166	R 1"
S 100	480	670	166	R 1"
S 140	480	941	166	R 1"
S 200	634	758	205	R 1"
S 250	634	888	205	R 1"
S 300	634	1092	235	R 1"
S 400	740	1102	245	R 1"
S 500	740	1321	245	R 1"
S 600	740	1559	245	R 1"

2006 634
2006 635
2006 636
2006 637
2006 638
2006 639
2006 640
2006 641
2017 376
2006 642
2017 384
2006 643
2017 385
2006 644
2017 386


Reflex V

In-line vessel made of sheet steel, from Reflex V 40 on feet. Designed for operating pressures up to 10 bar. Type V 6-20 for wall installation with clamping band (clamping band see accessories).

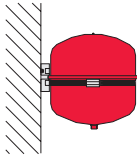
Reflex type	Ø D mm	H mm	h mm	A
V 6	206	244	-	R ¾"
V 12	280	287	-	R ¾"
V 20	280	360	-	R ¾"
V 40	409	562	113	R 1"
V 60	409	732	172	R 1"
V 200	634	901	142	DN 40/PN 16
V 300	634	1201	142	DN 40/PN 16
V 350	640	1341	210	DN 40/PN 16

2032 084
2032 085
2032 086
2057 249
2006 864
242 824
242 825
242 827

Further information

see "Various system components"

Accessories



Console with strap-on band
for Reflex NG 8-25, S 8-25, V 6-20
vertical installation
container connection upwards or
downwards

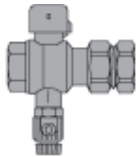
242 878



Chamber con-
nection side
anschlusseite

Quick connection SU R 3/4" x 3/4"
for diaphragm-type expansion chambers in
closed heating and cooling water plants.
With shut-off valve against unintended
closing (check ball) and drain according
to DIN 4751 Part 2,
tested by TÜV
Connection R 3/4"
PN 10/120 °C

242 771



Chamber con-
nection side
anschlusseite

Quick connection SU R 1" x 1"
for diaphragm-type expansion chambers in
closed heating and cooling water plants.
With shut-off valve against unintended
closing (check ball) and drain according
to DIN 4751 Part 2
tested by TÜV
Connection R 1" PN10/120 °C

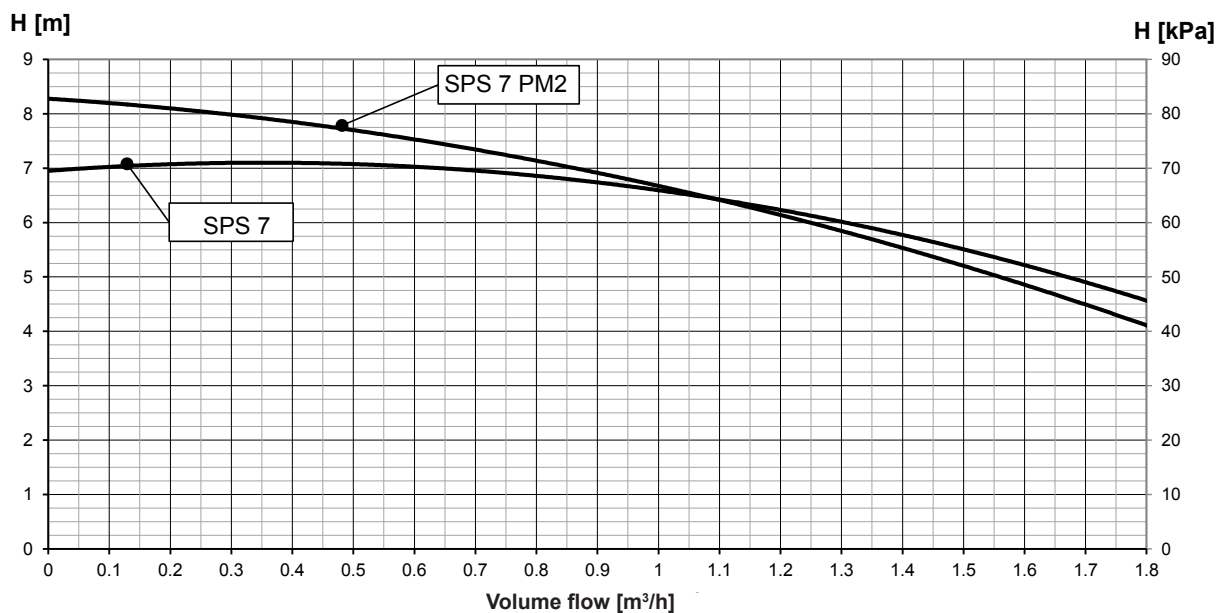
242 772

Solar armature groups

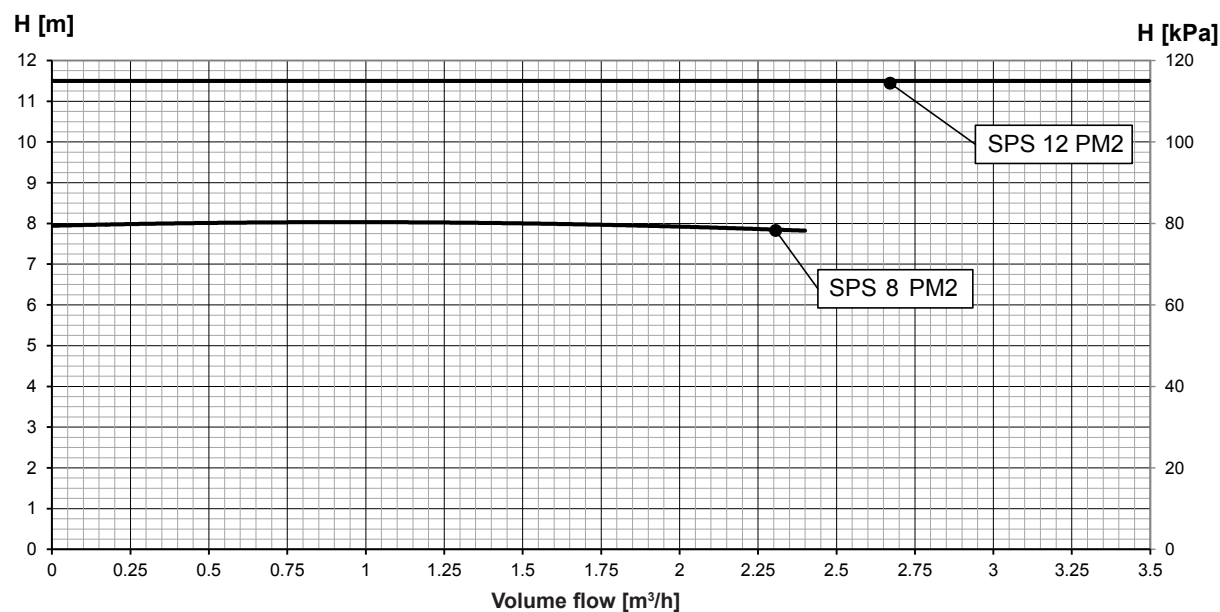
Type			SAR20	SAR20FR	SAG20	SAG20	SAG20FR	SAG25	SAG32
• Pump			SPS 7	SPS 7 PM2	SPS 7	SPS 7 PM2	SPS 7 PM2	SPS 8 PM2	SPS 12 PM2
• Voltage			1 x 230 V	1 x 230 V	1 x 230 V	1 x 230 V	1 x 230 V	1 x 230 V	1 x 230 V
• Maximum power consumption			45 W	45 W	45 W	45 W	45 W	130 W	310 W
• Maximum current			0.44 A	0.44 A	0.44 A	0.44 A	0.44 A	0.95 A	1.37 A
• Flow measuring range	Calibration valve	l/min	1-20	-	1-20	1-20	-	10-40 ¹	20-70 ¹
	FlowRotor	l/min	-	0.5-15	-	-	0.5-15	1-35 ¹	5-100 ¹
• Maximum pressure		bar	6	6	6	6	6	6	6
• Maximum temperature temporary		°C	110	110	110	110	110	110	110

* Optional accessory (recommended): calibration valve or FlowRotor

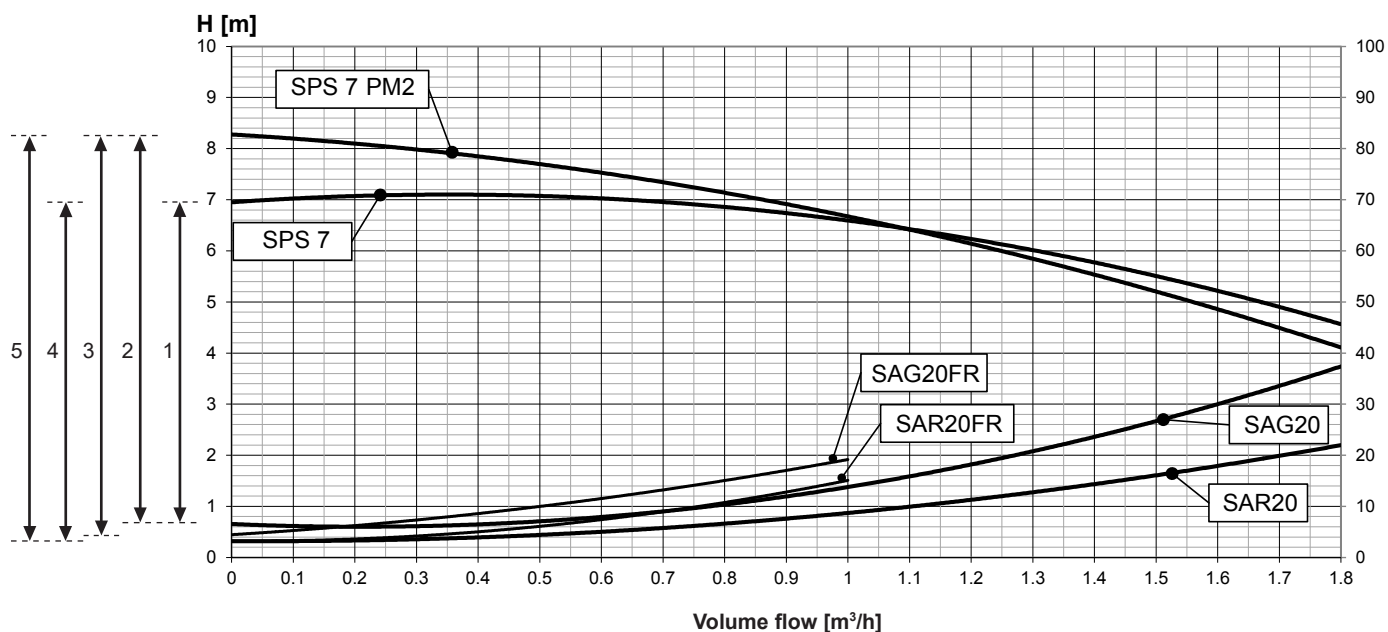
Pump characteristic curves SAG20 and SAR20



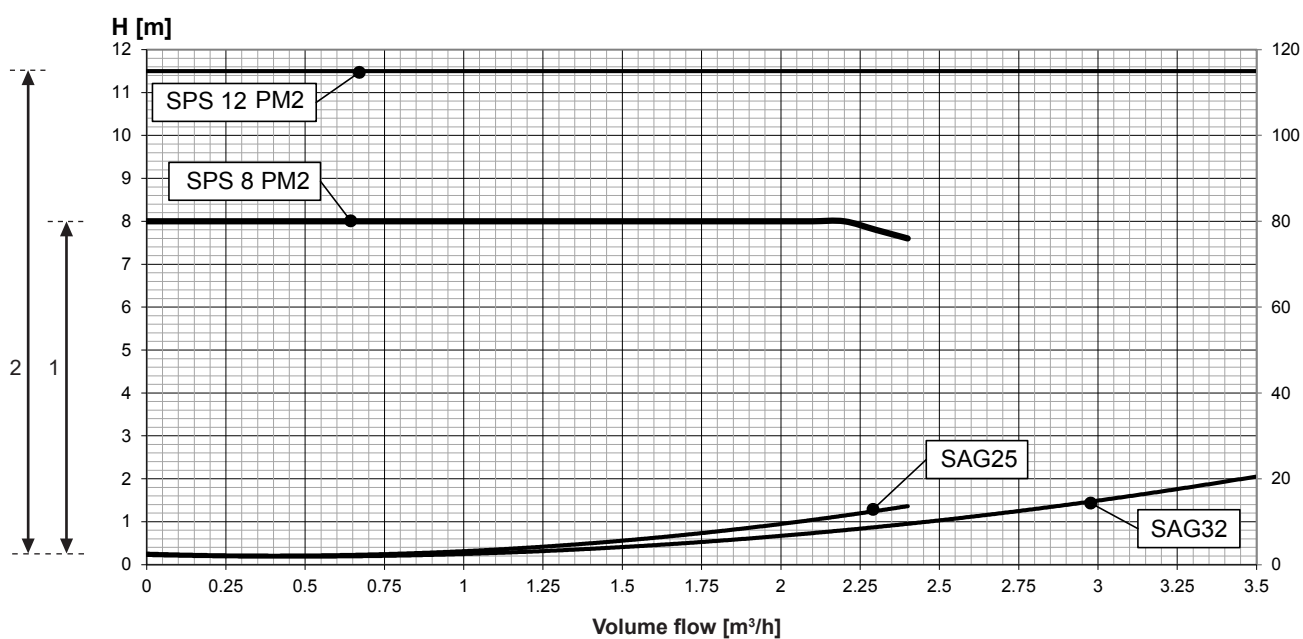
Pump characteristic curves SAG25 and SAG32



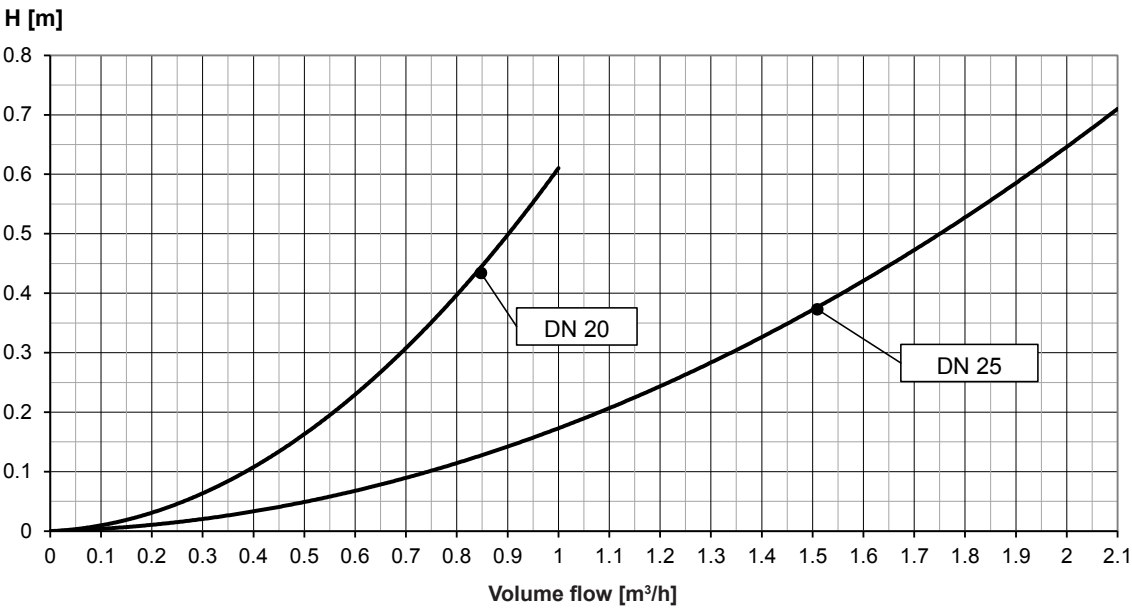
Residual overpressure SAG20, SAG20FR, SAR20 and SAR20FR



Residual overpressure SAG25 and SAG32



Pressure drop FlowRotor DN 20 and DN 25

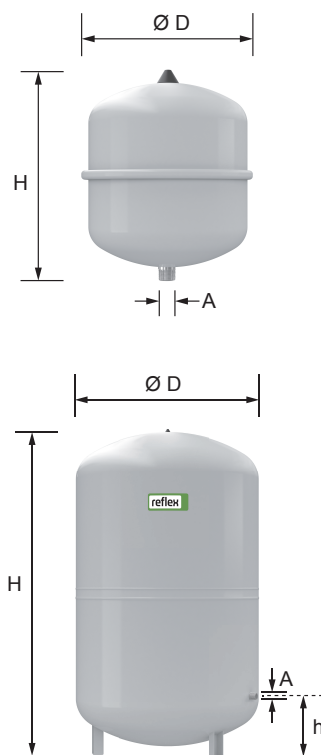


Expansion chambers Reflex

Reflex S

- For solar, heating and cooling water systems
- Vessel nominal volume 8-600 L
- For anti-freeze additive up to 50 %
- Permissible operating overpressure 10 bar
- Permissible operating temperature container/diaphragm 120 °C/70 °C
- Type S8-S33 for wall installation
- Type S50-S80 with feet

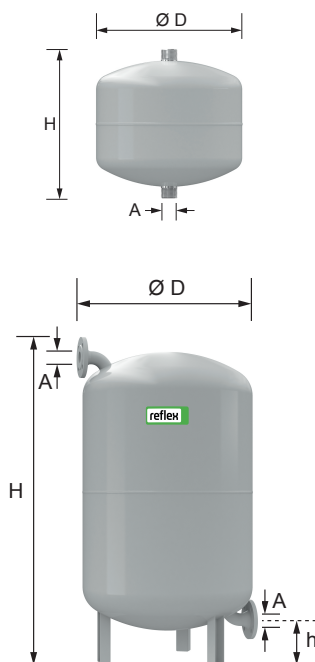
Type 10 bar/120 °C	Weight kg	Ø D mm	H mm	h mm	A	Pre-pressure bar
S 8	2.5	206	316	-	G ¾"	1.5
S 12	2.5	280	300	-	G ¾"	1.5
S 18	3.2	280	374	-	G ¾"	1.5
S 25	4.5	280	496	-	G ¾"	1.5
S 33	6.3	354	455	-	G ¾"	1.5
S 50	9.5	409	469	158	R ¾"	3.0
S 80	14.6	480	538	166	R 1"	3.0
S 100	15.5	480	644	166	R 1"	3.0
S 140	17.4	480	941	166	R 1"	3.0
S 200	35.6	634	758	205	R 1"	3.0
S 250	40.8	634	888	205	R 1"	3.0
S 300	47.0	634	1092	235	R 1"	3.0
S 400	61.0	740	1102	245	R 1"	3.0
S 500	72.0	740	1321	245	R 1"	3.0
S 600	87.0	740	1559	245	R 1"	3.0



