

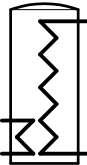
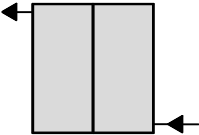
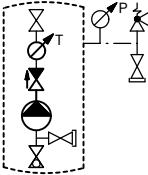
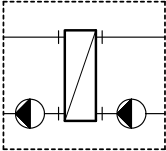


A close-up, low-angle shot of a solar thermal collector. The image shows a textured, metallic mesh on the left, a dark, possibly black, rectangular component in the center, and a white circular element on the right. The background is a bright, slightly blurred sky.

SOLAR

Hoval

Responsibility for energy and environment

Hoval UltraSol – A new generation of solar thermal collectors.

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■ Description

Hoval CombiSol R (800,1000)

- Heating support and hot water
- Scope detached house of approx. 4-5 persons
- Hygienic water heating by the limited water content and the continuous-flow principle
- For heating with solar for low-temperature heat generators (heat pumps) or high-temperature heat generators (e.g. BioLyt, AgroLyt®, UltraGas®)

Solar heating water storage

- Made of steel, coated outside
- 8 heating connections Rp 1½"
- Plain tube heat exchanger, built in (solar connection)
- Solar flow and return R ¾" for connection of solar armature group (SAG)
- Corrugated pipe stainless steel heat exchanger, spiral, built in
- Domestic water flow and return Rp 1¼"
- 1 sleeve Rp 1½" for screw-in electrical heating inset
- 2 sleeves ½" for sensor/thermometer
- Sensor terminal bar
- Air-bleeding Rp ½"
- Drain R 1"

Thermal insulation

- Thermal insulation made of polyester fleece 120 mm, 1-piece
- Plastic casing, colour red

Delivery

- Solar heating water storage completely insulated

Option

Screw-in electrical heating inset for CombiSol R (800,1000)

Type EP-3 to EP-6

- Made of Incoloy® alloy 825
- Heat input 3.0 to 6.0 kW
- Incl. temperature control and overheating protection
- Connection: 3 x 400 V/50 Hz
- No use for exclusively electrical heating

Delivery

- Delivered separately packed

On site

- Installation of the electrical heating inset

Insulated cover cap

- For unused connection fittings Rp 1½" (inner thread)
incl. 1½" malleable cast iron plug

Delivery

- Delivered separately packed

On site

- Installation of the insulated cover cap and of the malleable cast iron plug



Model range

CombiSol R type	Nominal content l
(800)	776
(1000)	912

■ Part No.



Hoval CombiSol R

Part No.

Solar heating water storage made of steel with plain tube heat exchanger integrated for the connection of the solar armature group SAG. Water heating with corrugated pipe-heat exchanger spirally integrated in the solar heating water storage.

Thermal insulation made of polyester fleece 120 mm, 1-piece and plastic casing, colour red.

CombiSol R Type	Nominal content l	Solar heat exchanger bottom m ²	Corrugated pipe heat exchanger dm ³	
(800)	776	3	19.5	41.6
(1000)	912	3	19.5	48.1

7013 359

7013 360

Accessories

Screw-in electrical heating insets for CombiSol R (800,1000)

With temperature control and overheating protection. Delivery separately, installation on site, No use for exclusively electrical heating.



Type	Output [kW]	Voltage [V]	Installation length [mm]	
EP-3	3.0	3 x 400	390	2022 216
EP-4,5	4.5	3 x 400	500	2022 217
EP-6	6.0	3 x 400	620	2022 218

Circulation set with double nipple for CombiSol R

polyethylene hose (cross-linked) fitting for securing the PE hose Y connection piece made of brass Rp 1" - Rp 1" - R 3/4" Double nipple made of brass R 1" - R 5/4" (outer thread/outer thread)



2055 685

Insulated cover flap

incl. malleable iron plug 1 1/2" For sealing and insulating unused connection nozzles 1 1/2". Cover flap made from expanded, closed-cell polypropylene. Manufactured without the use of CFCs. Meets the requirements of EC Directive 2002/95/EC (RoHS).



2055 614

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

for TopTronic® E controller modules/ module expansions with exception of basic module district heating/fresh water or basic module district heating com, cable length: 5 m without plug sensor sleeve diameter: 6 x 50 mm, dewpoint-proof, operating temperature: -20...105 °C, index of protection: IP67



2055 888

■ Part No.

Part No.



Calorifier thermostat control TW 12
 universal storage tank thermostat
 controller for thermostatic pump
 charge demand, setting in
 casing, visible from outside.
 15 - 95 °C, switching differential 6K,
 capillar length 700 mm incl. fastening
 material for Hoval storage tanks, can
 be used with integrated immersion well

6010 080



Thermostatic water mixer TM200
 3-way-mixing valve for regulating
 of the water temperature
 Material: brass
 Connection dimension R 3/4"
 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

2005 915

Further types/sizes

see Solar/Solar armature groups



Connection set AS 20-CS/SAG
 pre-assembled
 For the direct installation of a solar
 armature group.
 For type DN 20: AS 20-CS/SAG
 Consisting of the following pieces
 made of brass:
 2 KFE ball valves with hose connection,
 connection 3/4" outer thread with
 O-ring seal, union nut 1" flat sealing,
 connecting sleeve inner thread/outer
 thread 1"
 1 double nipple 3/4" with O-ring seal,
 1 distance pipe 3/8" 96 mm long, flat
 sealing
 Flat seals not graphitised:
 2 x 30x21x2
 2 x 23x17x2

6025 524

Solar armature group

must be ordered separately.



Connection hose with T-piece
 for EnerVal (800,1000)
 for the hydraulic parallel connection
 of two energy buffer storage tanks
 EnerVal
 Consisting of:
 flexible hose included insulation
 and a T-piece 1 1/2"

6019 013



Connection hose
 for EnerVal (800,1000)
 for the hydraulic parallel connection
 of two energy buffer storage tanks
 EnerVal
 Consisting of:
 flexible hose included insulation 1 1/2"

6019 014

■ Technical data

CombiSol R (800,1000)

Type		(800)	(1000)
• Total volume	dm³	800	1000
• Solar heat exchanger	dm³	19.5	19.5
• Calorifier (corrugated pipe heat exchanger)	dm³	41.6	48.1
Heating water storage			
• Max. working pressure/test pressure	bar	3/4.5	3/4.5
• Max. working temperature	°C	90	90
• Thermal insulation polyester fleece	mm	120	120
• Fire protection class		B2	B2
• Heat loss at 65 °C	W	135.0	143.0
• Weight with thermal insulation	kg	171	178
• Weight without thermal insulation	kg	157	163
• Dimensions and tilting measure		see table of dimensions	
Solar heating battery			
• Heating surface	m²	3.0	3.0
• For flat collectors to approx.	m²	15	15
• Flow resistance ³ water/glycol 50 %	z value	120	120
• Max. working pressure/test pressure	bar	6/9	6/9
• Working temperature maximal	°C	90	90
Calorifier (corrugated pipe heat exchanger)			
• Heating surface	m²	6.0	7.0
• Flow resistance ³ water	z value	11	11
• Max. working pressure/test pressure	bar	6/9	6/9
• Max. working temperature	°C	90	90
• Power characteristic number NL	NL	2	2.5
Hot water outputs			
Continuous output and power consumption ¹			
• At hot water temperature of 80 °C	l/h	2280	2669
	kW	93	109
• At hot water temperature of 60 °C	l/h	765	893
	kW	31	36
• At hot water temperature of 55 °C	l/h	644	751
	kW	26	31
10-min. output ²			
• At hot water temperature of 65 °C	l/10 min.	290	377
• At hot water temperature of 60 °C	l/10 min.	165	222

¹ Cold water 10 °C, hot water 45 °C, with reloading² Cold water 10 °C, hot water 45 °C, storage fully loaded³ Flow resistance heating battery in mbar = volume flow (m³/h)² x z

Screw-in electrical heating inset

made of Incoloy® alloy 825

with temperature control and overheating

protection, connection 3 x 400 V.