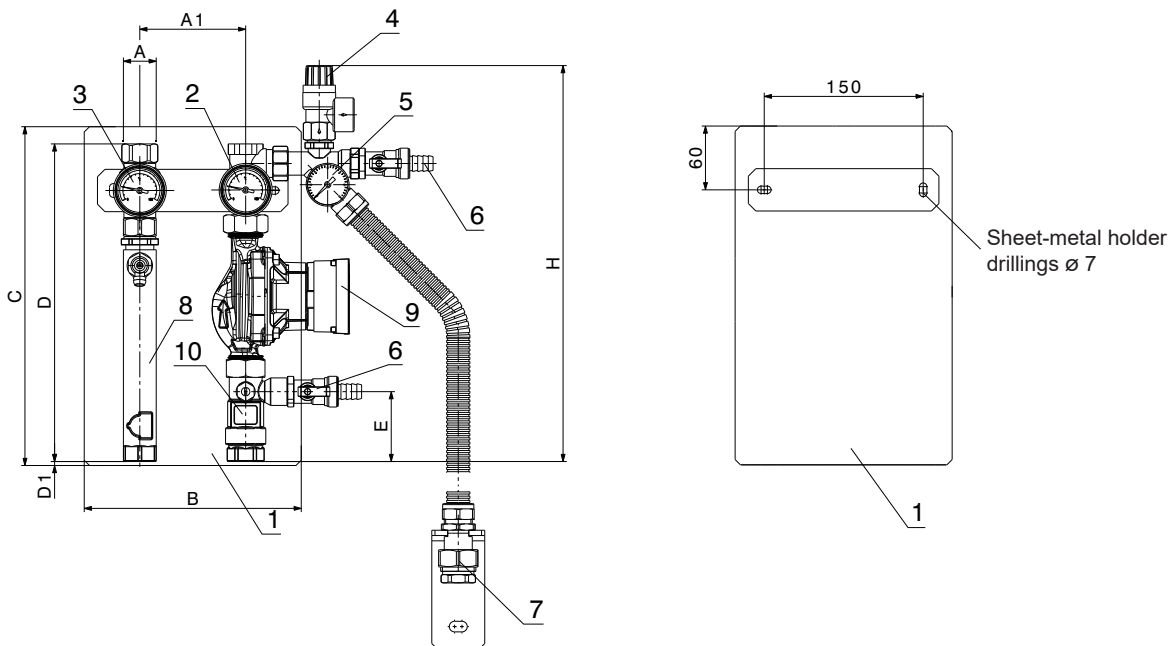
Reflex V

- Intermediate tank made of sheet steel from Reflex V 40 on feet
- Required for installations with return temperatures > 70 °C
- Use also as buffer storage tank
- Permitted operating temperature 120 °C and for operating pressures up to 10 bar

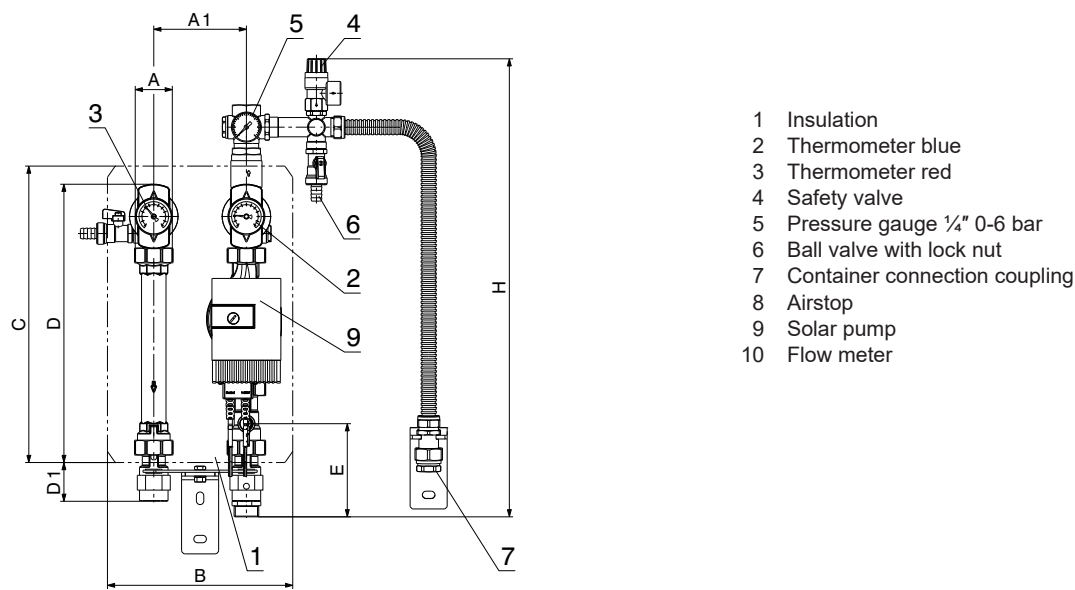
Type 10 bar/120 °C	Weight kg	Ø D mm	H mm	h mm	A
V 6	2.0	206	244	-	R ¾"
V 12	3.0	280	287	-	R ¾"
V 20	4.0	280	360	-	R ¾"
V 40	7.8	409	562	113	R 1"
V 60	23.0	409	732	172	R 1"
V 200	43.0	634	901	142	DN 40/PN 16
V 300	48.0	634	1201	142	DN 40/PN 16
V 350	51.0	640	1341	210	DN 40/PN 16



Solar armature group SAG20



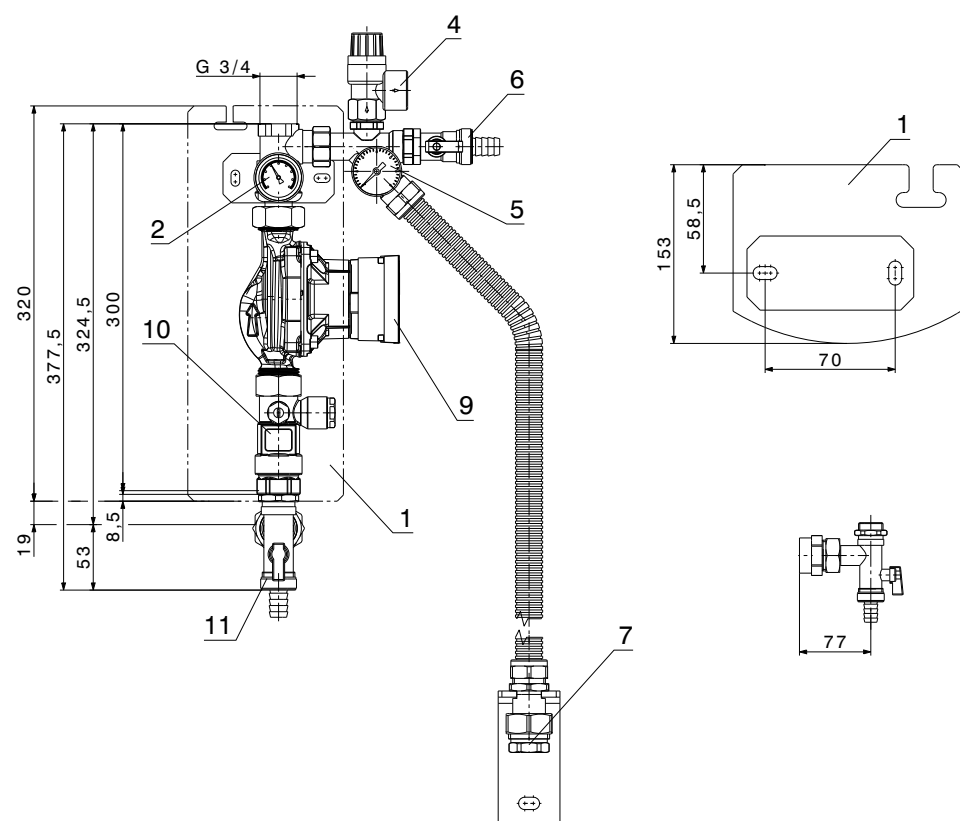
Solar armature group SAG25/32



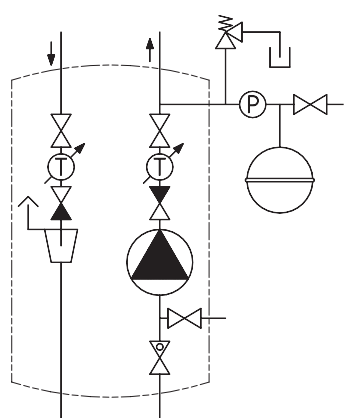
Wall mounting SAG 25/32
Bracket with variably adjustable distance to the wall

Type	A	A1	B	C	D	D1	E	H
DN 20	Rp 3/4"	100	205	320	300	7	66	371
DN 25	Rp 1"	125	250	380	340	89	172	744
DN 32	Rp 1 1/4"	125	250	440	400	52	126	618

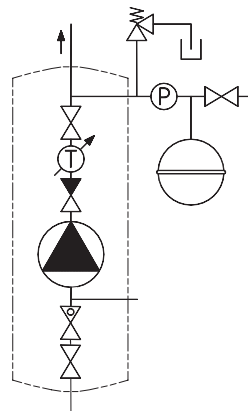
Solar return armature group SAR20



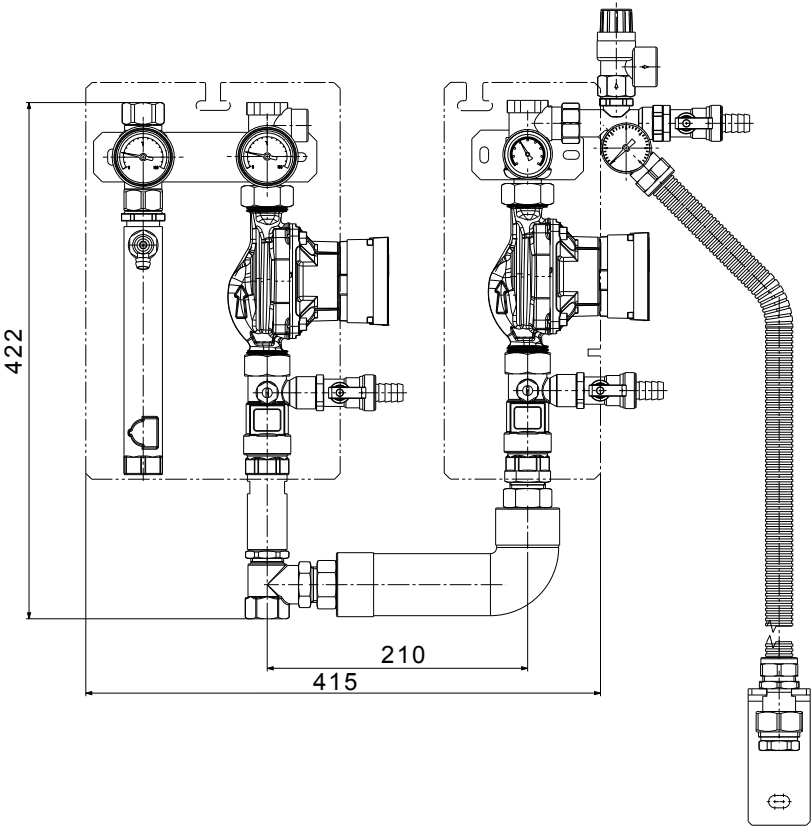
Schematic diagram
of the solar armature group
SAG20



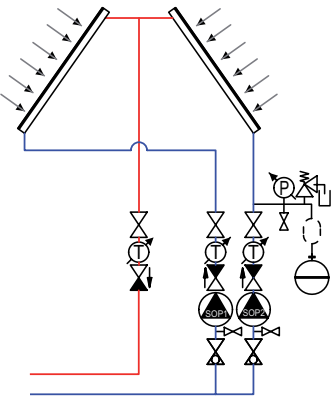
Schematic diagram
of the solar return armature group
SAR20



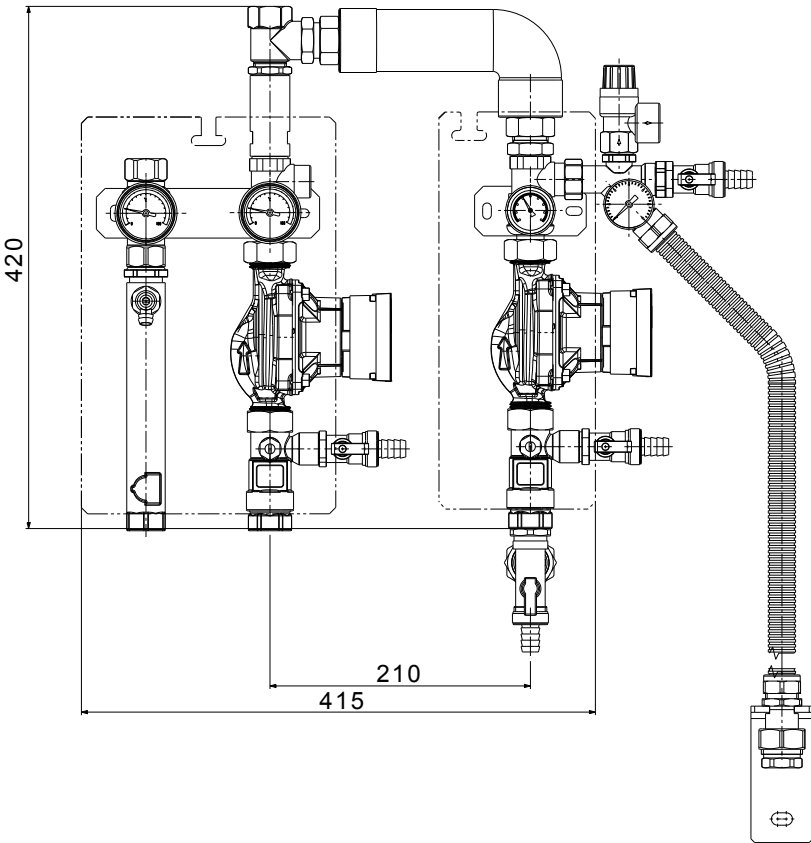
Connection set VS-DSA 20
Connection of two solar armature groups bottom



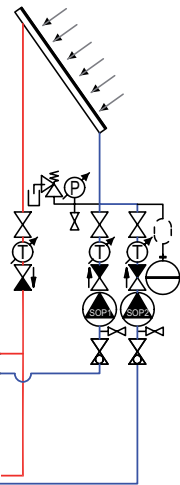
Schematic diagram



Connection set VS-DSA 20
Connection of two solar armature groups top

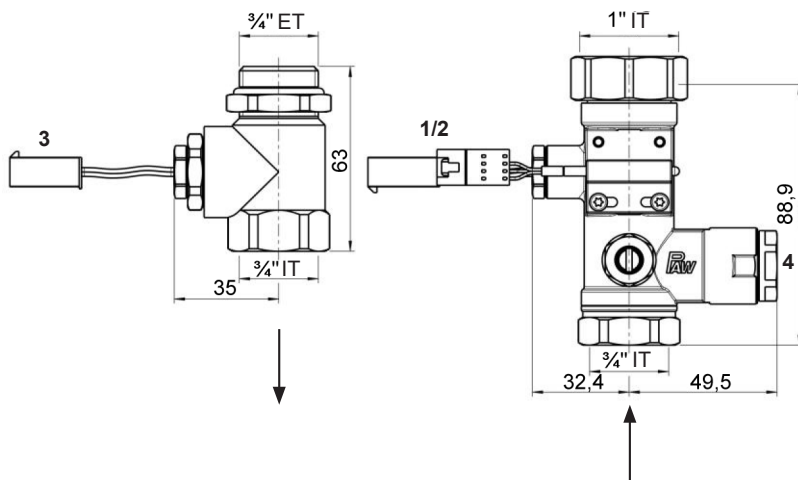


Schematic diagram



Kit FlowRotor

(Dimensions in mm)



- 1 Flow rate sensor
- 2 Temperature sensor for heat metering
- 3 Temperature sensor for heat metering
- 4 Flushing port

Dimensioning guidelines for expansion tanks of solar plants in the small range

The expansion tank is used for accommodating the expansion in volume of the heat carrier fluid in the solar circuit. Its size must be selected according to the applicable design regulations for expansion tanks.

If there is a possibility of the plant operating in standby mode for a long period, i.e. without heat output, it is necessary for the expansion tank to be able to hold the entire content of the collector array in addition to the expansion volume.

Circuit

The expansion tank must be arranged with a safety valve in the return to the collector which cannot be blocked off, as a result of which there is bound to be follow-up pressure maintenance, i.e. integration of the expansion tank on the pressure side of the circulating pump.

Selected example - solar installation, safety valve 6 bar:

Installation with 6 UltraSol® 2 collectors vertical
System height 15 m

Take account of the following for the effective expansion volume in litres:

- Volume: Collector field volume and flow at 100 %
Plant volume at 10 %
incl. heat exchanger
- Useful volume of the pressure expansion tank depending on the system height.

6 vertical UltraSol® 2 collectors of	2.5 litres	at 100 %	15.2 l
Flow	12.5 litres	at 100 %	12.5 l
Return	12.5 litres	at 10 %	1.25 l
Heat exchanger	37 litres	at 10 %	3.7 l
Expansion volume			32.63 l

Min. preliminary pressure:

System height + 0.3 bar = 1.8 bar (18 m)

In the table, select the next-higher

preliminary pressure: 2 bar

If the expansion tank is connected on the pressure side of the pump, the pressure value of the pump must be included in calculation to prevent cavitation.