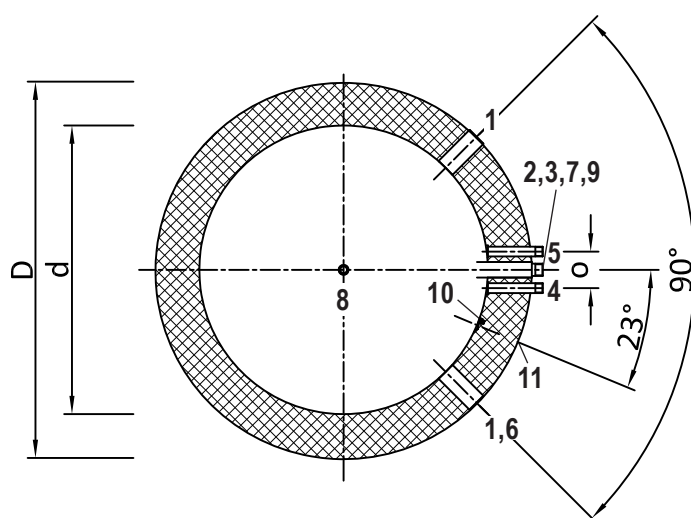
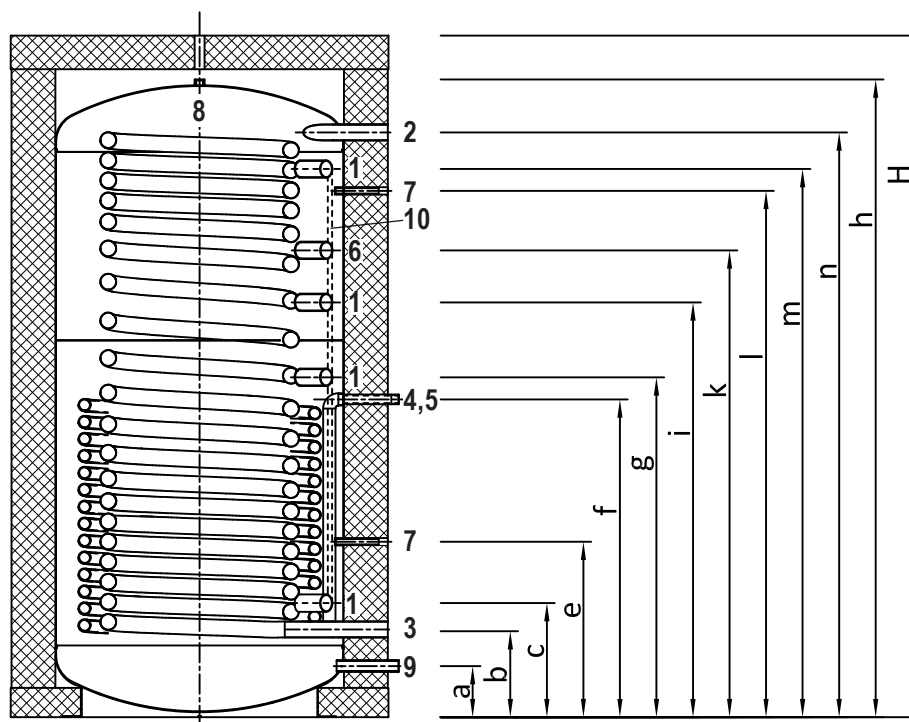
Delivered separately, installation on-site.

No use for exclusively electrical heating.

Type	Heat input [kW]	Voltage [V]	Installation length [mm]
EP-3	3.0	3 x 400	390
EP-4,5	4.5	3 x 400	500
EP-6	6.0	3 x 400	620

■ Dimensions

(Dimensions in mm)



1	Heating connection (8 connections)	Rp 1½"	120 mm
2	Domestic water hot	Rp 1¼"	120 mm
3	Domestic water cold	Rp 1¼"	120 mm
4	Solar flow	R ¾"	150 mm
5	Solar return	¾"	150 mm
6	Connection for screw-in electrical heating inset	Rp 1½"	120 mm
7	Sleeve for temperature sensor, thermostat, thermometer (3 sleeves)	½"	120 mm
8	Air-bleeding	Rp ½"	15 mm
9	Drain	1"	150 mm
10	Sensor terminal bar	(800)	1260 mm
		(1000)	1500 mm
11	Zip insulation		

CombiSol
type

	a	b	c	d	D	e	f	g	h	H	i	k	l	m	n	o	Tilting measure
R (800)	140	240	235	790	1030	480	950	932	1745	1865	1135	1280	1430	1497	1600	100	1835
R (1000)	140	240	309	790	1030	480	950	1006	2025	2145	1209	1370	1635	1699	1895	100	2105

Deviations possible as a result of
manufacturing tolerances.
Dimensions +/- 10 mm

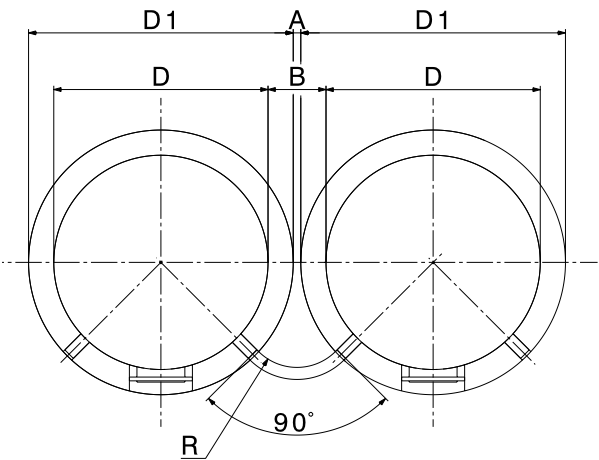
■ Dimensions

(Dimensions in mm)

Connection possibilities

- CombiSol R (800) and energy buffer storage EnerVal (800)
- CombiSol R (1000) and energy buffer storage EnerVal (1000)

CombiSol R EnerVal type	A	B	D	D1	R
(800,1000)	10	250	790	1030	210



■ Description

Hoval UltraSol

Flat collector

- High-performance flat collector, glazed, for thermal utilisation of solar energy
- Optical efficiency 85.1 %
- Solar glass with anti-reflective (AR) surface
- Vertical and horizontal design
- For surface-mounted, flat roof or in-roof installation
- Aluminium full-surface absorber with highly-selective coating
- Copper meander
- Dimensionally stable cast aluminium frame
- Thermal insulation made of mineral wool (20 mm)
- Pluggable collector connections



Hoval UltraSol eco

Flat collector

- Flat collector, glazed, for thermal utilisation of solar energy
- Optical efficiency 78.6 %
- Solar glass without anti-reflective (AR) surface
- Vertical and horizontal design
- For surface-mounted, flat roof or in-roof installation
- Full-surface absorber made from aluminium
- Copper meander
- Dimensionally stable cast aluminium frame
- Thermal insulation made of mineral wool (20 mm)
- Pluggable collector connections

Delivery UltraSol, UltraSol eco

- max. 8 pcs. upright on each pallet

Collector Type	Installation	Gross collector surface area m ²	Absorber surface area m ²
UltraSol V	vertical	2.52	2.36
UltraSol H	horizontal	2.52	2.36
UltraSol eco V	vertical	2.52	2.36
UltraSol eco H	horizontal	2.52	2.36

Approval Solar Keymark

Hoval UltraSol	Nr. 011-7S2227F
Hoval UltraSol eco	Nr. 011-7S2228F

Installation sets

- On-roof installation parallel and elevated (0°, 20°, 30°, 45°) horizontal and vertical 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 horizontal and vertical 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.