System height + pump pressure + 0.3 bar

selected:

pressure expansion tank type Reflex NG 80/6

Intermediate tank (if $t_R > 70^\circ\text{C}$!)

Contents collectors = 15.2 litres

selected: intermediate tank type **V20**

Execution:

A system-based configuration is mandatory!

Selection table Reflex NG/N/S

		with safety valve 6 bar Capacity V_N of the empty expansion tank in litres with a pre-pressure of					
Type		1.5 bar	2 bar	2.5 bar	3 bar	3.5 bar	4 bar
18/6	L	8	6	5	4	2	1
25/6	L	12	10	8	6	4	3
35/6	L	17	15	13	10	7	5
50/6	L	26	22	19	15	12	8
80/6	L	41	36	31	26	20	15
100/6	L	51	45	38	32	26	19
140/6	L	72	63	54	45	36	27
200/6	L	103	90	77	64	51	38
250/6	L	128	112	96	80	64	48
300/6	L	154	135	115	96	77	58
400/6	L	205	180	154	128	103	77
500/6	L	256	224	192	160	128	96
600/6	L	308	269	231	192	154	115
800/6	L	410	359	308	256	205	154
1000/6	L	513	449	385	321	256	192
Maximum possible system height*		12 m	17 m	22 m	27 m	32 m	37 m

* System height = middle of pressure expansion tank up to the uppermost point on the heating system / solar installation

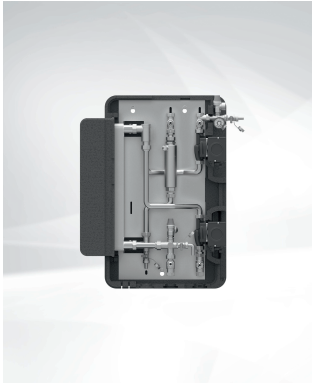
Hoval Solar charging modules

TransTherm solar (25), DN 20 (¾")
TransTherm solar (50), DN 20 (¾")
TransTherm solar (100), DN 25 (1")
TransTherm solar (200), DN 40 (1½")

- Solar charging module for the transfer of heat from the primary circuit (solar circuit) to the secondary circuit (energy buffer storage tank; secondary side not suitable for direct domestic water heating)
- Circulating pump pre-installed for primary and secondary circuit
- Flow rate sensor FlowRotor with PT1000 sensors installed in the primary circuit
- Tacosetter installed in secondary circuit
- TransTherm solar (25):
4 ball valves with thermometer
- TransTherm solar (50,100,200):
4 ball valves
- Gravity brake in flow and return of primary circuit and in return of secondary circuit
- Stainless steel plate heat exchanger
- Permanent exhaust valve AirStop
- Safety devices:
 - safety valve (6 bar) for the primary circuit
 - pressure gauge
 - flexible connection hose made of stainless steel for the membrane pressure expansion tank and
 - safety valve for the secondary circuit
 - TransTherm solar (25): 3 bar
 - TransTherm solar (50,100,200): 6 bar
- Rinsing and filling unit
- Heat damming box made of EPP half shells
- Wall mounting plate

Delivery

- Solar charging module packed



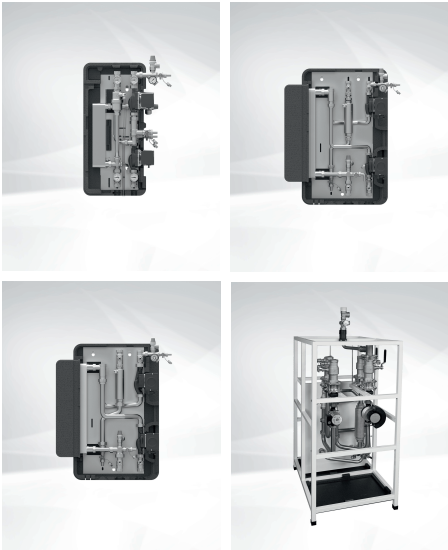
Solar charging modules

TransTherm solar

Type	Possible measuring range l/min	Pump primary circuit Type	Pump secondary circuit Type
(25)	0.5-15	PM2 15-145	PM2 15-65
(50)	0.5-15	PM2 15-145	PM2 15-65
(100)	1-35	PML 25-145	UPM2 25-75
(200)	5-100	UPM XL 25-125	UPML 25-105

¹ variable volume flow possible (PWM)

Solar heat transfer stations



Hoval Solar charging modules

Trans Therm solar Type	Possible measuring range l/min	Pump primary circuit Typ	Pump secondary circuit Typ
(25)	0.5-15	PM2 15-145 ¹⁾	PM2 15-65 ¹⁾
(50)	0.5-15	PM2 15-145 ¹⁾	PM2 15-65 ¹⁾
(100)	1-35	PML 25-145 ¹⁾	UPM2 25-75 ¹⁾
(200)	5-100	UPM XL 25-125 ¹⁾	UPML 25-105 ¹⁾

Part No.

6037 694
6037 695
6037 696
6037 697

¹⁾ variable volume flow possible (PWM);
FlowRotor installed in the primary circuit
Optional accessories secondary circuit
(recommended): FlowRotor or balancing valve
Actuation of pump only possible with
PWM-capable controller (TopTronic® E)

Accessories



Solar balancing valve with bypass

As a line balancing and shut-off valve with direct indication of the set flow rate on the sight glass.

Max. operating temperature 185 °C

DN	Measuring range [l/min]	Connection Rp x Rp	kvs
20	2-12	¾" x ¾"	2.2
20	8-30	¾" x ¾"	5.0
25	10-40	1" x 1"	8.1
32	20-70	1¼" x 1¼"	17.0

2038 034
2038 035
2038 036
2038 037



FlowRotor kit

for performance related control, system monitoring and heat metering

Consisting of:

Proximity-type volume flow sensor and PT1000 sensors

Pre-assembled ready for connection, sensor cable included

Operating temperature: max. 120 °C

DN 20: can be installed in the insulation of an SAG/SAR20

DN25/32: can be installed under an SAG25/32

DN	Measuring range [l/min]	Connection
20	0.5-15	¾"
25	1-35	1"
32	5-100	1¼"

6037 631
6037 632
6037 693



Permanent air vent AirStop

for permanent degassing.

Manual exhaust valve.

Installation in the collector flow.

Connections: top R ¾", bottom Rp ¾"

Connections: top R 1", bottom Rp 1"

641 311
641 463



Switching ball valve VBI60...L

DN 15-40, PN 40, -10...120 °C

- Ball valve body made of brass
- Connections with internal thread Rp acc. to ISO 7-1
- Leakage rate: 0...0.0001 % of Kvs value

DN	Connection	kvs m³/h
15	Rp ½"	5
20	Rp ¾"	9
25	Rp 1"	9
32	Rp 1¼"	13
40	Rp 1½"	25

6052 422
6052 443
6052 444
6052 445
6052 446



Suitable motor drive

Type	Voltage	Control signal	Actuator run time
------	---------	----------------	-------------------

GLB341.9E 230 V / 50/60 Hz 2-/3-point 150 s

2070 331

Further accessories

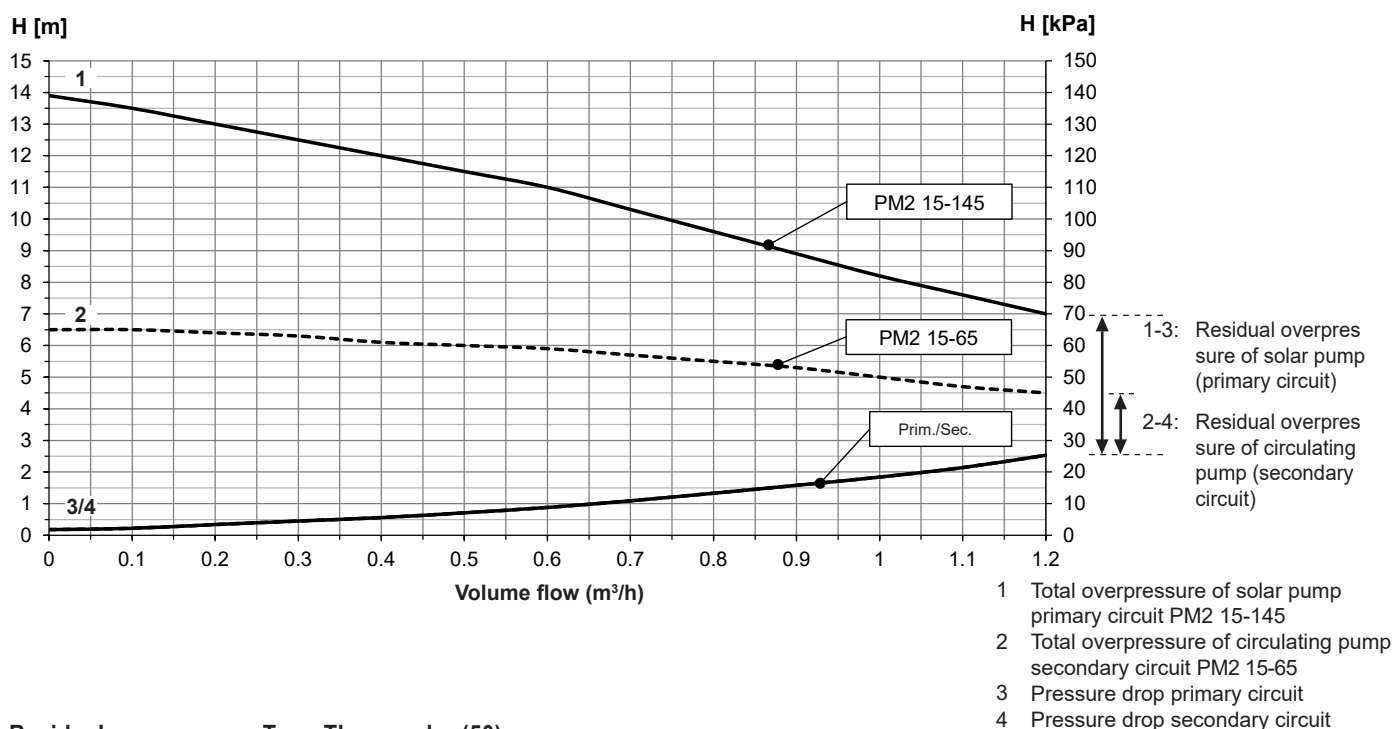
see chapter "TopTronic® E solar module", "Solar armature groups" resp. "System components"

TransTherm solar (25-200)

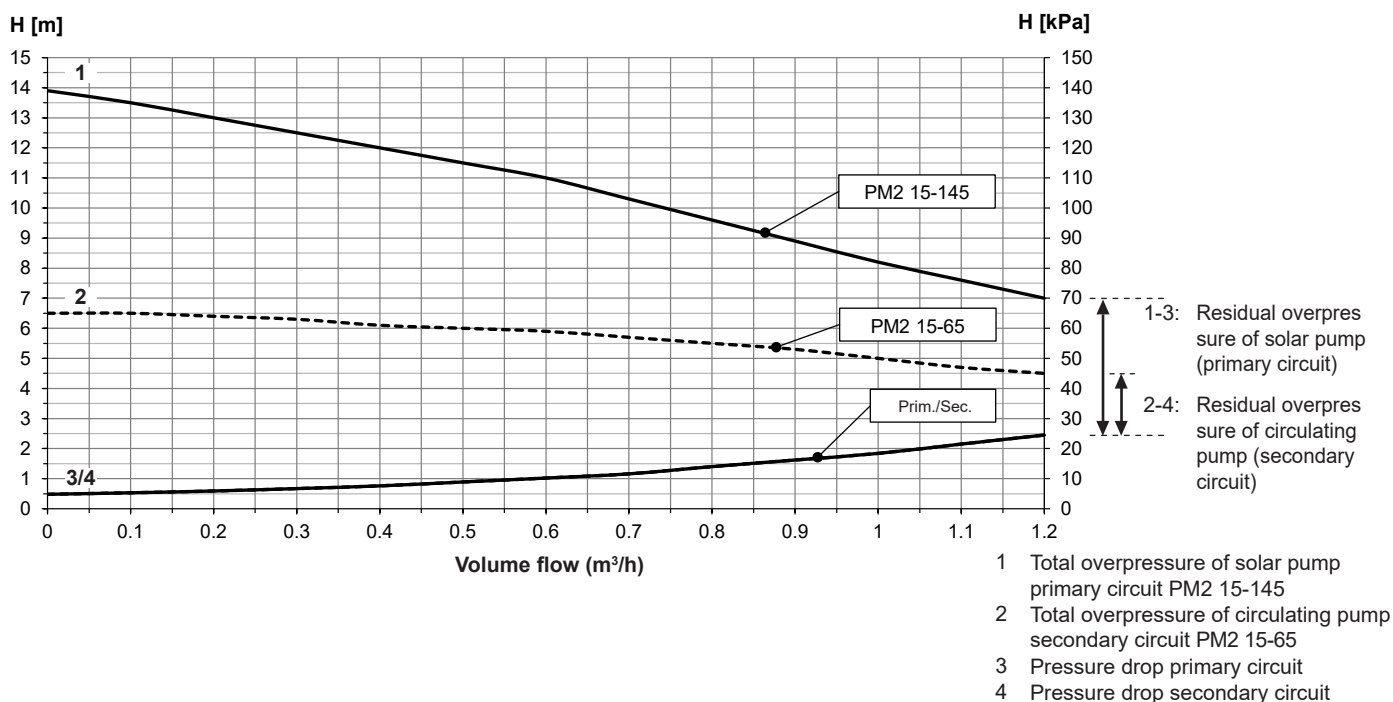
Type		(25)	(50)	(100)	(200)
Pump - primary/secondary circuit		PM2 15-145/ PM2 15-65	PM2 15-145/ PM2 15-65	PML 25-145/ UPM2 25-75	UPM XL 25-125/ UPML 25-105
Voltage	V	1x230	1x230	1x230	1x230
Max. power consumption - primary/secondary circuit	W	69/48	69/48	140/70	180/140
Max. current - primary/secondary circuit	A	0.68/0.4	0.68/0.4	1.18/0.52	1.4/1.1
Max. pressure - primary/secondary circuit	bar	6/3	6/6	6/6	6/6
Max. temperature - primary/secondary circuit	°C	120/95	120/95	120/95	120/95
Max. temperature temporary primary/secondary circuit	°C	160/120	160/120	160/120	160/120
Flow measuring range	l/min	0.5-15 ¹	0.5-15 ¹	1-35 ¹	5-100 ¹
Collector surface up to approx.	m²	25	50	100	150

¹ Optional accessories secondary circuit (recommended): balancing valve or FlowRotor

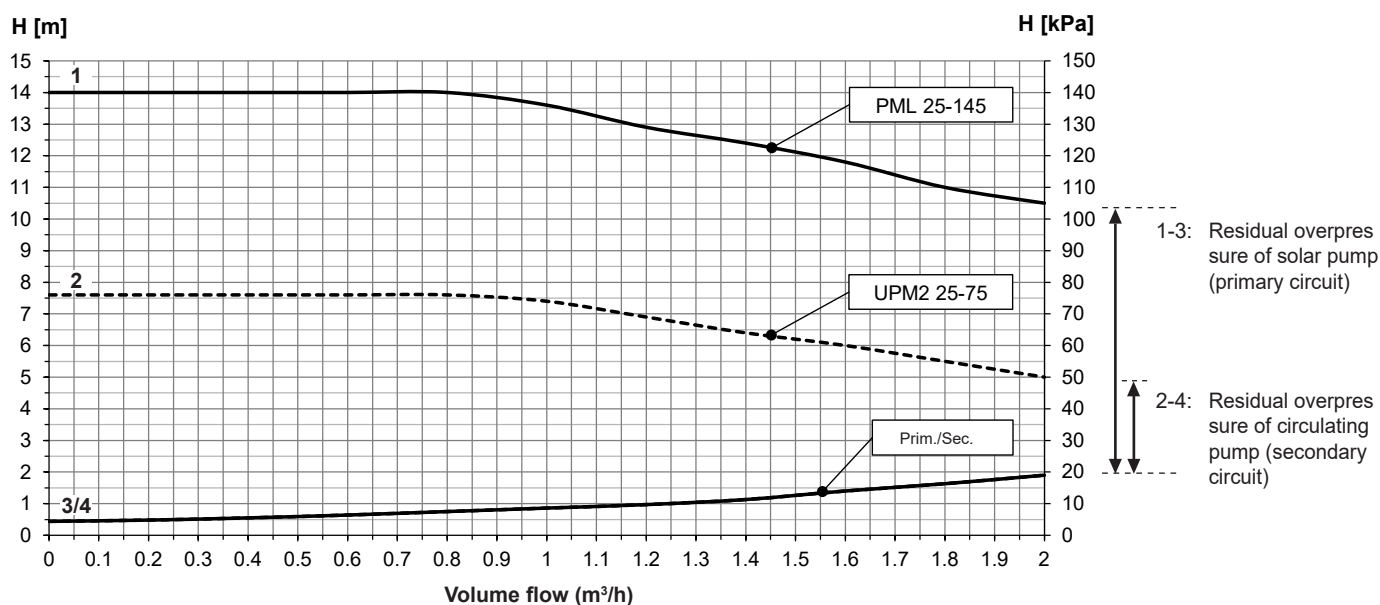
Residual overpressure TransTherm solar (25)



Residual overpressure TransTherm solar (50)

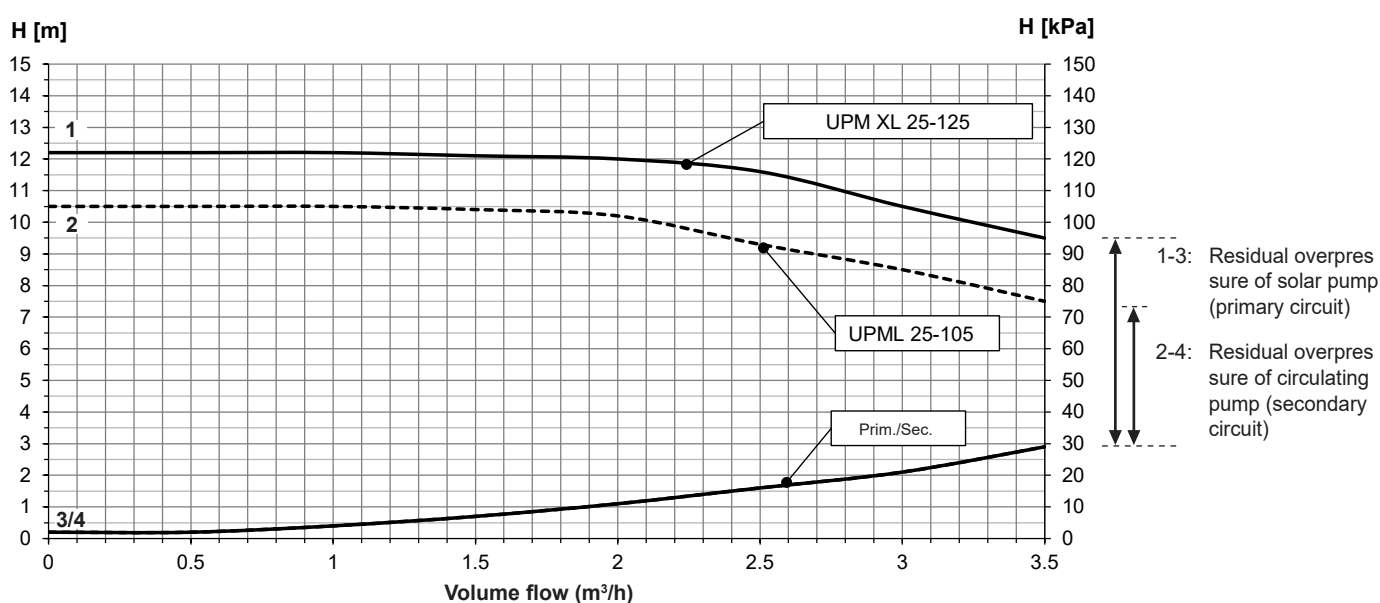


Residual overpressure TransTherm solar (100)



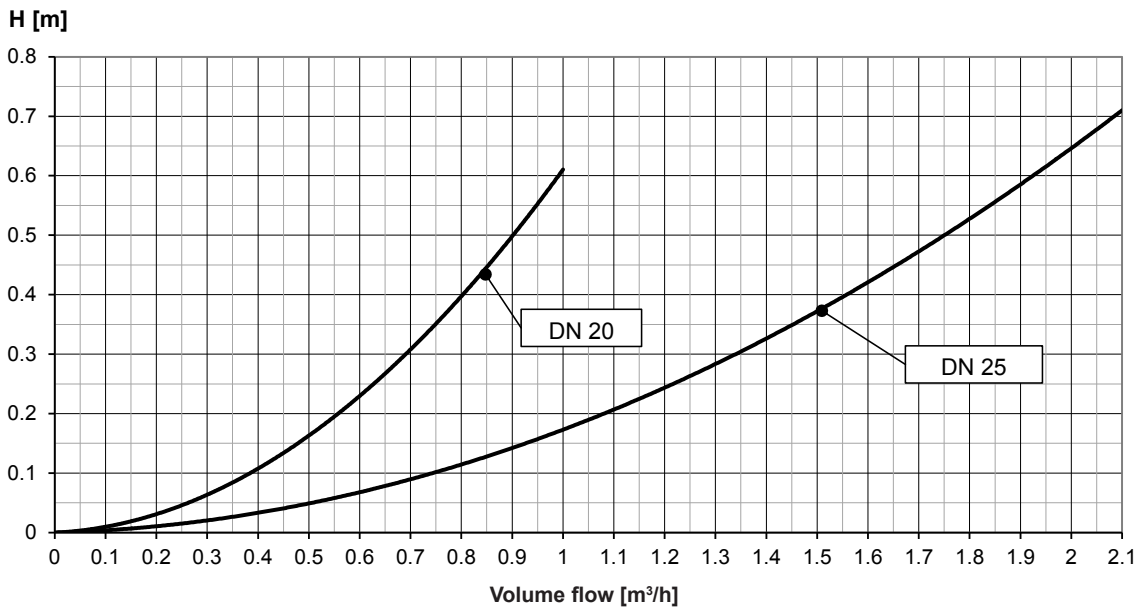
- 1 Total overpressure of solar pump primary circuit PML 25-145
- 2 Total overpressure of circulating pump secondary circuit UPM2 25-75
- 3 Pressure drop primary circuit
- 4 Pressure drop secondary circuit

Residual overpressure TransTherm solar (200)



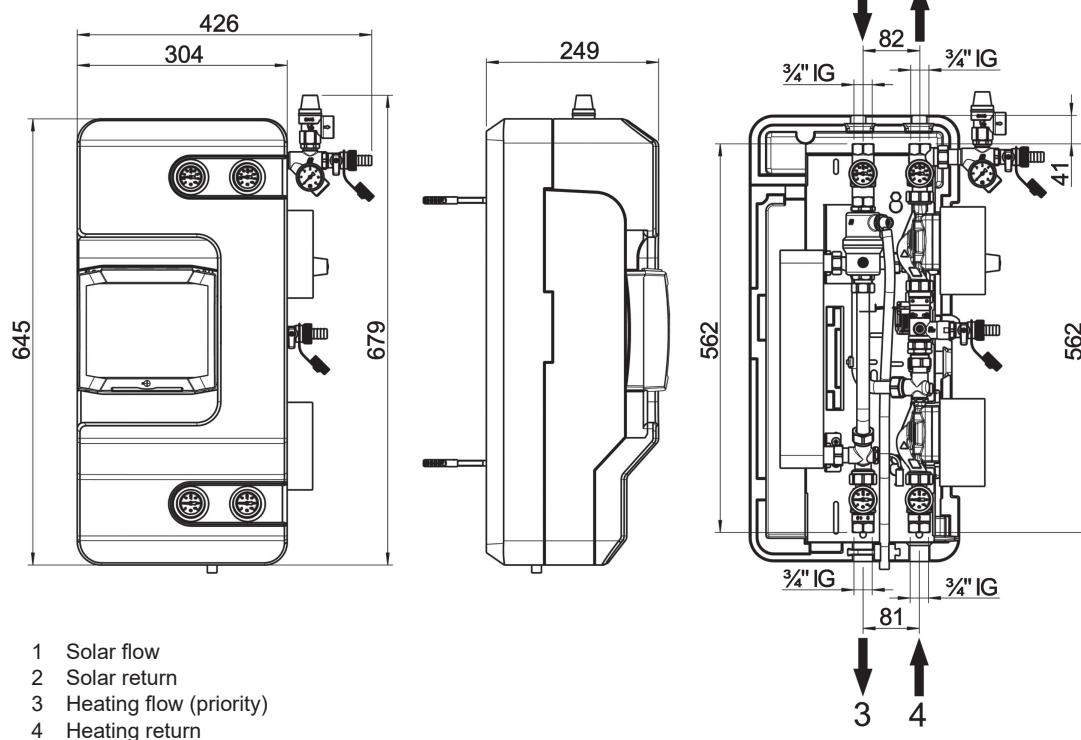
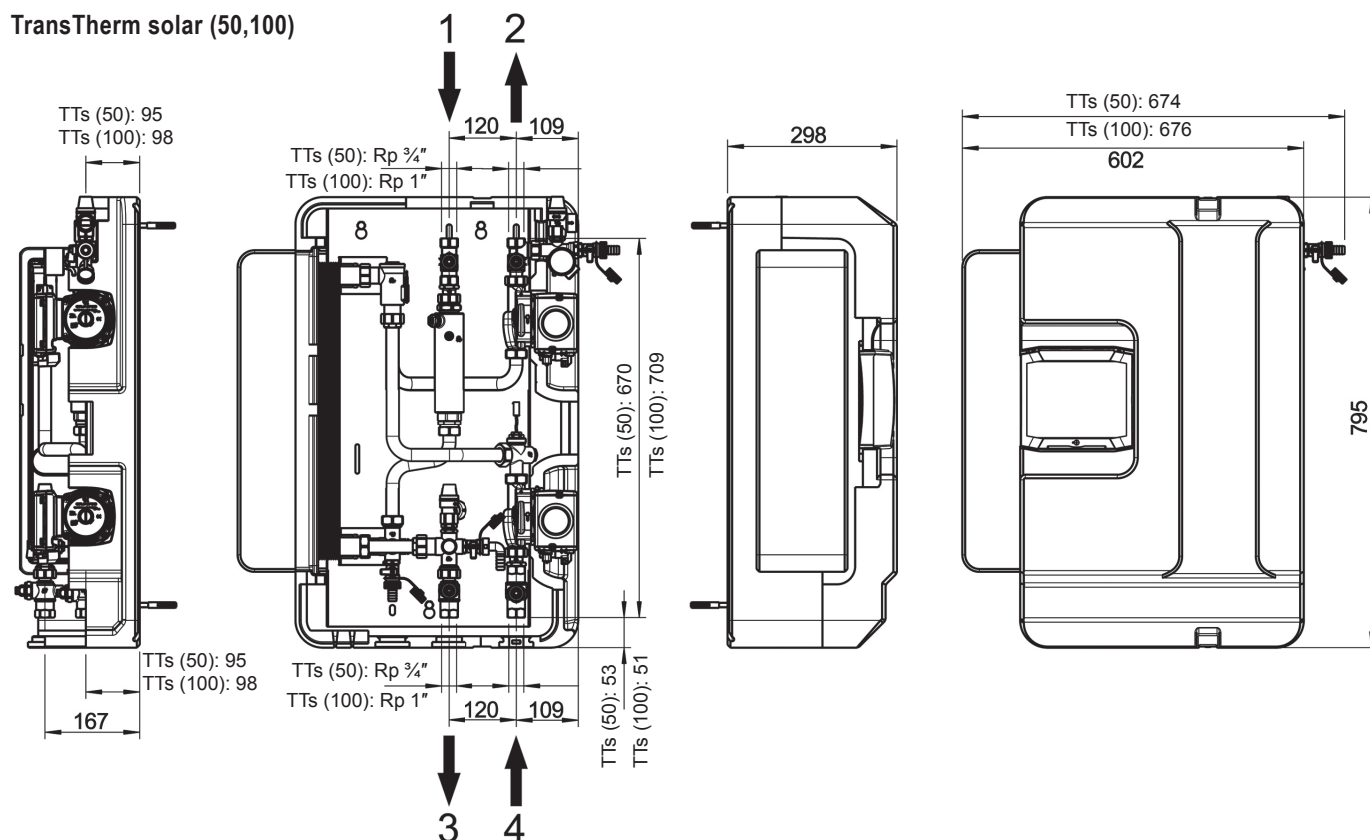
- 1 Total pumping head of the solar pump primary circuit UPM XL 25-125
- 2 Total pumping head of the circulating pump secondary circuit UPML 25-105
- 3 Pressure drop primary circuit
- 4 Pressure drop secondary circuit

Pressure drop FlowRotor DN 20 and DN 25

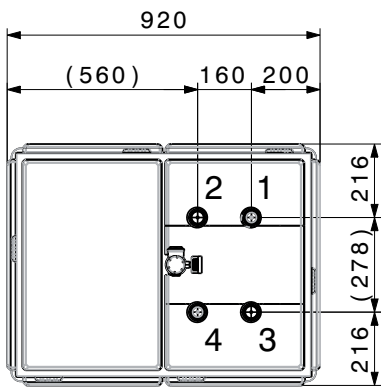
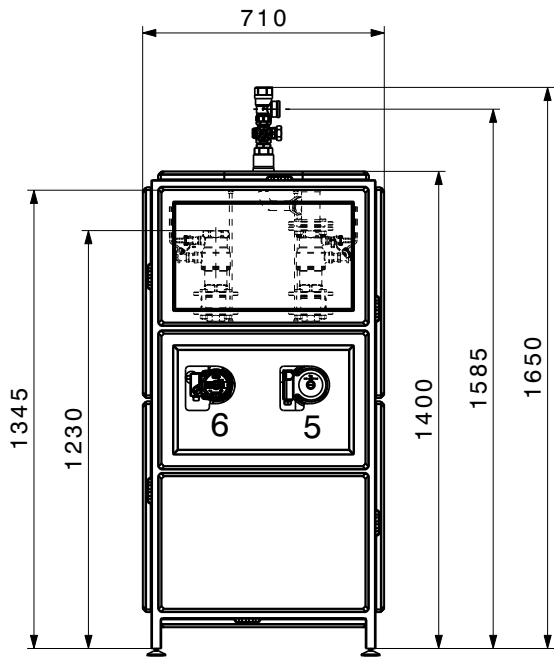
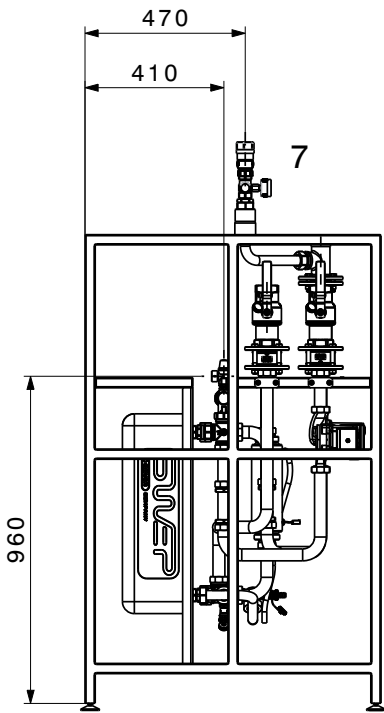


TransTherm solar (25)

(Dimensions in mm)


TransTherm solar (50,100)


TransTherm solar (200)
(Dimensions in mm)



- | | | |
|---|-----------------------------|--------|
| 1 | Solar flow | Rp 1½" |
| 2 | Solar return | Rp 1½" |
| 3 | Heating flow | Rp 1½" |
| 4 | Heating return | Rp 1½" |
| 5 | Solar pump | |
| 6 | Heating pump | |
| 7 | Safety valve/pressure gauge | |

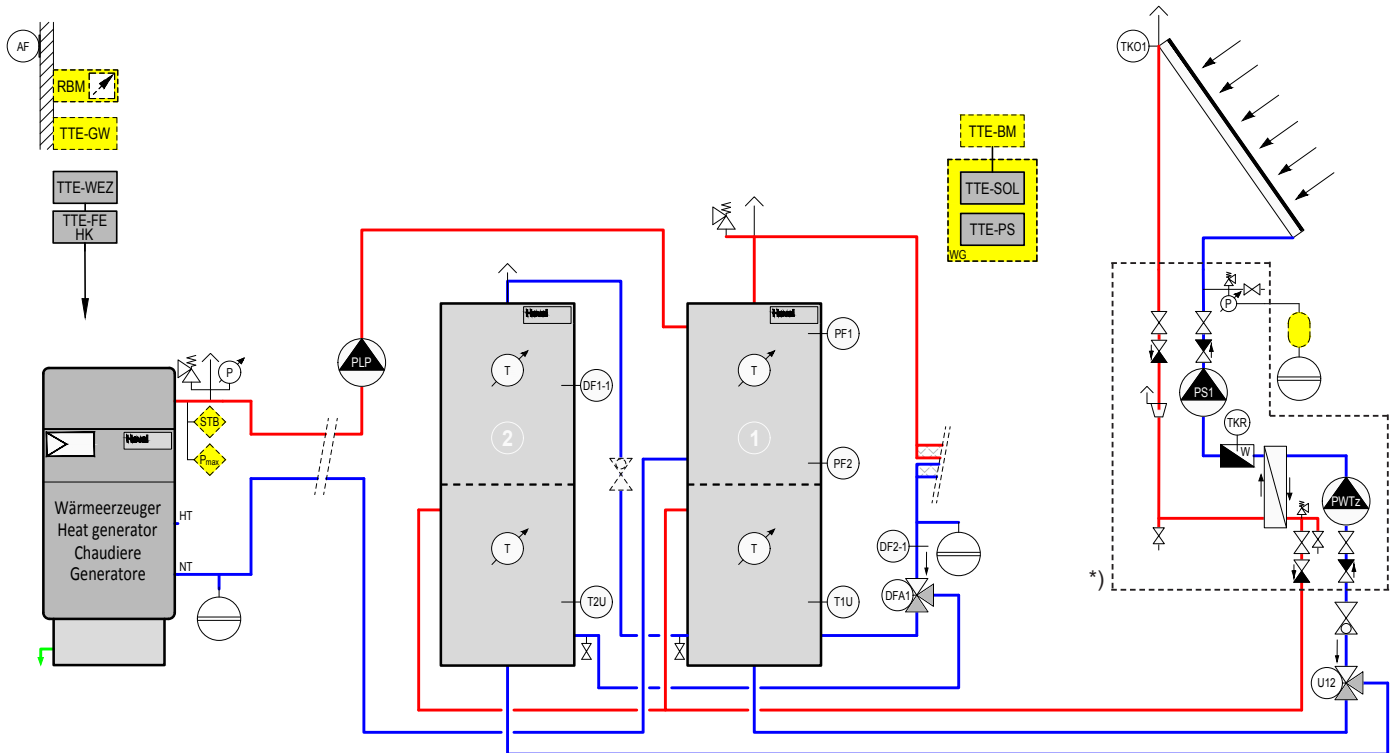
TransTherm solar

Solar preheating with

- 2 energy buffer storage tanks

Hydraulic schematics BABE040

Not suitable for direct domestic water heating.