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.

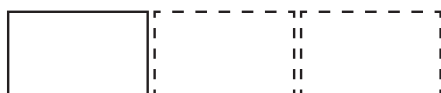


Solarkeymark-certified

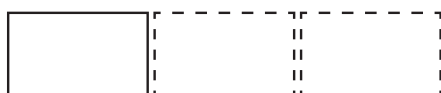
■ Part No.



UltraSol



UltraSol eco



Installation set
See following pages

Flat-panel collectors Hoval UltraSol, UltraSol eco

Part No.

UltraSol

- High-performance flat collector for solar systems with water/glycol mixture as heat transfer medium
- Selectively coated absorber
- Optical efficiency $\eta_0 = 85.1\%$

Flat collector - vertical installation type

UltraSol type	Collector surface area		Number of collectors units
	Gross m ²	Absorber m ²	
1V	2.52	2.36	1
2V	5.04	4.72	2
3V	7.56	7.08	3
4V	10.08	9.44	4
5V	12.60	11.80	5
6V	15.12	14.16	6
7V	17.64	16.52	7
8V	20.16	18.88	8

6032 715
6032 716
6032 717
6032 718
6032 719
6032 720
6032 721
6032 722

Flat collector - horizontal installation type

UltraSol type	Collector surface area		Number of collectors units
	Gross m ²	Absorber m ²	
1H	2.52	2.36	1
2H	5.04	4.72	2
3H	7.56	7.08	3
4H	10.08	9.44	4
5H	12.60	11.80	5
6H	15.12	14.16	6
7H	17.64	16.52	7
8H	20.16	18.88	8

6032 744
6032 745
6032 746
6032 747
6032 748
6032 749
6032 750
6032 751

UltraSol eco

- Flat collector for solar systems with water/glycol mixture as heat transfer medium
- Selectively coated absorber
- Optical efficiency $\eta_0 = 78.6\%$

Flat collector - vertical installation type

UltraSol eco type	Collector surface area		Number of collectors units
	Gross m ²	Absorber m ²	
1V	2.52	2.36	1
2V	5.04	4.72	2
3V	7.56	7.08	3
4V	10.08	9.44	4
5V	12.60	11.80	5
6V	15.12	14.16	6
7V	17.64	16.52	7
8V	20.16	18.88	8

6032 875
6032 876
6032 877
6032 878
6032 879
6032 880
6032 881
6032 882

Flat collector - horizontal installation type

UltraSol eco type	Collector surface area		Number of collectors units
	Gross m ²	Absorber m ²	
1H	2.52	2.36	1
2H	5.04	4.72	2
3H	7.56	7.08	3
4H	10.08	9.44	4
5H	12.60	11.80	5
6H	15.12	14.16	6
7H	17.64	16.52	7
8H	20.16	18.88	8

6032 883
6032 884
6032 885
6032 886
6032 887
6032 888
6032 889
6032 890

■ Part No.



On-roof installation

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



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

Part No.

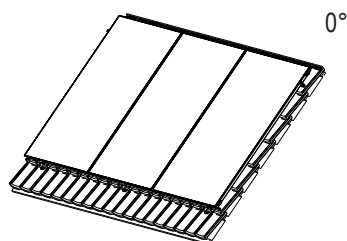
Substructure and hydraulics (without roof connection)

Substructure and hydraulic for on-roof installation vertical and horizontal 0°

- for Hoval flat collectors UltraSol, UltraSol eco
- 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. 20°

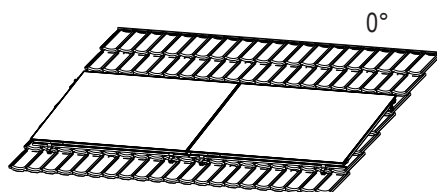
Consisting of:

- complete fitting accessories (without roof connection)
- hydraulic collector connections and connections:
 - 3-layer sealed elastic connection pipes
 - 1 unit 90° elbow with immersion sleeve for collector sensor, 1 unit 90° elbow
 - dummy plug, man. air vent



for number of collectors vertical
per collector field
units

	Installation set	
1	AD0V-1	6037 796
2	AD0V-2	6037 797
3	AD0V-3	6037 798
4	AD0V-4	6037 799
5	AD0V-5	6037 800
6	AD0V-6	6037 801
7	AD0V-7	6037 802
8	AD0V-8	6037 803
9	AD0V-9	6037 804
10	AD0V-10	6037 805



for number of
collectors horizontal
per collector field units

	Installation set	
1	AD0H-1	6037 601
2	AD0H-2	6037 602
3	AD0H-3	6037 813
4	AD0H-4	6037 814
5	AD0H-5	6037 815
6	AD0H-6	6037 816

■ Part No.



On-roof installation

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



Installation sets for on-roof installation

side-by-side, vertical and horizontal 20°, 30°, 45°

Part No.

Substructure and hydraulics

(without roof connection)

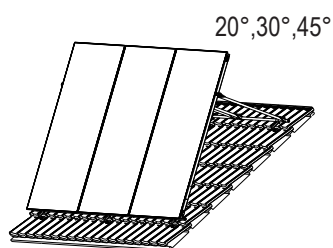
Substructure and hydraulic for on-roof installation

vertical and horizontal 20°, 30°, 45°

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

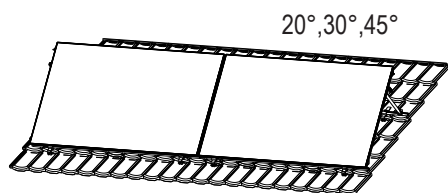
Consisting of:

- complete fitting accessories (without roof connection)
- hydraulic collector connections and connections:
 - 3-layer sealed elastic connection pipes
 - 1 unit 90° elbow with immersion sleeve for collector sensor, 1 unit 90° elbow
 - dummy plug, man. air vent
- Adjustable elevation angle 20°, 30°, 45°



for number of collectors vertical
per collector field
units

	Installation set	
1	AD20-45V-1	6037 825
2	AD20-45V-2	6037 826
3	AD20-45V-3	6037 827
4	AD20-45V-4	6037 828
5	AD20-45V-5	6037 829
6	AD20-45V-6	6037 830
7	AD20-45V-7	6037 831
8	AD20-45V-8	6037 832
9	AD20-45V-9	6037 833
10	AD20-45V-10	6037 834



for number of
collectors horizontal
per collector field units

	Installation set	
1	AD20-45H-1	6037 837
2	AD20-45H-2	6037 838
3	AD20-45H-3	6037 839
4	AD20-45H-4	6037 840
5	AD20-45H-5	6037 841
6	AD20-45H-6	6037 842

■ Part No.

Roof connections for on-roof installation

Part No.

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
consisting of
- 2 roof bars
- Screw set US-SHS

6037 731



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

6037 764



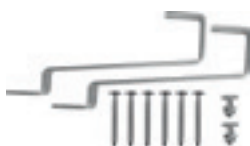
Packing plate 2mm
for levelling the roof bars

2061 367



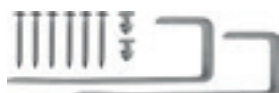
Packing plate 3mm
for levelling the roof bars

2061 368



Roof bar set plain tile
for attaching the carrier profiles for
on-roof attachment of UltraSol
consisting of
- 2 roof bars
- Screw set US-SHS
- Installation set T-head bolt

6037 767



Roof bar set slate/flat Eternit
for attaching the carrier profiles for
on-roof attachment of UltraSol
consisting of
- 2 roof bars
- Screw set US-SHS
- Installation set T-head bolt

6037 769



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

6037 770

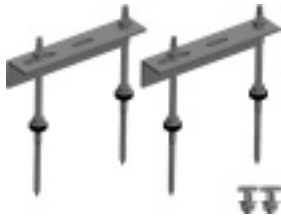
■ Part No.



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

Part No.

6037 771



Double level screw set
for attaching the carrier profiles for
on-roof attachment of UltraSol
consisting of
- 2 double level screws US-DSS
- Installation set T-head bolt

6037 772



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

6037 775



Installation set US BSES
Collector attachment expansion set
Attachment on concrete base between
collectors
consisting of
- 2 collector middle terminals cpl.

6040 034



Installation set US BSGS
Collector attachment basic set
Attachment on concrete base, starting
and final attachment of the collector
consisting of
- 4 collector end terminals cpl.

6040 035

■ Part No.

**Metal tiles and roof bushings
for concrete, clay and plain tiles**
Part No.


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 exchanging the roof tile
(e.g. Eternit slabs, slate slabs)
galvanised version

2057 264



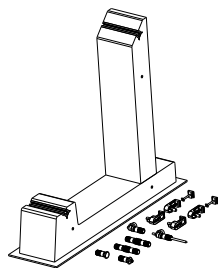
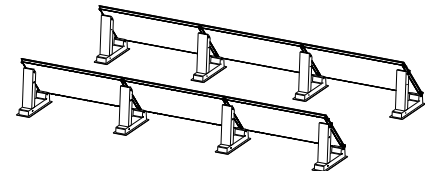
Roof bushing, type slate
for tube bushing (1 tube) through the
roof cladding (e.g. Eternit slabs,
slate slabs)
galvanised version, 2 pieces

2057 265

■ Part No.



Flat roof mounting
Concrete base



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

Part No.

Flat roof - concrete base
45°, horizontal

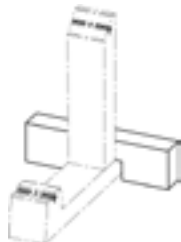
- for Hoval flat collectors UltraSol H, UltraSol eco H
- for flat roof installation 45°
- with concrete base

- Comprising:
- Two-part concrete base
 - Weight: 92 kg
 - Protective mat with aluminium lining
 - Complete fitting accessories (retaining bars, screws..)
 - Hydraulic collector connections and connections:
 - 3-layer sealed, elastic connection pipes
 - 1 unit 90° elbow with immersion sleeve for collector sensor, 1 unit 90° elbow
 - Dummy plug, man. air vent

for number
of collectors
per collector
field units

Installation set

1	FDBS45H-1	6040 041
2	FDBS45H-2	6040 042
3	FDBS45H-3	6040 053
4	FDBS45H-4	6040 054
5	FDBS45H-5	6040 055
6	FDBS45H-6	6040 056
7	FDBS45H-7	6040 057
8	FDBS45H-8	6040 058
9	FDBS45H-9	6040 059
10	FDBS45H-10	6040 060
11	FDBS45H-11	6040 061
12	FDBS45H-12	6040 062



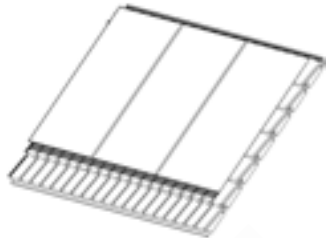
Additional weight for concrete base
for UltraSol H, UltraSol eco H
for the increase of the loading weight
in areas with increased wind loads or
on high buildings.
Number of additional weights acc. to
static calculations.
Collector height above installation
surface: approx. 200 mm
L/W/H: 740/120/200 mm
Additional weight approx. 34 kg

2053 055

■ Part No.



Roof inlay mounting



Installation sets

Roof inlay mounting

side-by-side, vertical

Part No.

In-roof - side-by-side, vertical

- for Hoval flat collectors UltraSol 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
- Hydraulic collector connections and connections:
 - 3-layer sealed elastic connection pipes
 - 1 unit 90° elbow with immersion sleeve for collector sensor, 1 unit 90° elbow
 - Dummy plug, man. air vent
- Complete sheet-metal flashing made from coated aluminium, RAL 7016

for number
of collectors
per collector
field units

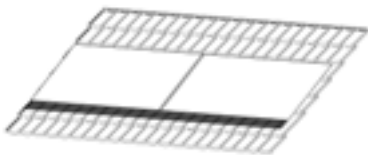
Installation set

1	IDNV-1	6032 141
2	IDNV-2	6032 142
3	IDNV-3	6032 143
4	IDNV-4	6032 144
5	IDNV-5	6032 145
6	IDNV-6	6032 146
7	IDNV-7	6032 147
8	IDNV-8	6032 148
9	IDNV-9	6034 833
10	IDNV-10	6034 834
11	IDNV-11	6034 835
12	IDNV-12	6034 836

■ Part No.



Roof inlay mounting



Installation sets
Roof inlay mounting
side-by-side, horizontal

Part No.

- In-roof - side-by-side, horizontal**
- for Hoval flat collectors UltraSol 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
 - Hydraulic collector connections and connections:
 - 3-layer sealed elastic connection pipes
 - 1 unit 90° elbow with immersion sleeve for collector sensor, 1 unit 90° elbow
 - Dummy plug, man. air vent
 - Complete sheet-metal flashing made from coated aluminium, RAL 7016

for number of collectors per collector field units	Installation set	
1	IDNH-1	6032 151
2	IDNH-2	6032 152
3	IDNH-3	6032 153
4	IDNH-4	6032 154
5	IDNH-5	6032 155
6	IDNH-6	6032 156
7	IDNH-7	6032 157
8	IDNH-8	6032 158
9	IDNH-9	6034 837
10	IDNH-10	6034 838
11	IDNH-11	6034 839
12	IDNH-12	6034 840

■ Part No.



Roof inlay mounting



Installation sets
Roof inlay mounting
one over another, vertical

Part No.

- In-roof - one over another, vertical**
- for Hoval flat collectors UltraSol 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
 - Hydraulic collector connections and connections:
 - 3-layer sealed elastic connection pipes
 - 1 unit 90° elbow with immersion sleeve for collector sensor, 1 unit 90° elbow
 - Connection pipe between upper and lower row
 - Dummy plug, man. air vent
 - Complete sheet-metal flashing made from coated aluminium, RAL 7016

for number
of collectors
per collector
field units

Installation set

Further variants
see individual sets "in-roof"



IDUV - 2U

6032 159



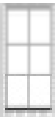
IDUV - 2U-2N

6032 160



IDUV - 2U-3N

6032 161



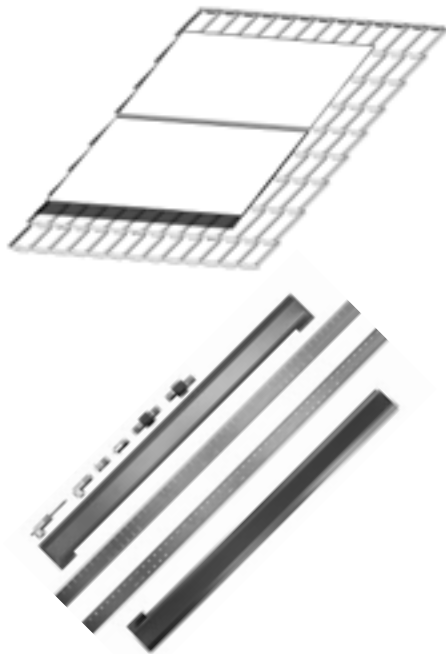
IDUV - 3U-2N

6032 162

■ Part No.