Nur in Verbindung mit TTE-Regelsystem
Only in conjunction with TTE control system
Seulement en relation avec système de régulation TTE
Solo in presenza del sistema di regolazione TTE

Notice:

- The example schematics merely show the basic principle and do not contain all information required for installation. The installation must be done according to local conditions, dimensioning and regulations.
- With underfloor heating a flow temperature monitor must be built in.
- Shut-off devices to the safety valve (pressurised expansion tank, safety valve, etc.) are to safe against unintended closing!
- Mount bags to prevent single pipe gravity circulation!

TTE-WEZ	TopTronic® E basic module heat generator (built-in)
TTE-SOL	TopTronic® E solar module
TTE-PS	TopTronic® E buffer module
TTE-FE HK	TopTronic® E module extension heating circuit
AF	Outdoor sensor
TKO1	Collector sensor 1
T1U	Storage tank sensor 1
T2U	Storage tank sensor 2
PS1	Solar circuit pump
TKR	Return sensor
PF1	Buffer sensor 1
PF2	Buffer sensor 2
PLP	Buffer charging pump
DFA1	Differential control output 1
DF1-1	Differential control sensor 1
DF2-1	Differential control sensor 2
PWTz	Pump heat exchanger central
U12	Switch-over unit storage tank

Option

RBM	TopTronic® E room control module
TTE-GW	TopTronic® E gateway
TTE-BM	TopTronic® E control module
WG	Wall casing

*) Scope of delivery

TopTronic® E solar module

- The controller module is suitable for use as differential temperature control, control of thermal solar plants, for heating process water and/or heating support.
- The controller module contains predefined hydraulic applications for different applications or plants.
- The solar yield calculation calculates the current output, the split yield in kWh as well as the total yield in MWh.
- Control unit with integrated regulating functions for:
 - One/two circuit solar energy plants
 - integrated heat balancing
 - Various additional functions
- Connection technology executed as plug-in screw terminals in coded RAST-5 design
- Update capability of the controller software
- Time and date via integrated RTC, multi-year spring reserve
- Fine fuse 10 A
- Control unit suitable for cabinet installation thanks to ability to install on DIN rail 35 x 15 x 2.2 mm
- Expansion possibilities via Hoval CAN bus:
 - max. 16 controller modules in the bus system
 - max. 16 solar modules in the bus system

Notice

Operation of the controller module is generally via the TopTronic® E control module installed in the heat generator!

If the control module is used without Hoval heat generator, the control module for operating the solar module and a wall casing with control module cut-out must be ordered separately!

Inputs and outputs

- 3 variable sensor inputs:
 - 2x variable input for connection of a sensor
 - 1x variable input for connection of a sensor or pulse sensor
- 0-10 V input
- 0-10 V or PWM output for controlling a variable-speed pump
- Connection of a flow rate sensor (pulse sensor), e.g. for heat metering
- Variable 230V 3-point output
- Variable 230V output, e.g. for controlling a solar charging pump
- 230V optocoupler input connected in series to the variable 230V output

Option

- Can be expanded by max. 2 module expansions (expansion of the inputs/outputs):
 - Module expansion universal

Functions

- Simple configuration and parameter setting of the plant by predefined hydraulic and function applications
- 41 pre-programmed basic variants
- Differential temperature control
- Integrated solar yield calculation
- Storage tank cascade with up to 4 consumers
- Loading and unloading function for buffer
- Cooling down function
- Overheating and frost protection
- Forced energy/high-temperature discharge



Notice

Max. 2 module expansions can be connected.



TopTronic® E
module expansion
Universal



TopTronic® E
module expansion
Universal

- Collector cascade with up to 2 collector fields
- Charging via plate heat exchanger
- Heat exchanger cascade
- Additional functions, e.g. recharging function, circulating pump, etc.
- Start help function
- Consumer loading with type selection
- High temperature discharge
- Fault reporting output
- Return flow increase
- Forced energy/high-temperature discharge on storage tank or buffer maximum temperature
- Relay test for each output can be activated separately
- Self-test with error diagnosis and error memory
- Functions that can be implemented with module expansions:
 - Multi-circuit solar plants with up to 4 consumers
 - 2 collector fields
 - misc. application functions acc. to heating system diagrams

Notice

Depending on the complexity of the corresponding system hydraulics, module expansions are required for using the listed functions (max. 2 module expansions can be connected)!

Use

- Control of thermal solar plants with differential temperature control for heating process water and/or heating support

- For one/two-circuit solar plants with varying complexity with integrated heat balancing
- For decentralised assembly - remote from the control module - directly at the sensors and actuators (solar regulating armature located a long way away):
 - Installation in wall casing/control panel
 - Connection to the operating unit via Hoval CAN bus
- With significant expansion capability by controller modules via the Hoval CAN bus
- For flexible integration in modern communication systems via different interface modules
- For remote connection via HovalConnect

Delivery

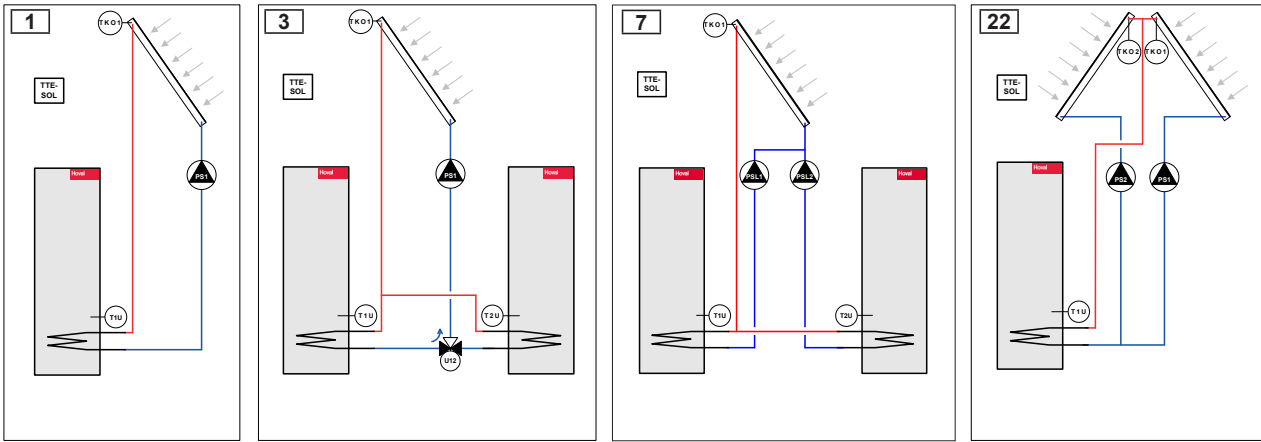
- TopTronic® E solar module incl. 2x mounting clips for DIN rail attachment
- DIN rail with fitting accessories
- 1x immersion sensor TF/2P/5/6T, L = 5.0 m
- 1x collector sensor TF/1.1P/2.5S/5.5T, L = 2.5 m
- Basic plug set for controller module
 - Mains in
 - Plug for 230 V output (VA3)
 - Plug for 2x 230 V output (VA1/VA2)
 - Plug for optocoupler input (SK-VA3)
 - 2x plug for sensor (VE1/VE2)
 - Plug for 0-10V output (VA10V/PWM)
 - Plug for Hoval CAN bus

Notice

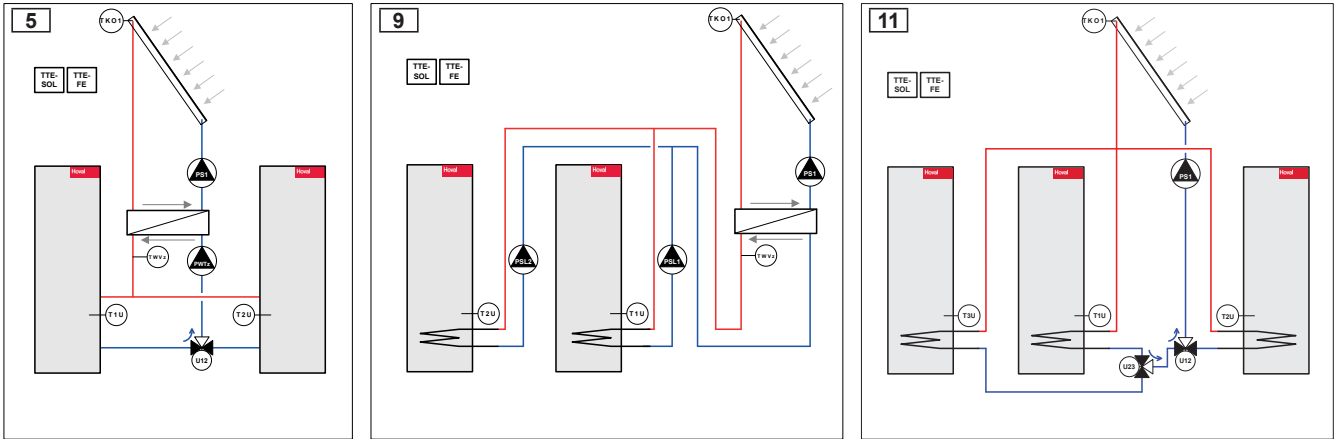
The supplementary plug set may have to be ordered to implement functions differing from the standard!

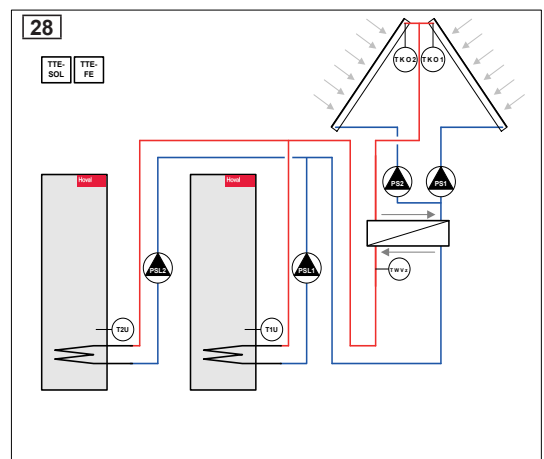
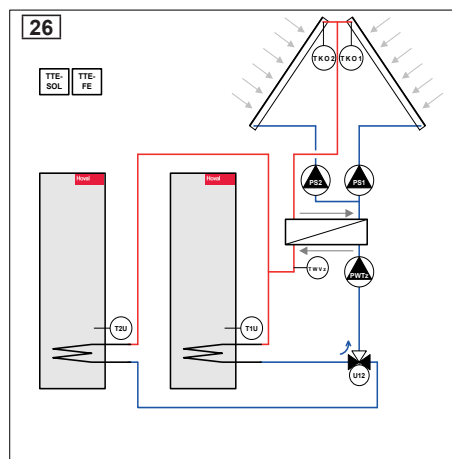
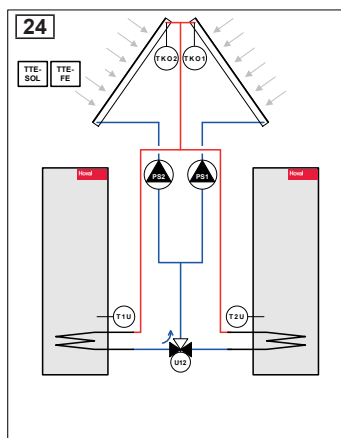
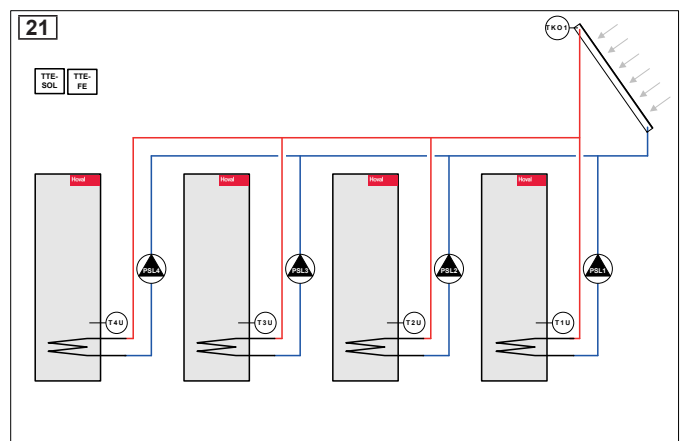
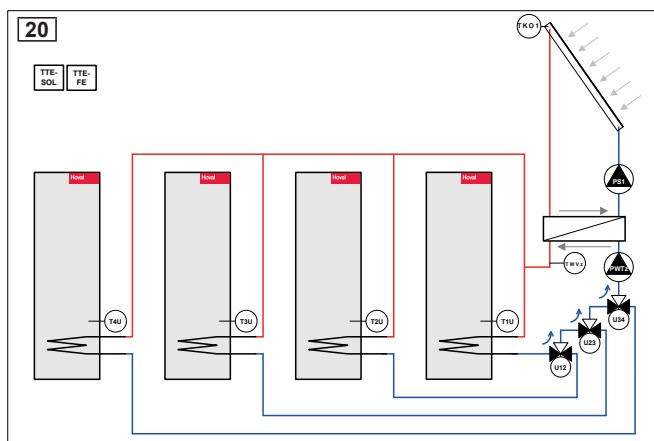
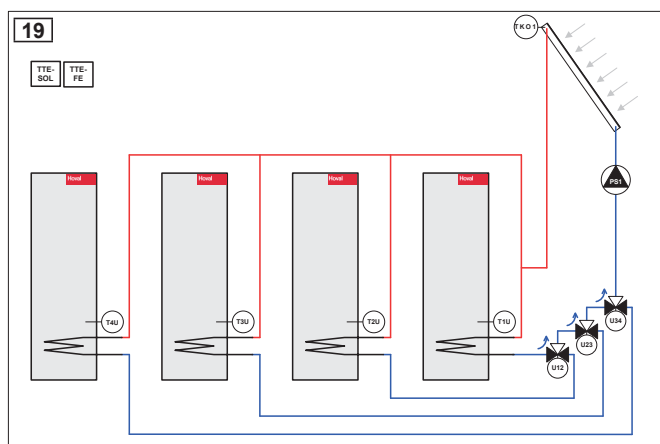
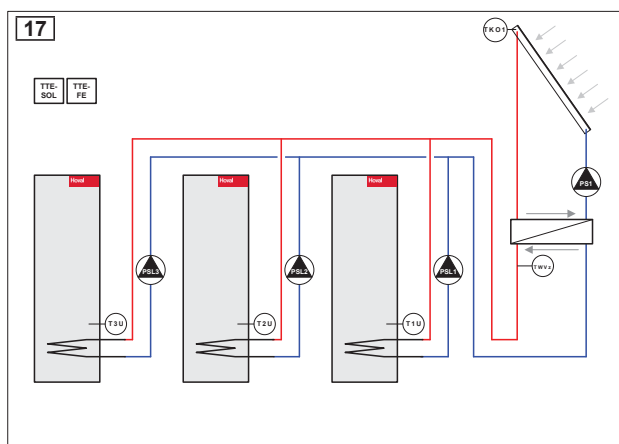
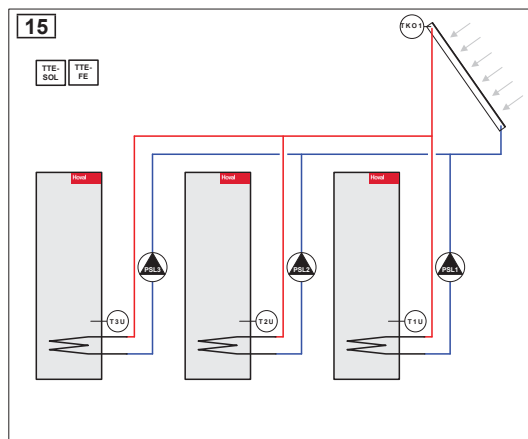
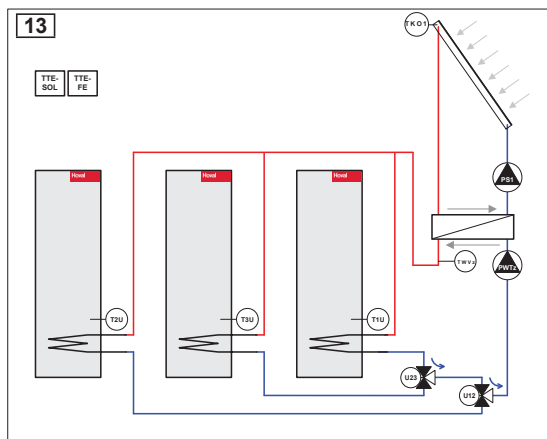
Functions that can be implemented
TopTronic® E solar module