Roof inlay mounting





Further variants
see individual sets “in-roof”

Installation sets
Roof inlay mounting
one over another, horizontal

Part No.

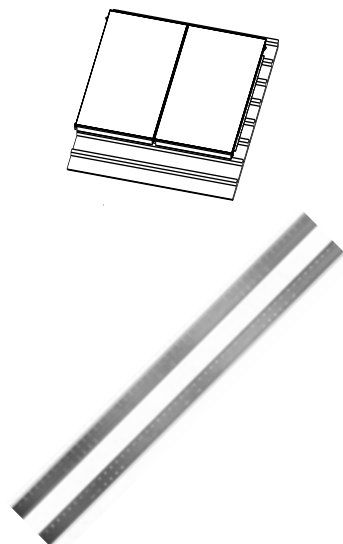
- In-roof - one over another, horizontal**
- for Hoval flat collectors UltraSol H, UltraSol eco H
 - for in-roof installation
 - Sheet-metal flashing in a tiled roof (e.g. interlocking tiles, sliding tile, plain tiles)
 - minimum roof pitch 25° (sheet metal)
 - leaktight subroof necessary
- Comprising:
- Complete fitting accessories for attachment on cross battens
 - Hydraulic collector connections and connections:
 - 3-layer sealed elastic connection pipes
 - 1 unit 90° elbow with immersion sleeve for collector sensor, 1 unit 90° elbow
 - Connection pipe between upper and lower row
 - Dummy plug, man. air vent
 - Complete sheet-metal flashing made from coated aluminium, RAL 7016

for number of collectors per collector field units	Installation set	
	IDNH - 3U	6032 163
	IDNH - 3U-2N	6032 164

■ Part No.



Roof inlay mounting
Sheet-metal flashing provided by
the customer

**Installation sets****in-roof installation - Sheet-metal flashing
provided by the customer**

side-by-side, vertical

Part No.**In-roof - side-by-side, vertical**

- for Hoval flat collectors UltraSol V, UltraSol eco V
- for in-roof installation
- without sheet-metal flashing
- for fastening on tiled roof
(e.g. interlocking tiles, sliding tile, plain tiles)
- Minimum roof pitch is determined by the
sheet-metal flashing provided by the
customer (not allowed to be less than 20°).
- leaktight subroof necessary

Comprising:

- Complete fitting accessories
for attachment on cross battens
- Hydraulic collector connections and connections:
 - 3-layer sealed elastic connection pipes
 - 1 unit 90° elbow with immersion sleeve
for collector sensor, 1 unit 90° elbow
 - Dummy plug, man. air vent

for number
of collectors
per collector
field units

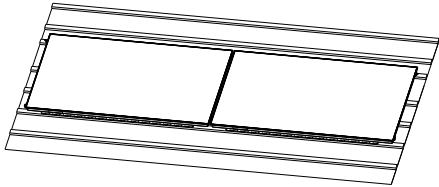
Installation set

1	IDNV-1 - oB	6032 171
2	IDNV-2 - oB	6032 172
3	IDNV-3 - oB	6032 173
4	IDNV-4 - oB	6032 174
5	IDNV-5 - oB	6032 175
6	IDNV-6 - oB	6032 176
7	IDNV-7 - oB	6032 177
8	IDNV-8 - oB	6032 178
9	IDNV-9 - oB	6034 843
10	IDNV-10 - oB	6034 844
11	IDNV-11 - oB	6034 845
12	IDNV-12 - oB	6034 846

■ Part No.



Roof inlay mounting
Sheet-metal flashing provided by
the customer



Installation sets
in-roof installation - Sheet-metal flashing
provided by the customer
side-by-side, horizontal

Part No.

- In-roof - side-by-side, horizontal**
- for Hoval flat collectors UltraSol H, UltraSol eco H
 - for in-roof installation
 - without sheet-metal flashing
 - for fastening on tiled roof
(e.g. interlocking tiles, sliding tile, plain tiles)
 - Minimum roof pitch is determined by the
sheet-metal flashing provided by the
customer (not allowed to be less than 20°).
 - leaktight subroof necessary

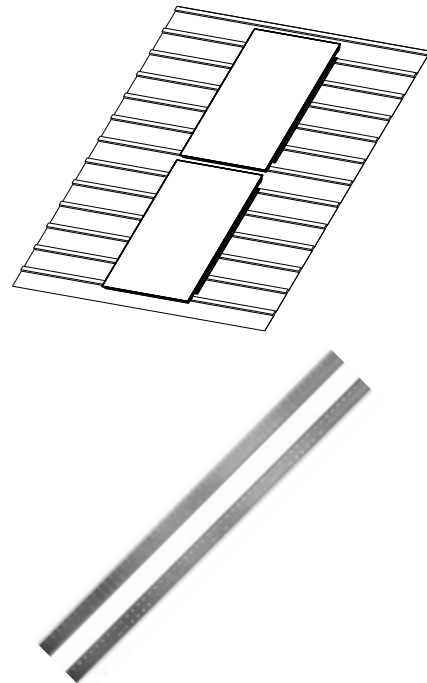
- Comprising:
- Complete fitting accessories
for attachment on cross battens
 - Hydraulic collector connections and connections:
 - 3-layer sealed elastic connection pipes
 - 1 unit 90° elbow with immersion sleeve
for collector sensor, 1 unit 90° elbow
 - Dummy plug, man. air vent

for number of collectors per collector field units	Installation set	
1	IDNH-1 - oB	6032 181
2	IDNH-2 - oB	6032 182
3	IDNH-3 - oB	6032 183
4	IDNH-4 - oB	6032 184
5	IDNH-5 - oB	6032 185
6	IDNH-6 - oB	6032 186
7	IDNH-7 - oB	6032 187
8	IDNH-8 - oB	6032 188
9	IDNH-9 - oB	6034 847
10	IDNH-10 - oB	6034 848
11	IDNH-11 - oB	6034 849
12	IDNH-12 - oB	6034 850

■ Part No.



Roof inlay mounting
Sheet-metal flashing provided by
the customer



Installation sets
in-roof installation - Sheet-metal flashing
provided by the customer
one over another, vertical

Part No.

- In-roof - one over another, vertical**
- for Hoval flat collectors UltraSol V,
UltraSol eco V
 - for in-roof installation
 - without sheet-metal flashing
 - for fastening on tiled roof
(e.g. interlocking tiles, sliding tile, plain tiles)
 - Minimum roof pitch is determined by the
sheet-metal flashing provided by the
customer (not allowed to be less than 20°).
 - leaktight subroof necessary

- Comprising:
- Complete fitting accessories
for attachment on cross battens
 - Hydraulic collector connections
and connections:
 - 3-layer sealed elastic connection pipes
 - 1 unit 90° elbow with immersion sleeve
for collector sensor, 1 unit 90° elbow
 - Connection pipe between upper
and lower row
 - Dummy plug, man. air vent

for number
of collectors
per collector
field units

Installation set



IDUV - 2U - oB

6032 189



IDUV - 2U-2N - oB

6032 190



IDUV - 2U-3N - oB

6032 191



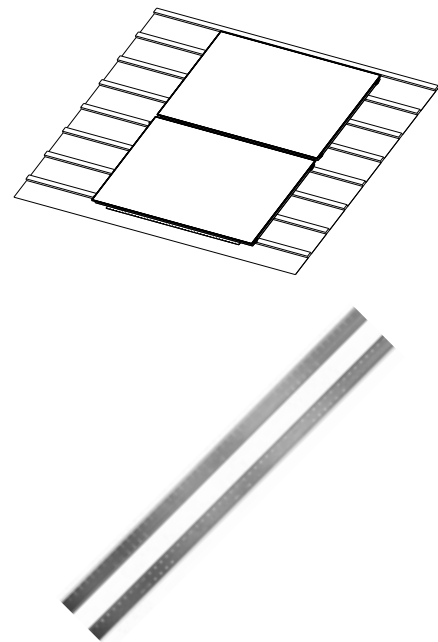
IDUV - 3U-2N - oB

6032 192

■ Part No.



Roof inlay mounting
Sheet-metal flashing provided by
the customer



**Installation sets in-roof installation -
Sheet-metal flashing provided by the customer**
one over another, horizontal

Part No.

- In-roof - one over another, horizontal**
- for Hoval flat collectors UltraSol H,
UltraSol eco H
 - for in-roof installation
 - without sheet-metal flashing
 - for fastening on tiled roof
(e.g. interlocking tiles, sliding tile, plain tiles)
 - Minimum roof pitch is determined by the
sheet-metal flashing provided by the cus-
tomer (not allowed to be less than 20°).
 - leaktight subroof necessary
- Comprising:
- Complete fitting accessories
for attachment on cross battens
 - Hydraulic collector connections
and connections:
 - 3-layer sealed elastic connection pipes
 - 1 unit 90° elbow with immersion sleeve
for collector sensor, 1 unit 90° elbow
 - Dummy plug, man. air vent

for number
of collectors
per collector
field units

Installation set



IDUH - 3U - oB

6032 193



IDNH - 3U-2N - oB

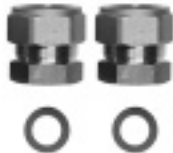
6032 194

■ Part No.

**Solar cables****Part No.**

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	2054 140
SL 1520	DN 15	20	2054 141
SL 1525	DN 15	25	2054 142
SL 2015	DN 20	15	2054 143
SL 2020	DN 20	20	2054 154
SL 2025	DN 20	25	2054 155
SL 2515	DN 25	15	2054 156
SL 2520	DN 25	20	2054 157
SL 2525	DN 25	25	2054 158

**Connection set collector flow/return**

for connecting the Hoval solar cable to the collector. Solar cable side with metal sealing. Collector side with flat seal (PTFE, Teflon resistant to temperatures up to 260 °C).

Size solar cable	Connection fitting	
DN 15	Rp 3/4"	6026 408
DN 20	Rp 3/4"	6026 409
DN 25	Rp 3/4"	6026 410

**Connection set armature group flow/return**

for connecting the Hoval solar cables to a solar armature group 3/4" (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 3/4"	6026 411
DN 20	R 3/4"	6026 412
DN 25	R 3/4"	6026 413

**T-piece set flow/return**

for connecting several collector fields to a common Hoval solar cable. with metal sealing

DN 15 (all 3 connections)	6026 405
DN 20 (all 3 connections)	6026 406
DN 25 (all 3 connections)	6026 407

**Connection coupling**

for extending the solar cable

Type		
VKSL15	to solar cable DN 15	2054 159
VKSL20	to solar cable DN 20	2054 160
VKSL25	to solar cable DN 25	2054 161

■ Part No.

Part No.



Connection set type WES DN 20
for connecting a collector field
(with connecting angles) to a
pipeline created by the customer.
2 st. steel corrugated pipes w/13mm PE
heat insulation, incl. screw connection,
3/4" or 22x1x100 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 st. steel corrugated pipes w/13mm PE
heat insulation, incl. screw connection,
3/4" or 22x1x100 mm copper solder bush,
L: 3000 mm

2062 006



**Transition screw connection
to connection set WES**
Compression fitting 3/4" AG fits
22 x 1 mm copper end piece for
further installation with steel pipe
Price includes 2 pieces

2054 163

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

■ Part No.



Individual hydraulic sets

Part No.

Basic hydraulic set GS

6031 626

for hydraulic connection of a collector field.
Consisting of:
1 connection bracket 90° ¾" outer thread
1 connection bracket 90° ¾" outer thread
with immersion sleeve for collector sensor
1 air vent plug
1 dummy plug
4 locking clips
Silicone grease
Collector connections 3-way sealed.


Hydraulic basic set BS concrete base

6035 435

for hydraulic connection of a collector field with concrete base attachment.
Consisting of:
1 pce. straight connection fitting, ¾" ET
1 pce. connection bracket 90°, ¾" ET
with immersion sleeve for collector sensor
1 pce. air vent plug
1 pce. dummy plug
4 pcs. locking clips
Silicone grease
Collector connections 3-way sealed.


Hydraulic expansion set ESN

6031 627

for hydraulic connection of the collectors side-by-side.
Consisting of:
2 3-layer sealed elastic collector connections
4 locking clips
Silicone grease


Hydraulic expansion set ESU - surface-mounted

6031 628

for serial connection of fields one above each other (surface-mounted).
Max. number of bends: 2 pieces
Max. number of collectors in the fields to be connected: 6 pieces
Consisting of:
1 3-layer sealed elastic connection bracket 90°
Pipe centre distance 171 mm
1 dummy plug, 3-layer sealed
1 locking clip
Silicone grease


Hydraulic expansion set BLESU - in-roof

6031 629

for serial connection of fields one above each other (in-roof).
Max. number of bends: 2 pieces
Max. number of collectors in the fields to be connected: 6 pieces
Consisting of:
1 3-layer sealed elastic connection bracket 90°
Pipe centre distance 225 mm
1 dummy plug, 3-layer sealed
1 locking clip
Silicone grease

■ Part No.


Hydraulic spare parts set

Consisting of:
3 O-rings
1 locking clip
Silicone grease

Part No.

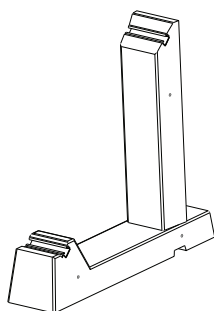
6032 707


Connection bracket 90°, 3/4"
without immersion sleeve

2053 411

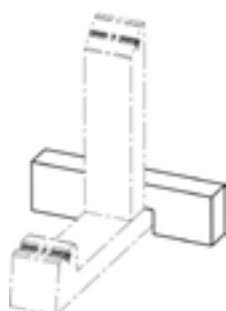

Connection fitting straight, 3/4" ET
Triple sealing on collector side

2057 573

Individual sets concrete base

Concrete base 45° cpl.

2-piece, slope 45° with cast-in holder
tube section for collector attachment
incl. folding split pin 6/40/33 galv.
for protection against lifting off
L/W/H: 930/190/865 mm
Weight: approx. 92 kg

6040 040


Additional weight for concrete base

for UltraSol H, UltraSol eco H
for the increase of the loading weight
in areas with increased wind loads or
on high buildings.
Number of additional weights acc. to
static calculations.
Collector height above installation
surface: approx. 200 mm
L/W/H: 740/120/200 mm
Additional weight approx. 34 kg















2053 055


Protective mat with aluminium lining














for concrete base
for protecting the roof cladding
and compensating irregularities
L/W/H: 1000/260/6 mm

2061 579

■ Part No.