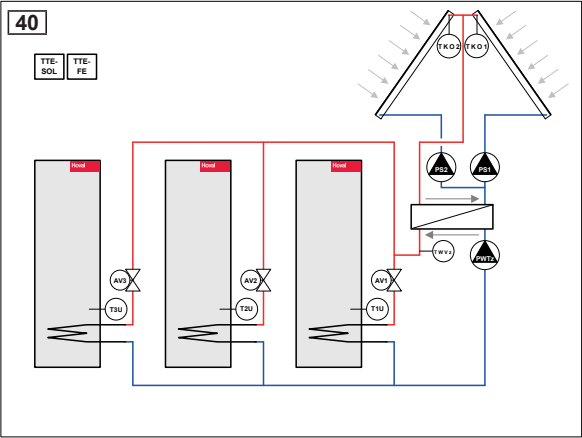
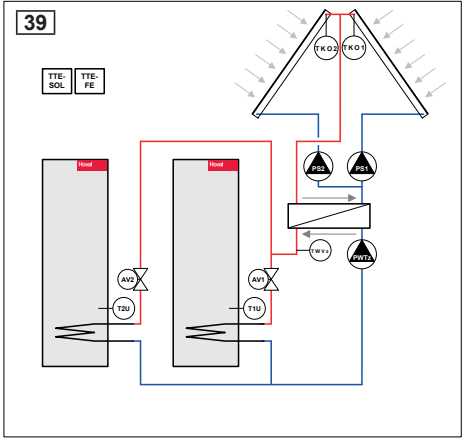
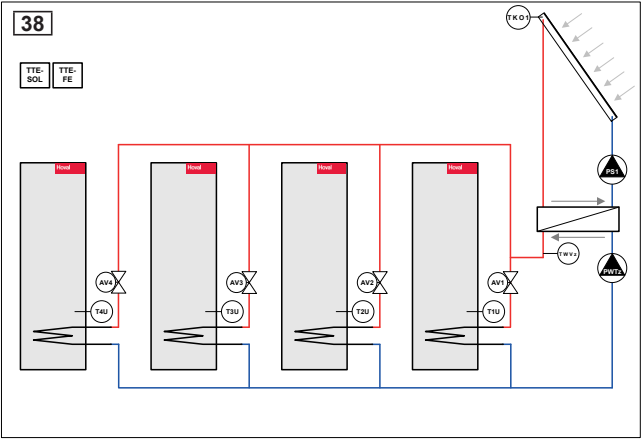
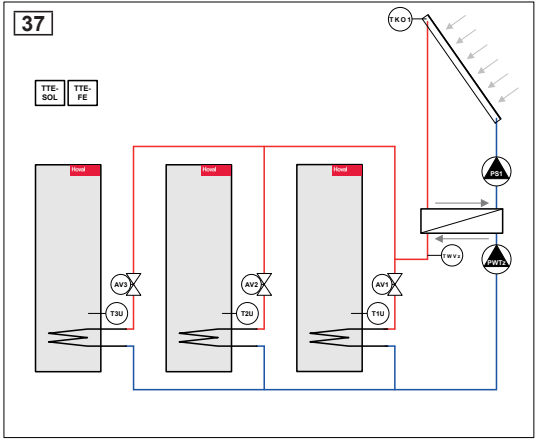
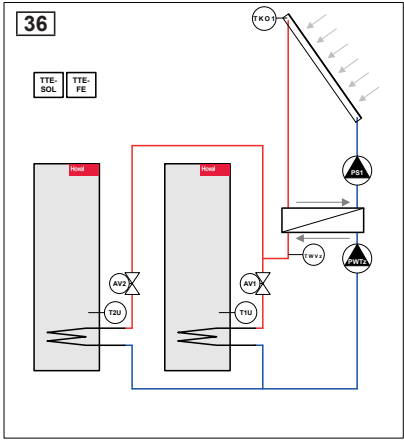
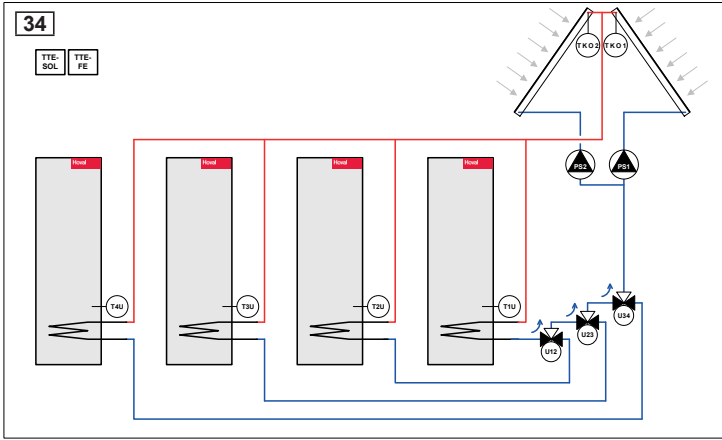
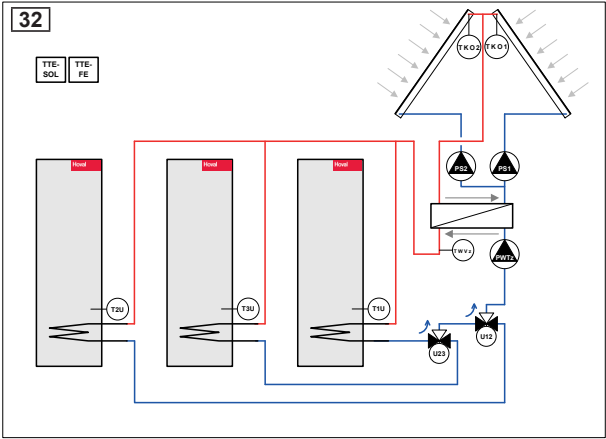
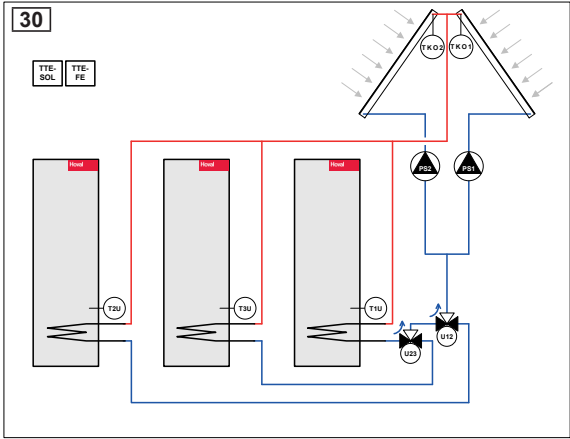
TTE-SOL	1 collector	2 collectors	Ext. HE	1 consumer	2 consumers	3 consumers	4 consumers	Change-over unit	Shut-off unit
Hydr. 1	•			•					
Hydr. 3	•			•	•			•	
Hydr. 5	•		•	•	•			•	
Hydr. 7	•			•	•				
Hydr. 9	•		•	•	•				
Hydr. 11	•			•	•	•		•	
Hydr. 13	•		•	•	•	•		•	
Hydr. 15	•			•	•	•			
Hydr. 17	•		•	•	•	•			
Hydr. 19	•			•	•	•	•	•	
Hydr. 20	•		•	•	•	•	•	•	
Hydr. 21	•			•	•	•	•		
Hydr. 22		•		•					
Hydr. 24		•		•	•			•	
Hydr. 26		•	•	•	•			•	
Hydr. 28		•	•	•	•				
Hydr. 30		•		•	•	•		•	
Hydr. 32		•	•	•	•	•		•	
Hydr. 34		•		•	•	•	•	•	
Hydr. 35		•	•	•	•	•	•	•	
Hydr. 36	•		•	•	•				•
Hydr. 37	•		•	•	•	•			•
Hydr. 38	•		•	•	•	•	•		•
Hydr. 39		•	•	•	•				•
Hydr. 40		•	•	•	•	•			•
Hydr. 41		•	•	•	•	•	•		•



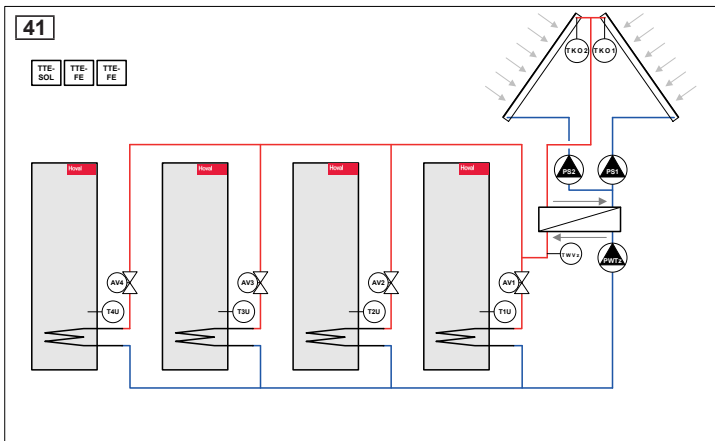
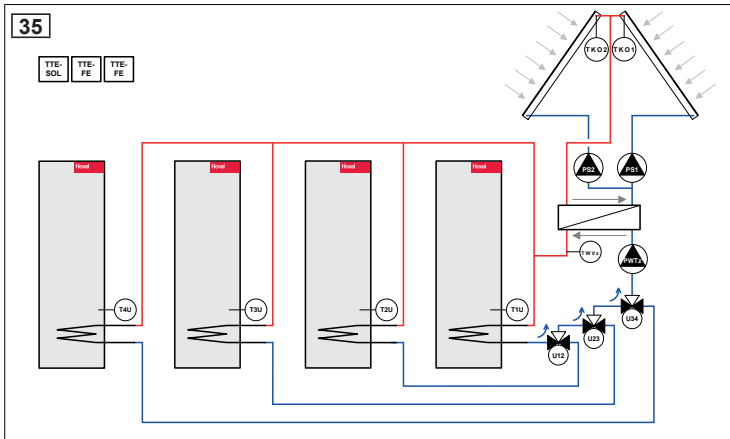
TopTronic® E solar module and 1 module expansion



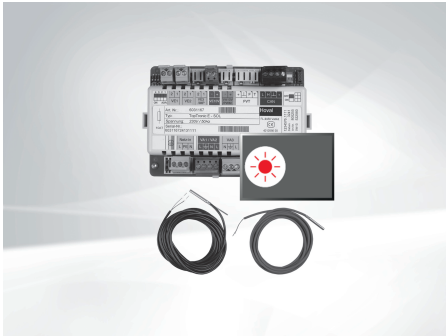




TopTronic® E solar module and 2 module expansions



TopTronic® E controller module



TopTronic® E solar module TTE-SOL

The controller module is suitable for use as temperature differential control, control of thermal solar plants, for heating process water and/or heating support.

Controller module with integrated control functions for

- Solar circuit
- Collector cascade
- Storage tank cascade with up to 4 consumers
- Consumer loading, with type selection
- Temperature differential control
- Loading and unloading function for additional/reserve buffer tank
- Integrated solar yield calculation

Consisting of:

- TopTronic® E solar module incl. 2 pcs. mounting clips for top hat rail attachment
- 1 pce. immersion sensor TF/2P/5/6T, L=5 m
- 1 pce. collector sensor TF/1.1P/2.5S/5.5T, L=2.5 m
- basic plug set for controller module:
 - Mains in
 - Plug for 230 V output (VA3)
 - Plug for 2x 230V output (VA1/VA2)
 - Plug for optocoupler input (SK-VA3)
 - 2x plugs for sensors (VE1/VE2)
 - Plug for 0-10 V output (VA10V/PWM)
 - Plug for Hoval CAN bus
- top hat rail with fitting accessories

Notice

In a standalone application, the control module for operating the solar module and a wall casing must be ordered separately!!

Notice

Depending on the complexity, module expansions are required for using the listed functions (max. 2 module expansion can be connected)!

Notice

The supplementary plug set may have to be ordered to implement functions differing from the standard!



Supplementary plug set

for controller modules and module expansion TTE-FE HK

Consisting of Rast-5 mating plugs for connecting further sensors and actuators on the controller module or on the module expansion.

The controller module is already equipped with a basic plug set, the supplementary plug set is required for advanced functions.

Consisting of:

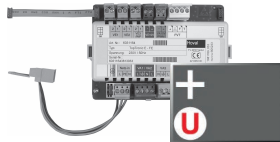
- Plug for mains out
- Plug for sensor (variable input)
- Plug for 0-10 V/PWM input
- Plug for flow rate sensor

Part No.

6037 058

6034 503

TopTronic® E module expansion for TopTronic® E solar module



Max. 2 expansions can be connected.

TopTronic® E module expansion Universal TTE-FE UNI

Expansion to the inputs and outputs of a controller module (basic module heat generator, heating circuit/domestic hot water module, solar module, buffer module) for implementing various functions

Consisting of:

- TopTronic® E module expansion
- top hat rail with fitting accessories
- ribbon cable for connecting the device bus to the controller module
- connection set for connecting the controller module to the mains voltage
- complete plug set for module expansions

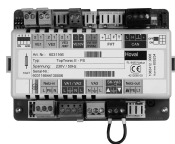
Notice

Refer to the Hoval System Technology to find which functions and hydraulic arrangements can be implemented.

Part No.

6034 575

Accessories for TopTronic® E



HovalConnect available from mid-2020
Up to that point, TopTronic® E online is delivered.



Supplementary plug set

for basic module heat generator (TTE-WEZ)

TopTronic® E controller modules

TTE-HK/WW TopTronic® E heating circuit/
hot water module

TTE-PS TopTronic® E buffer module

TTE-MWA TopTronic® E measuring module

TopTronic® E control module

TTE-BM black

TopTronic® E room control modules

TTE-RBM TopTronic® E room control modules

easy white

comfort white

comfort black

Enhanced language package TopTronic® E

one SD card required per control module

Consisting of the following languages:

HU, CS, SL, RO, PL, TR, ES, HR, SR, JA, DA

HovalConnect

HovalConnect LAN

HovalConnect WLAN

TopTronic® E interface modules

GLT module 0-10 V

HovalConnect Modbus

HovalConnect KNX

TopTronic® E wall casing

WG-190 Wall casing small

WG-360 Wall casing medium

WG-360 BM Wall casing medium with
control module cut-out

WG-510 Wall casing large

WG-510 BM Wall casing large with
control module cut-out

TopTronic® E sensors

AF/2P/K Outdoor sensor

TF/2P/5/6T Immersion sensor, L = 5.0 m

ALF/2P/4/T Contact sensor, L = 4.0 m

TF/1.1P/2.5S/6T Collector sensor, L = 2.5 m

System housing

System housing 182 mm

System housing 254 mm

Bivalent switch

Further information

see "Controls"

Part No.

6034 499

6034 571

6037 057

6034 574

6043 844

6037 071

6037 069

6037 070

6039 253

6049 496

6049 498

6034 578

6049 501

6049 593

6035 563

6035 564

6035 565

6035 566

6038 533

2055 889

2055 888

2056 775

2056 776

6038 551

6038 552

2061 826


Solar controller set WM complete

for wall mounting

consisting of a black housing incl.

TopTronic® E solar module

1x immersion sensor TF/2P/5/6T, L = 5 m

1x collector sensor TF/1.1P/2.5S/5.5T,
L = 2.5 m

Basic connector set

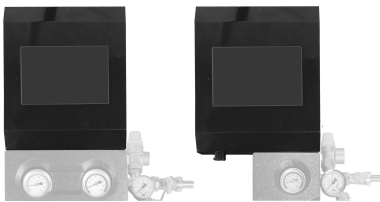
Blind cover for control module cut-out

incl. wall mounting material

TopTronic® E control module as an option

Part No.

6027 257


Solar controller set AG complete

for mounting on regulating armature

SAG20 or SAR20

consisting of a black housing incl.

TopTronic® E solar module

1x immersion sensor TF/2P/5/6T, L = 5 m

1x collector sensor TF/1.1P/2.5S/5.5T,
L = 2.5 m

Basic connector set

Blind cover for control module cut-out

TopTronic® E control module as an option

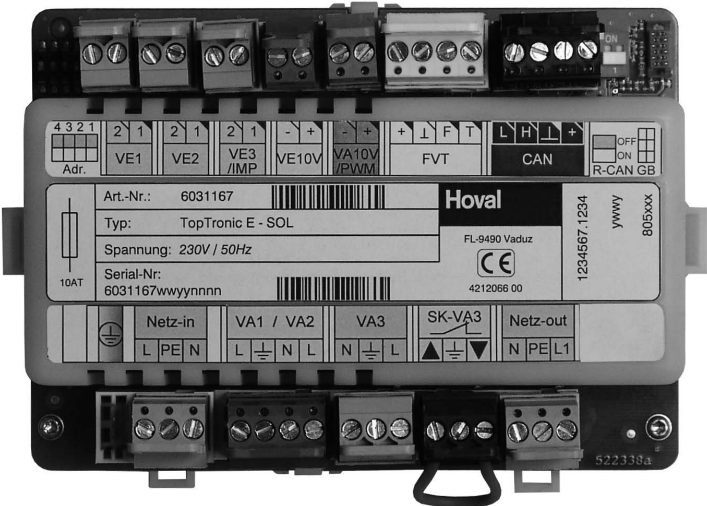
6037 492

TopTronic® E solar module

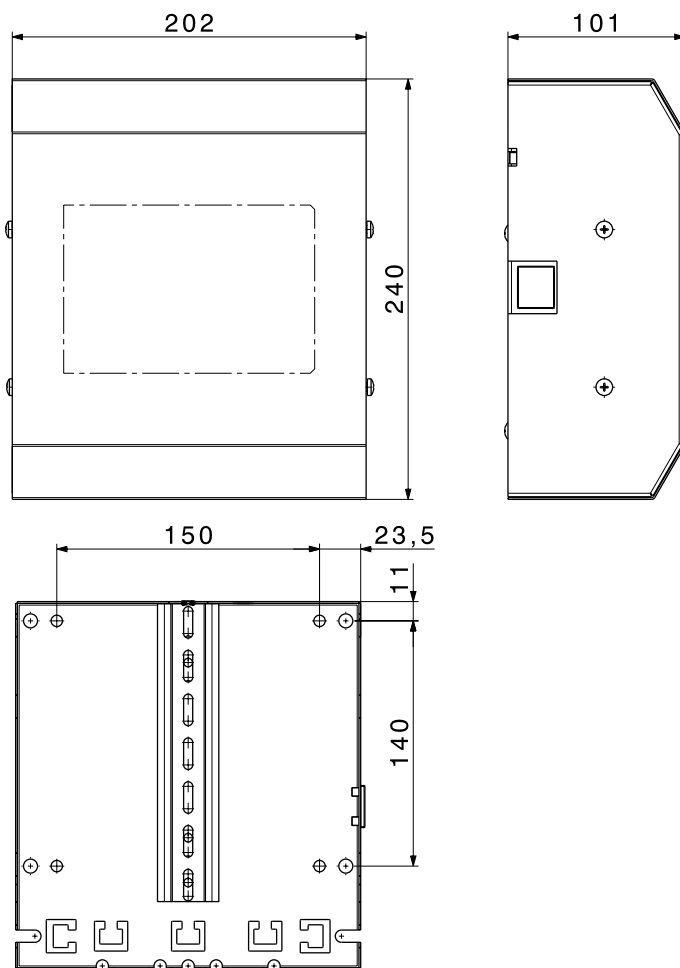
Model	TTE-SOL
<ul style="list-style-type: none"> Power supply max. Frequency Min. power consumption Max. power consumption Fuse 	230 V AC +6/-10 % 50-60 Hz 0.8 W 7.8 W 10 A slow-blow
Output (low voltage) <ul style="list-style-type: none"> Electromechanical relays 	3
Output (extra-low voltage) <ul style="list-style-type: none"> Signal output PWM or 0-10 V 	1
Switching capacity <ul style="list-style-type: none"> Electromechanical relays 	3 A
Input (low voltage) <ul style="list-style-type: none"> Optocoupler input 	1
Inputs (extra-low voltage) <ul style="list-style-type: none"> Input 0-10 V Inputs sensors Inputs flow rate sensor Pulse input 	1 2 1 1 (can be switched over to sensor)
Expansion (module expansion) <ul style="list-style-type: none"> Max. number 	2
Casing <ul style="list-style-type: none"> Installation Dimensions (W x H x D) incl. plug Ambient temperature (during operation) Humidity (in operation) Storage temperature 	Top hat rail mounting 150 x 100 x 75 mm 0...50 °C 20...80 % RH, non-condensing -20...60 °C
Bus system (Hoval CAN bus) <ul style="list-style-type: none"> Capacity Bus supply Bus line Bus length Line cross-section Cable type (recommended) 	max. 4 control modules / 3 control modules + 1 gateway yes 4-wire bus twisted, shielded, max. 100 m min. 0.5 mm² JY-(ST) 2 x 2 x 0.6
Other bus interfaces	Internal unit bus (master)
Miscellaneous <ul style="list-style-type: none"> Spring reserve Type of protection Protection class Plug types 	approx. 10 years, battery buffered IP 20 I – EN 60730 Rast 5 (coloured, coded)