	Individual sets / further installation sets	Part No.
	Roof bar US-DBAV - adj. tile for attaching the carrier profiles for on-roof attachment of UltraSol 1 pce w/o screw set US-SHS	6037 730
	Roof bar US-DBCV - tile HD for attaching the carrier profiles for on-roof attachment of UltraSol 1 pce w/o screw set US-SHS Version stainless steel high load	6037 763
	Screw set roof bars US-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 US-SS - individual M12x300 incl. quick-mount adapter incl. EPDM seal	2061 347
	Double level screw US-DSS 2xM12x300 incl. mounting plate incl. EPDM seals	2061 348
	Roof bar US-DBC - type plain for attaching the carrier profiles for on-roof attachment of UltraSol 1 pce w/o screw set US-SHS	2061 344
	Roof bar US-DBC - slate for attaching the carrier profiles for on-roof attachment of UltraSol 1 pce w/o screw set US-SHS	2061 398
	Installation set T-head bolt 2x bolt and nut	6037 766
	Clamp US-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.

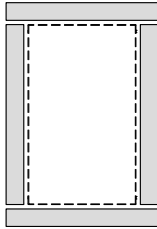
		Part No.
	Carrier profile ADKBV cpl. 1330mm On-roof short base vertical	6037 776
	Carrier profile ADLBV cpl. 1960mm On-roof long base vertical	6037 777
	Carrier profile ADKEV cpl. 1247mm On-roof short expansion vertical incl. profile connector 45 cpl.	6037 783
	Carrier profile ADLEV cpl. 1872mm On-roof long expansion vertical incl. profile connector 45 cpl.	6037 784
	Carrier profile ADBH cpl. 2150mm On-roof base horizontal	6037 785
	Carrier profile ADEH cpl. 2065mm On-roof expansion horizontal incl. profile connector 45 cpl.	6037 786
	Profile connector 45 cpl. incl. self-tapping screws	6037 787
	Elevation 20, 30, 45° V cpl. vertical version incl. 4 cross-connectors cpl.	6037 789
	Elevation 20, 30, 45° H cpl. horizontal version incl. 4 cross-connectors cpl.	6037 790
	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
	Installation set US ADGS collector attachment basic set consisting of - 4 US collector end clamps cpl. - 4 end caps 45 Hoval - 2 anti-slip protectors	6037 792
	Installation set US ADES collector attachment expansion set consisting of - 2 US collector middle clamps cpl. - 2 anti-slip protectors	6037 794

■ Part No.

Individual sets "in-roof"

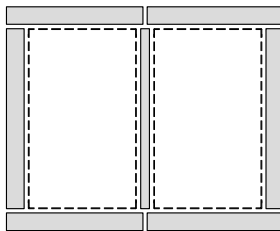
Part No.

Information for arranging the variants can be found in the section following the individual sets.


Basic set in-roof BLGS 1V

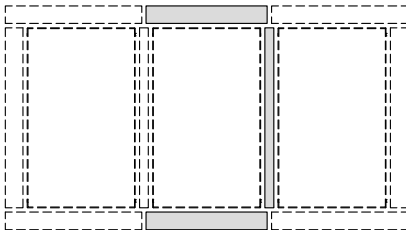
6031 630

Set for in-roof mounting of
1 collector UltraSol V / UltraSol eco V
comprising: Collector fastening rails
Fastening material
Collector stop individual collector
Ridge sheet indiv. coll. incl. supports
Eaves sheet individual collector
Side sheets left and right


Basic set in-roof BLGS 2VN

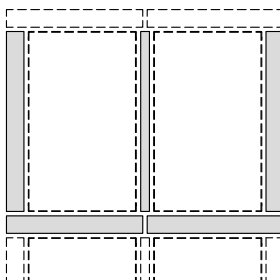
6031 631

Set for in-roof mounting of
2 collectors UltraSol V / UltraSol eco V
adjacent to one another
comprising: Collector fastening rails
Fastening material
Collector stops for 2 collectors
Ridge sheets for 2 coll. incl. supports
Eaves sheets for 2 collectors
Side sheets left and right
Intermediate sheet


Expansion set in-roof BLES 1VN

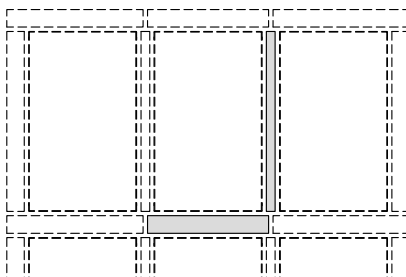
6031 632

Set for in-roof mounting of one
additional collector UltraSol V /
UltraSol eco V, adjacent to one another
comprising: Collector fastening rails
Fastening material
Collector stop middle
Ridge sheet middle incl. supports
Eaves sheet middle
Intermediate sheet


Expansion set in-roof BLES 2VU

6031 633

Set for in-roof mounting of two
additional collectors UltraSol V /
UltraSol eco V, one above the other
comprising: Collector fastening rails
Fastening material
Spacer
Middle sheets including connector
Side sheets left and right
Intermediate sheet

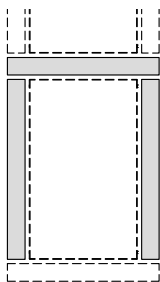

Expansion set in-roof BLES 1VUN

6031 634

Set for in-roof mounting of one
additional collector UltraSol V /
UltraSol eco V, adj. & above one another
comprising: Collector fastening rails
Fastening material
Spacer
Middle sheets including connector
Intermediate sheet

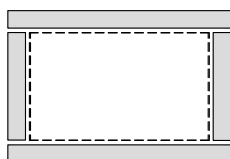
■ Part No.

Part No.


Expansion set in-roof BLES 1VU

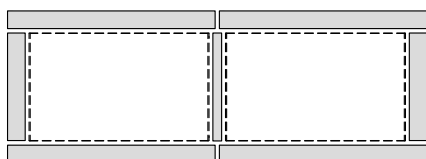
Set for in-roof mounting of one additional collector UltraSol V / UltraSol eco V, one above the other comprising: Collector fastening rails
Fastening material
Spacer
Middle sheets including connector
Side sheets left and right

6031 635


Basic set in-roof BLGS 1H

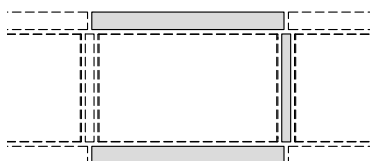
Set for in-roof mounting of 1 collector UltraSol H / UltraSol eco H comprising: Collector fastening rails
Fastening material
Collector stop individual collector
Ridge sheet individual collector incl. supports
Eaves sheet individual collector
Side sheets left and right

6031 636


Basic set in-roof BLGS 2HN

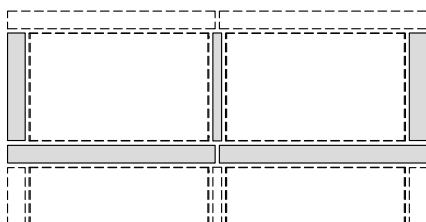
Set for in-roof mounting of 2 collectors UltraSol H / UltraSol eco H adjacent to one another comprising: Collector fastening rails
Fastening material
Collector stops for 2 collectors
Ridge sheets for 2 collectors incl. supports
Eaves sheets for 2 collectors
Side sheets left and right
Intermediate sheet

6031 637


Expansion set in-roof BLES 1HN

Set for in-roof mounting of one additional collector UltraSol H / UltraSol eco H, adjacent to one another comprising: Collector fastening rails
Fastening material
Collector stop middle
Ridge sheet middle incl. supports
Eaves sheet middle
Intermediate sheet

6031 638

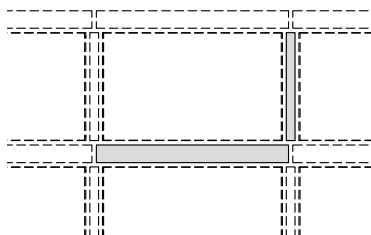

Expansion set in-roof BLES 2HU

Set for in-roof mounting of two additional collectors UltraSol H / UltraSol eco H, one above the other comprising: Collector fastening rails
Fastening material
Spacer
Middle sheets including connector
Side sheets left and right
Intermediate sheet

6031 639

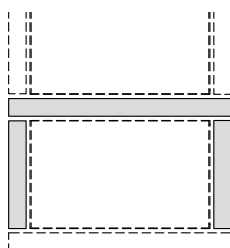
■ Part No.