Electrical connection

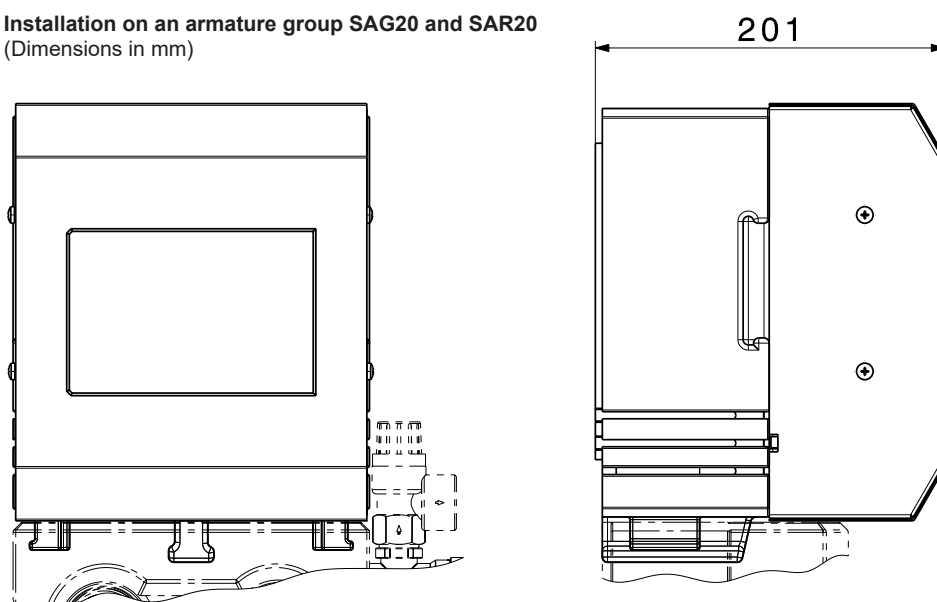
TopTronic® E solar module



Solar controller set WM (wall installation)
Solar controller set AG (armature group)
(Dimensions in mm)



Installation on an armature group SAG20 and SAR20
(Dimensions in mm)

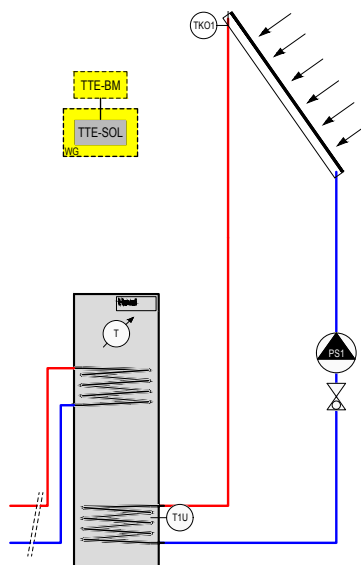


Heat quantity balancing for solar systems

Variant 1 (305) Energy balancing without installation of a heat meter

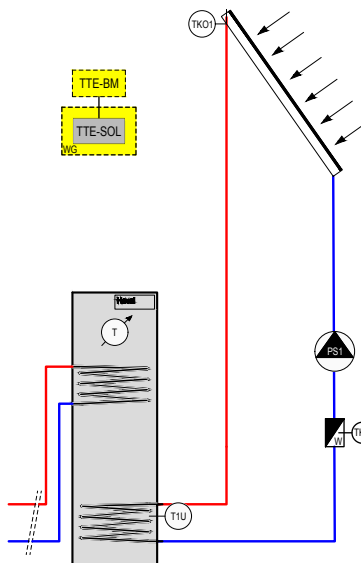
TopTronic® E solar module offers the opportunity of calculating and displaying the solar yield by storing a fixed flow rate of value. Also, when a speed-controlled circulating pump is used, there is no need for additional components in order to calculate the solar yield. **Variant 2** can be used for more accurate balancing.

- Application: energy yield calculation
collector circuit
- Flow: constant or speed-controlled -
balancing valve TN necessary
- Flow sensor: collector sensor (TKO1)
- Return sensor: calorifier sensor (T1U)



Variant 2 (310) Energy balancing with heat meter

- Application: energy yield calculation
collector circuit
- Flow: FlowRotor kit (FlowRotor al-
ready installed in solar arma-
ture group SAG/SAR FR)
- Flow sensor: collector sensor (TKO1)
- Return sensor: installed in FlowRotor (TKR)



1 Use of solar energy

The use of the solar energy reduces the pollutant emissions with the production of low-temperature heat and preserves thereby the environment.

With the use of solar energy no fossil sources are being burned, thus valuable raw materials are being preserved at negligible annual operating cost.

Per year up to 1200 kW/h of sun exposure energy is available for water heating, swimming pool heating and low-temperature heating per square metre of collector surface.

Professionally dimensioned and implemented solar plants prepare for many decades a large part of the yearly warm water with a temperature of 60 °C and beyond.

By the use of high-quality materials the life expectancy of a solar plant amounts to several decades.

The use of solar energy is today a highly developed technology, which:

- is absolutely safe and causes no damage
- does not decrease the dependence on valuable and regenerable, fossil sources of energy
- can be used without impairment of the environment
- is available free of charge, without the danger of economic price influence or manipulation
- can be used decentralised, whereby expensive distribution and control devices can be cancelled
- is available continuously for all time

2 Planning and dimensioning references for solar plants

Information for new buildings

Solar plants can be integrated in many cases optimally in the roof. Certain difficulties with the accommodation of the collectors due to the prescribed roof pitch resp. the roof ridge direction can occur. Therefore it is already advisable, when planning of the new building to keep certain guidelines which favour the solar energy use:

1. During the building of the house it is to be respected unimpaired exposition to sun of the roof area within the range of southeast to southwest. The chimney and the roof systems should be accommodated in the northern part of the house if possible.
2. For the in-roof installation of the collectors in a south lateral roof area (or a part of the same), the angle of inclination should amount > 22° for sheet metal frames on site or > 25° for sheet metal frames from Hoval. Otherwise the collectors must be raised against the roof pitch.
3. If an installation of the collector plant on the roof should prove as technically unfavourable, it can be installed also on the ground.
4. For the solar connection pipes either a shaft is to be planned, or the tubes can be installed first between the assembly place of the collectors up to the storage tank.

5. The water heating takes place separately from the boiler for example in the solar water heater. The boiler can be warmed up both by the solar plant and with the conventional heating. During correct planning of the solar plant the heating system for water heating can remain out of operation in the summer half-year.
6. For the part-solar room heating different combinations are possible.
7. Warm water connections for washing machine, dishwasher etc. are recommended.
8. To increase the utilisation of the valuable heating energy generally applies:
 - Very well thermally insulated buildings
 - Energy-fair architecture for passive use of solar energy
 - Design of the hot water heating on a low flow temperature
 - Modern heating regulation and system engineering
9. The collector angle is freely selectable between 22° and 90°.

The most important components of a solar plant are an efficient long-term collector, the solar armature group, the solar regulation and the solar storage tank with the integrated heat exchanger, which is co-ordinated with the size of the collector surface and the water heater volume. With larger plants an external plate-type heat exchanger should be used.

A professional assembly is a requirement for the full efficiency of the solar plant.

1 Collectors

The collector surface should be arranged to south. (Angles of inclination of the collectors see dimensioning guidelines). The collector surface should not stand in the shadow at any time of day.

2 Fastening parts

The minimum installation angle of the collectors Hoval UltraSol® 2 is 20°; if using Hoval sheet metal edgings 25°. Minimum installation angle with GFRP 25°.

Depending on the assembly place of the collectors, Hoval supplies fastening parts and assembly kits for the different mounting types:

- in-roof assembly with integrated sheet metal frame
- on-roof assembly parallel to the roof pitch
- on-roof assembly with raised angle of inclination
- flat roof assembly and assembly at the soil with different angles of inclination
- wall mounting

3 Connection tubes

The solar circuit consists of the tubes for the heat transfer medium, usually copper tubes including thermal insulation, which are laid from the collector to the water heater, and of sensor tubes for the difference temperature control and the frost-protected heat distribution medium. As an alternative to the copper pipes, pre-fabricated solar pipes with thermal insulation and integrated sensor leads and made from corrugated stainless steel or spiral tubing are finding increasing use.

The advantage of these connection pipes lies in easier and quicker routing.

4 Solar armature group

The solar armature group provides for the forced circulation of the heat distribution medium in the solar circuit and contains all fill, lock off, safety and indicator armatures (manometer, thermometer).

With the operation of the solar storage tank or with multi-circuit plants the solar armature group SAG will be used, which is mountable onto the wall.

In addition this thermally insulated, assembly-finished unit offers the possibility to connect an expansion tank.

The performance of the circulating pump should be examined (dependent on collector surface, pipework length and flow resistances).

5 Solar calorifier and energy storage tank

With conventional solar plants for water heating and room heating support the solar water heaters within the lower range are heated by a heating element on the inside or - with larger collector surfaces - by an external plate-type heat exchanger.

The Hoval solar multi-storage tank is equipped with largely dimensioned fixed inserted heating elements on the inside (MultiVal ERR, MultiVal ESRR, MultiVal CRR).

Of course all solar water heaters offer also the possibility for the heating of a part of the storage volume by conventional energy, and can additionally be equipped with electrical heating insets.

6 Solar control

In the collectors the nontoxic, frost-protected heat transfer medium on base of polypropylene glycol is heated.

As soon as the temperature at the collector sensor is higher around the adjusted difference temperature as the temperature measured in the lower part of the solar storage tank, the circulating pump is switched on over the solar regulation.

Thereby the heat transfer medium heated up in the collectors is transported into the heat exchanger, which is in the water heater, delivers the warmth at the service water or the heating water and flows cooled down back into the collectors.

This circuit is only interrupted if the temperature difference between collector and memory sensors is again smaller than the adjusted difference temperature.

Depending upon plant conception and the number of the solar energy customers who can be warmed up one-circuit resp. multi-circuit regulations are necessarily.

For the description of the quality of solar collectors and for the comparison of their efficiency some collector characteristic data worked satisfactorily. These characteristic data is determined after standardised testing methods by independent testing institutes.

1 Conversion factor

(η_0 , unit %)

is the maximum collector efficiency in per cent. It is reached if the average collector temperature is equal to the ambient temperature.

2 Heat loss coefficient

(U-value, unit W/m^2K)

describes the average heat loss of the collector related to the entrance surface and the temperature difference between collector work temperature (= average collector temperature) and ambient temperature.

3 Collector characteristic

The collector characteristic shows the dependence of the collector efficiency on the temperature difference between collector work temperature and ambient temperature and the sun exposure. The process of the collector characteristic is determined by the building method of the collector and the operating conditions.

Thus affect the light permeability of the collector vitrification, the kind of the absorber coating, the thermal insulation and the radiation and convection losses the process.

A collector with a high conversion factor, small heat loss coefficient and flat characteristic is considered as energetically particularly favourably.

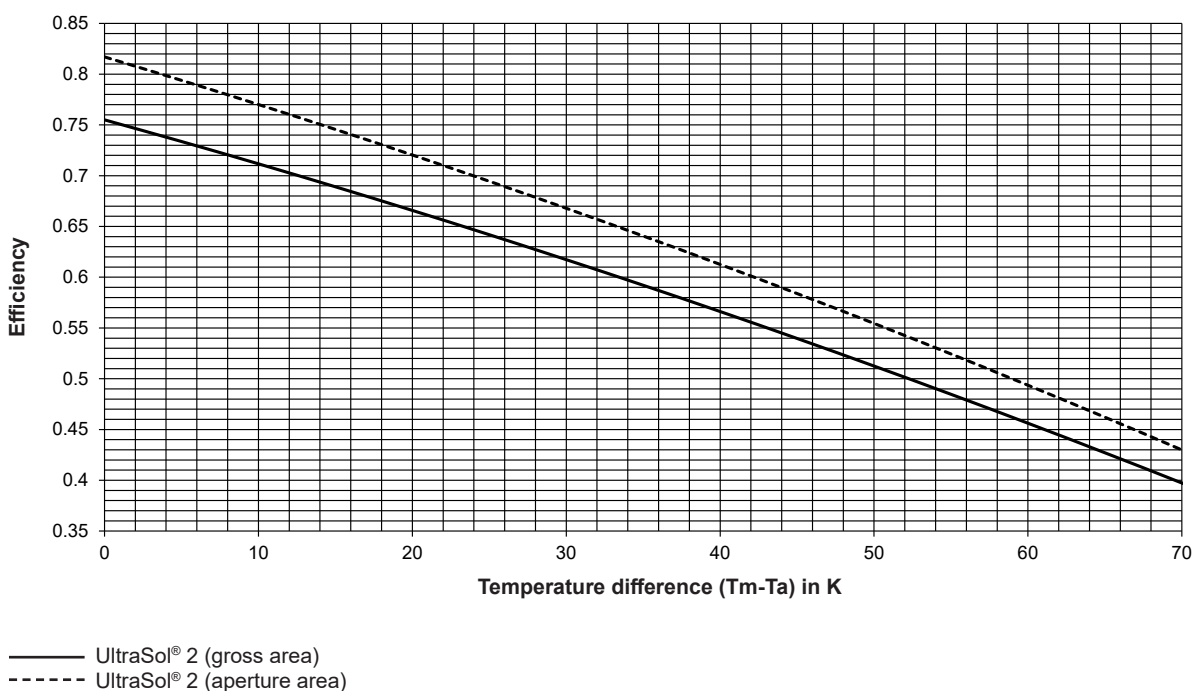
For the comparison of collectors the effective absorber surface (collector effective area) of a collector is in addition, just as important, since by it the total quantity of the irradiation energy taken up by the collector is determined.

4 Collector testing

The quality and energy efficiency of solar collectors is determined by standardised test procedures of independent institutions, e.g. according to EN 12 975. Based upon this testing the European quality label for solar collectors "Solar KEYMARK" is being issued.

Hoval solar collectors are quality and performance-tested by different inspecting authorities and are labelled with Solar KEYMARK. As a result, they meet the highest quality standards.

Efficiency characteristic curve UltraSol® 2



T_m = average collector temperature
 T_a = ambient temperature

Valid for flat collectors under the following conditions

1. Average sun exposure about 1200 kWh per square meters and year, related to the horizontal irradiation surface and the Central European climate conditions.
2. Sunshine on the collector surface more than 90 %, no shade
3. Collector angle of inclination depending upon type of use and period of use:
 - Open-air swimming pool from May to September 25-35°
 - Service water and indoor swimming pool 30-50°
 - Service water all year round 35-55°
 - Service water and additional heating 40-60°
4. Deviation of the collector surface from the south < 35°. In the case of deviations from 35 up to 45° of the south direction an enlargement of the collector surface of approx. 20 % is necessary. Collector arrangements with deviations greater than 45° from the south direction are not recommended.
5. As far as possible the entire collector surface should be arranged in an orientation. An allocation on differently oriented collector fields is not recommended.

1 Water heating:

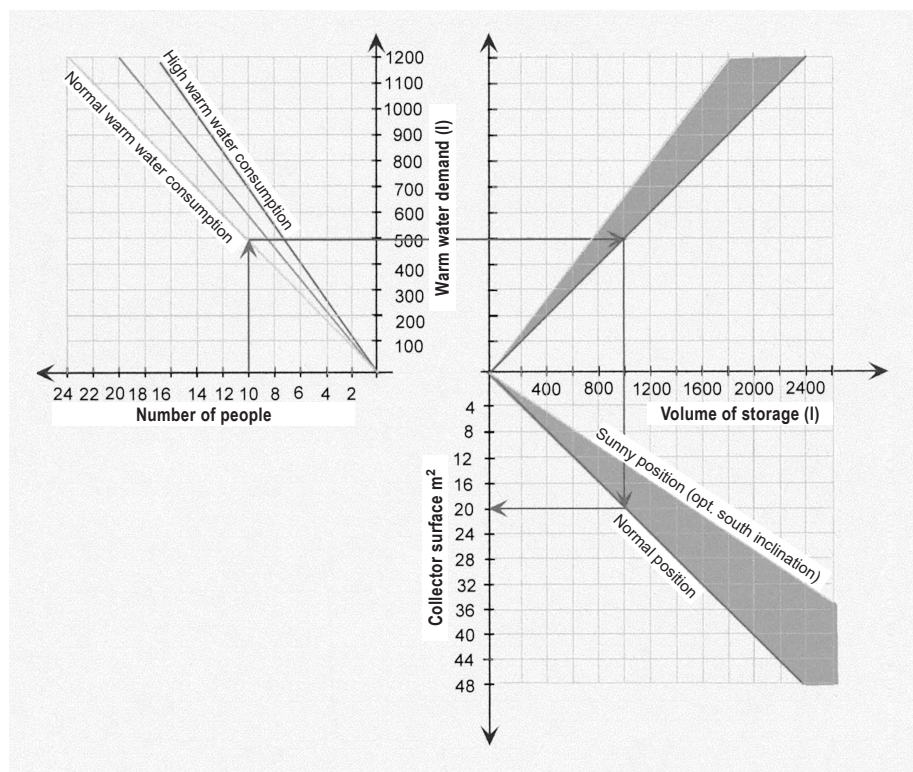
For the water heating with standard solar plants (flat collector HighFlow) approx. 1.5 m² collector surface and 50 to 85 litres storage volume are necessary per person.

Examples of water heating:

2-3	Persons	Collector surface up to 4 m ²	300 l storage
3-4	Persons	Collector surface up to 6 m ²	300 l storage
4-6	Persons	Collector surface up to 8 m ²	500 l storage
6-8	Persons	Collector surface up to 10 m ²	500 l storage
8-10	Persons	Collector surface up to 12 m ²	500 l storage
10-14	Persons	Collector surface up to 16 m ²	800 l storage
14-18	Persons	Collector surface up to 20 m ²	1000 l storage
18-24	Persons	Collector surface up to 24 m ²	2x800 l storage

Interpretation diagram

Solar collector surface for water heating



Interpretation diagram for the solar collector surface with standard solar plants for water heating.

2 Room heating:

Particularly in the transitional period and in connection with low-temperature heating systems (wall or under-floor heating) solar collectors can be used depending upon irradiation with considerable success.

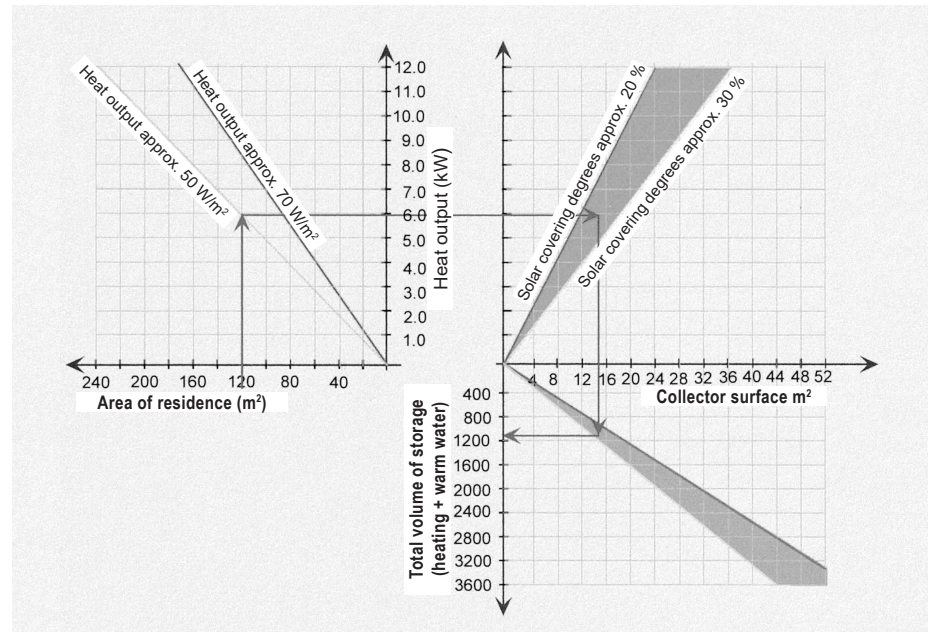
As approximate value 1.5-2 m² collector surface are to be planned additionally for water heating per 10 m² living space, respectively 15-20 % of the surface which has to be heated.

In progressive low-energy buildings, the heating system can be supported even with smaller collector surfaces (from 10 % of the heated area).

3 Swimming pool heating:

Swimming pools may be warmed up with copper collectors only over a suitable heat exchanger (dual-circuit systems). As approximate value at least 2/3 of the basin surface as collector surface are to be planned.

Interpretation diagram solar collector surface for water heating and heating support



Solar collectors

Solar collectors are used to generate heat and utilise the total momentary radiation. The orientation and slope of the solar collectors have a significant influence on the effectivity of the solar plant and must be checked for each individual system.

Location

• Sloping roof

A good solution. Orientation, angle of inclination and shade must be checked. Collector array designs are available for on-roof and in-roof assembly.

• Flat roof

Very good solution allowing optimum selection of orientation and angle of inclination for the solar collectors. Shade must be checked. Solar collectors can often be erected in two or more rows.

• Building facade/balcony

Poor results. An angle of inclination of 15-20° for the collectors already ensures much better utilisation. Some wall installation sets with several angles of inclination are available. We highly recommend an on-site supporting structure for the collector assembly with corresponding angles of inclination.

Approximate values

Standard values for collector surfaces

Single- and two-family homes

	Collector surface per person	per MWh/a * m ²
Hot water	1-1.25	-
Hot water+	-	0.6-1
Heating support		

Multiple dwelling units

	Collector surface per person m ²
Hot water	0.8
Preheating	0.5

* Annual heat demand for hot water and heating

Allowances for the collector surface

Hot water

Slope Orientation	Degrees	Flat %
	0-22°	not permissible
South	22-25°	approx. 10
South-west	25-60°	0
South-east	60-75°	approx. 10
	75-90°	30-50
	0-22°	not permissible
West	22-30°	15-20
East	30-50°	0
	50-75°	30-50
	75-90°	50-80

Hot water and heating support

Orientation	Slope degrees	Flat %
	0-22°	not permissible
South	22-25°	20-30
South-west	25-60°	10
South-east	60-75°	0
	75-90°	20-40
	0-22°	not permissible
West	22-30°	25-35
East	30-50°	35-45
	50-75°	45-60
	75-90°	60-100

Heating outdoor swimming pools

Orientation	Slope Degrees	Collector type Flat collector %
South	0-22°	5
	22-40°	0
	40-60°	15
South-west	0-22°	15
South-east	22-40°	0
	40-60°	20
West	0-22°	10
East	22-40°	25
	40-60°	40

Shade

(proportion of shade max. 25 %)

Period	Allowance
All-year	20 %
Winter and between seasons	10 %
November to January	0

Approximate values for collector yields

Annual yield per m² useful collector surface, dependent on location, system design and user characteristics.

Hot water

Utilisation standard	kWh/m ² a
High degree of coverage	300-450
Average degree of coverage	400-550
Preheating	450-650

Hot water and heating support

Design	kWh/m ² a
Generous dimensions	150-250
Average dimensions	200-300
Tight dimensions	250-500

In mountain regions, the solar collectors should not remain covered with snow for long periods of time. They should be positioned in such a way that the snow slides off (min. slope 45°, no snow fence at the bottom).

Heating outdoor swimming pools

Flat collector Type	Yield kWh/m ² a
unglazed, SP absorber	280-330
glazed	260-320

Heat exchangers

The solar circuit heat exchangers should be designed for an average temperature difference (ΔT_m) of approx. 5-15 K at max. collector output (700 Watt/m²). Up to approx. 30 m² collector surface, internal heat exchanger surfaces are usually used. Above this, an external heat exchanger (plate exchanger) is recommended. Calorifiers should be designed for 700 Watt/m² collector output and an average temperature difference of 5-10 K. Note that there is a danger of calcification. For this reason, the plate exchanger should rather be used for heating the swimming pool or for charging heating water tanks.

Approximate values for internal heat exchangers

- Plain-tube exchangers:
0.15-0.25 m² per m² collector surface
- Finned-tube exchangers
0.3-0.5 m² per m² collector surface

Influence of ΔT_m selection:
Effect on the efficiency of the system

ΔT_m	5K	10K	15K	20K
Change	+3.5 %	0	-3.5 %	-7 %

Solar storage tanks

The heat supplied by the solar collectors is transferred in the solar storage. The solar storage bridges the time gap between heat recovery and consumption. The solar storage tank incl. connections and flanges should be well insulated and *all connection pipes should be connected with a siphon.*

Check the max. permissible operating temperature and operating pressure of the solar storage tank.

Approximate values
Standard values for the tank size

Hot water

	Volume dm ³
Single- and two-family houses	85/person
Volumetric content for additional heating (electric)	acc. to daily demand
Multi-family houses	80/person
Volumetric content for solar heating *	40/m ² collector surface
additional heating electric boiler	acc. to daily demand 15-60/person

Hot water and heating support for single- and two-family houses

	Volume per m ² collector surface
Solar heating *	40-60
Additional heating	40-60

* Free "solar volume" for the storage of solar energy

Expansion tank

The dimensions of the expansion tank must be selected taking into account the total content of the collectors (in the event of evaporation).

Observe the following during selection:

- Max. operating temperature (provide pre-tank where necessary)
- Check the pretension of the selected expansion tank against system-specific data.

Solar circuit pipes

Copper, iron or stainless steel pipes can be used for the solar circuit. The pipe runs should be kept short, in particular the flow pipe for the collector array (line from the collector array to the consumer load). Pipes must be routed and insulated professionally.

The thermal insulation should be resistant to temperatures of at least 130 °C. For recommended insulation thickness and pipe cross-sections: see Solar collectors.

Heat transfer liquid

As a rule, a frost protection agent on polypropylene basis is used as frost protection in the solar circuit. The concentration should be selected according to the climate zone and system-specific data. A frost protection percentage of 40 % is usually sufficient. Percentages of over 50 % frost protection should be avoided.

Example: approx. -20 °C outside temperature (glycol content 40 %). *The water and glycol must be mixed before introducing the mixture into the system.*

Circulating pumps, instruments, armatures

Check the max. permissible operating temperature for the selected products.

Overheating protection

High temperatures and possible formation of vapour in the solar circuit can never be completely ruled out. (The sun supplies heat even when this heat cannot be used directly.)

Causes:

- Systems with widely fluctuating consumption
- Power failure or defective system components

For this reason, we recommend the inclusion of an overheating concept before realisation of the system. The minimum requirements here are:

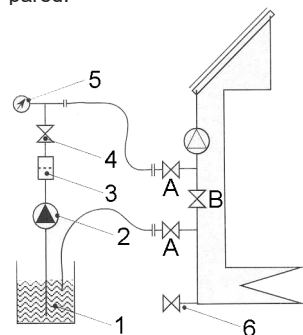
- regulatory measures
- thermal discharge safety device
- selection of an appropriate expansion tank
- selection of the appropriate frost protection agent

Flushing, filling and venting

The system may only be filled and pressure testing carried out when the sun is not shining on the collector array.

Flushing of the system is extremely IMPORTANT and must be carried out with due care, for preference with the prepared heat transfer liquid. Dirt particles in the system cause malfunctions. Use filters!

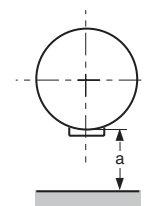
The system may only be filled if it can be put into operation at the same time. A pump should be used to fill the system, the system should be fully installed, filled and connected on-site and the heat transfer medium mixed and prepared.



- | | |
|------------|------------------|
| 1 Tank | 4 Ball valves |
| 2 Jet pump | 5 Pressure gauge |
| 3 Filter | 6 Drain |
| A Open | B Closed |

Necessary space

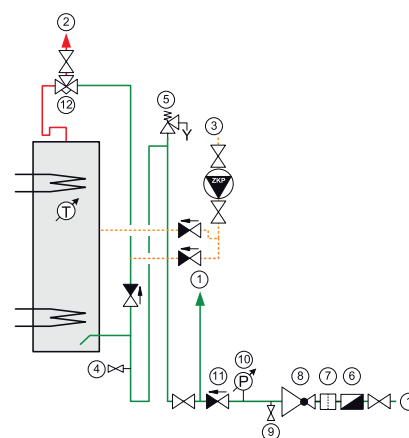
- The inspection opening has to be well accessible.
- Distance to the wall for the installation and removal of the electrical heating inset (a):



Calorifier	dm ³	a
MultiVal ERR	300-500	≥ 600
MultiVal ERR	800-1000	≥ 950
MultiVal CRR	300-540	≥ 600
MultiVal CRR	800-2000	≥ 950
EnerVal	500-1500	≥ 950
(laterally left or right distance to wall for mounting of casing)		≥ 700

Plumbing

- For electrical heating a hot water distribution system without circulation must be planned if possible.
- The hot water pipe must be insulated and installed with a siphon (minimum ≥ 200 mm).
- Maximum safety adjustment: 1 bar less than the maximum operating pressure
- Caution! When only small amounts of hot water are tapped, higher hot water temperatures can occur. (Depending on comfort requirements, provide suitable measures, e.g. thermomixer etc.)

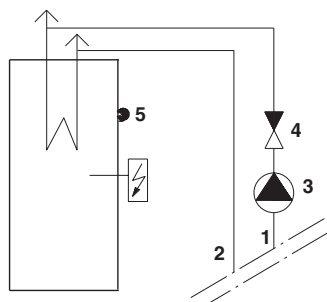


- | |
|-----------------------------------|
| 1 Cold water |
| 2 Hot water |
| 3 Circulation |
| 4 Drain |
| 5 Safety valve |
| 6 Pressure reduction valve |
| 7 Testing device |
| 8 Return flow inhibitor |
| 9 Connection for manometer |
| 10 Thermostatic blender for water |

Heating assembly

(Recharging with boiler)

- Flow and return lines must be connected in such a way that no flow reversal and single-pipe gravity circulation can occur with the charging pump switched off and electric heating switched on (see drawing).
- Expansion of heating water must always be ensured (also during electric charging).
- Install air vent at the top point of the heating water pipe.



- 1 Flow
- 2 Return
- 3 Venting charging pump
- 4 Non-return valve
- 5 Temperature regulator

Commissioning

- The system must be created, the heating and plumbing installation carried out, the system filled, vented and the electrical connections established in accordance with the design documentation and assembly specifications for the system components supplied.
- At the time of commissioning, the design values must be known and the building owner or the person responsible for operation present for instruction.
- Registration should be carried out in good time (approx. 10 days before the planned date of commissioning).

Maintenance

The following inspections must be planned for maintenance of the system:

Inspection	Type
<i>User</i>	
Condition of system	Visual inspection
Circulating pump	periodical
Pressure	

The thermal solar plant must be checked regularly in order to ensure the operational safety and the efficiency as well as the high durability in the long term. Inspection should be carried out annually and maintenance every 2 years. The completion of a maintenance contract is recommended for all thermal solar plants.

Static dimensioning aid

The following requirements and directives must be complied with:

- Regionally applicable standards and regulations
- The installer is responsible for ensuring compliance with the relevant standards and local regulations.

Germany/Austria:

- The snow and wind loads are regulated by DIN EN 1991 and the associated national appendix.
- The load bearing capacities of building coverings are prescribed ÖNORM B 1991.
- ÖNORM M 7778 (Installation planning and installation of thermal solar collectors)
- Both the Austrian as well as the German regulation is based on European standard EN 1991-1-3. They are valid up to altitudes of 1500 m. Any altitudes above that are regulated by special national appendices.

Switzerland:

- SIA 261 applies.

General information on statics

- Installation is only permissible on roof areas or substructures of sufficient load-bearing capacity. It is essential for the static load-bearing capacity of the roof or the substructure to be checked by the local statics engineer before the collectors are installed.
- The examination of the entire collector structure according to DIN 1055 Parts 4 and 5 is required by the local statics engineer, in particular in areas subject to high snowfall or high wind speeds. Attention in this must be paid to all special features of the installation site (foehn winds, venturi effects, eddy formation etc.) that can lead to increased load.

Roof-mounted systems

- With roof-mounted systems, particular attention must be paid to the quality of the wood in the substructure with regard to the durability of the screw connections for attaching collector installation fixtures. The selection and also the number of roof connections must be adapted to the local snow and wind loads. Binding statements about the wind and snow loads as well as building altitudes about seal level must be obtained from the relevant authorities in the regions.
- If the roof anchors are exposed to maximum load, their geometry means that deformation will be unavoidable and contact between the roof anchor and the tiles can often not be prevented. As a result, it is recommended for metal tiles to be used if there will be high snow and wind loads.
- The significant number of roof connection sets is based on the calculated minimum number of attachment points for the planned number of collectors without taking account of the building-specific anchoring conditions of the roof covering and the building structure. The local force application via roof connection sets has been provided. The transmission of forces via the screw connection to the building structure does not form part of this calculation and must be verified separately.
- To prevent impermissible wind suction loads, the collectors must not be installed near the edges of the roof. The relevant standards must be observed in this case.

When elevators are used, the upper edge of the collector must not project beyond the ridge of the roof. Collectors must not be installed under a height change, in order to avoid increased loads due to windblown or slipping snow from the higher section of the roof onto the collector array. If snow guards are mounted on the more elevated roof for this reason, the statics of this roof must be inspected.

Personal protection

- In order to carry out work on the roof, safety equipment for personal protection must be included in the planning. For pitched roofs, these are safety roof hooks and for flat roofs, suitable attachment points or cable systems.

Germany/Austria:

- Regarding work on the roof, the AUVA regulations must be observed in Austria and DGUV1 regulations in Germany.

Switzerland:

- Regarding work on the roof, the SUVA regulations must be observed.

Flat roof systems

Wind load calculation according to DIN EN 1991-1-3 and -4 for free-standing flat roof systems

In general, calculation in accordance with standard DIN EN 1991-1-3 and -4 applies for the detailed wind load calculation.

The existing recommendation should cover the standard cases and ease handling in daily use. However, this recommendation does not release the planning authority from carefully examining the local conditions and having a designated specialist (structural engineer/civil engineer) make a detailed calculation. Consequently, no liability claims can be asserted on this basis.

The following points are decisive for the design of the wind load:

- Collector angle
- Backpressure zone/wind zone
- Terrain category/location
- Height of building above terrain
- Building dimensions/shape
- Roof edge height (attic)
- Distance from collectors to roof edge
- Number of collectors in a row

The more exposed, the more free-standing the building is, the higher are the expected wind loads. In city areas, the buildings are often protected from wind by other neighbouring buildings.