Part No.


Expansion set in-roof BLES 1HUN

Set for in-roof mounting of one additional collector UltraSol H / UltraSol eco H, adj. & above one another comprising: Collector fastening rails
Fastening material
Spacer
Middle sheets including connector
Intermediate sheet

6031 640


Expansion set in-roof BLES 1HU

Set for in-roof mounting of one additional collector UltraSol H / UltraSol eco H, one above the other comprising: Collector fastening rails
Fastening material
Spacer
Middle sheets including connector
Side sheets left and right

6031 641


Intermediate plate, vertical

vertical covering strip for covering between 2 collectors

2054 245


Intermediate plate, horizontal

horizontal covering strip for covering between 2 collectors

2054 285


Collector fastening set in-roof KBSI vertical

for fastening a collector on the cross battens.
Consisting of:

- collector retaining strip left + right
- set of screws

6032 170


Collector fastening set in-roof KBSI horizontal

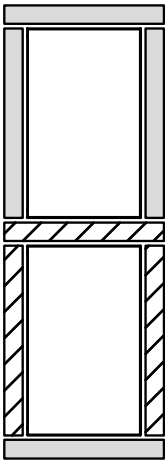
for fastening a collector on the cross battens.
Consisting of:

- collector retaining strip left + right
- set of screws

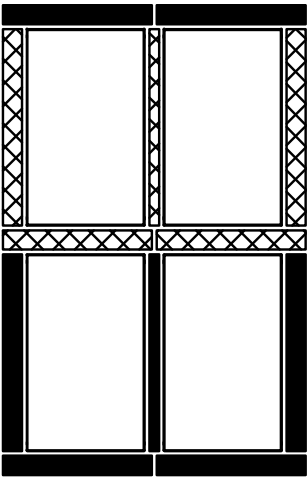
6032 829

■ Order example

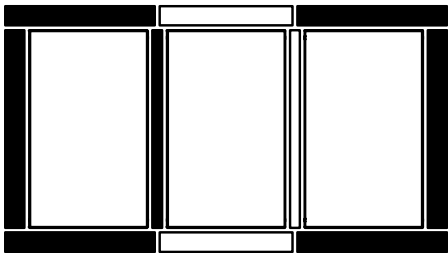
Examples for individually arranged in-roof sets for different collector surfaces



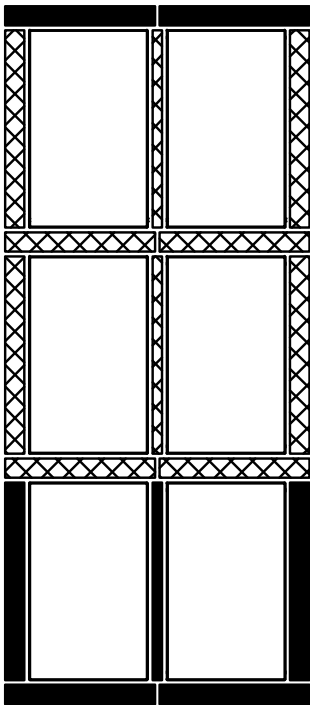
- to be ordered:
- 1 x 6031 630 **basic set in-roof BLGS 1V**
 - 1 x 6031 635 **expansion set in-roof BLES 1VU**



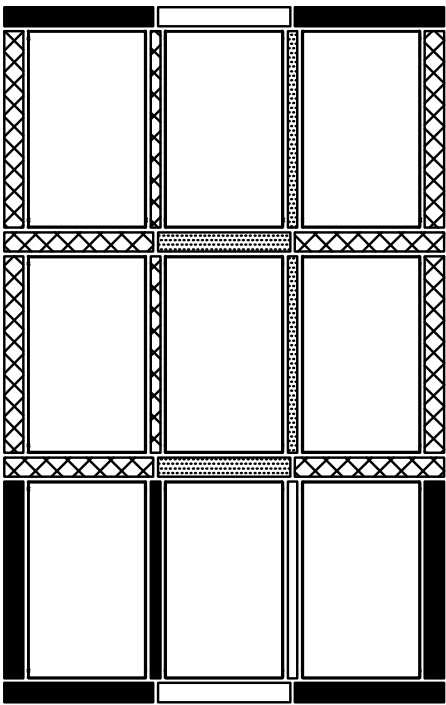
- to be ordered:
- 1 x 6031 631 **basic set in-roof BLGS 2VN**
 - 1 x 6031 633 **expansion set in-roof BLES 2VU**



- to be ordered:
- 1 x 6031 631 **basic set in-roof BLGS 2VN**
 - 1 x 6031 632 **expansion set in-roof BLES 1VN**



- to be ordered:
- 1 x 6031 631 **basic set in-roof BLGS 2VN**
 - 2 x 6031 633 **expansion set in-roof BLES 2VU**



- to be ordered:
- 1 x 6031 631 **basic set in-roof BLGS 2VN**
 - 1 x 6031 632 **expansion set in-roof BLES 1VN**
 - 2 x 6031 633 **expansion set in-roof BLES 2VU**
 - 2 x 6031 634 **expansion set in-roof BLES 1VUN**

■ Technical data

Hoval UltraSol, UltraSol eco

Type		UltraSol		UltraSol eco	
		V	H	V	H
Optical efficiency ¹	%	85.1	85.1	78.6	78.6
a ₁ ¹	W/(m²K)	4.107	4.107	4.360	4.360
a ₂ ¹	W/(m²K²)	0.016	0.016	0.012	0.012
<i>Reference surfaces</i>					
• Total surface area	m²	2.522	2.522	2.522	2.522
• Aperture surface	m²	2.4	2.4	2.4	2.4
• Absorber surface	m²	2.36	2.36	2.36	2.36
<i>Collector/casing</i>					
• Design					
• Length, width, height					
• Material					
• Weight	kg	39	39	39	39
<i>Absorber</i>					
• Surface treatment					
• Absorption level	%	95	95	95	95
• Emissions level	%	5	5	5	5
• Heat transfer medium content	l	2.53	2.92	2.08	2.67
• Flow shape					
• Number of connections					
• Configuration of connections					
<i>Glass cover (transparent cover)</i>					
• Product name					
• Transmission level	%				
• Thickness	mm				
<i>Thermal insulation</i>					
• Material					
• Heat conductivity	W/(mK)	0.04	0.04	0.04	0.04
• Thermal capacity	kJ (kgK)	840	840	840	840
• Thickness	mm	20	20	20	20
<i>Application limits</i>					
• Max. operating temperature	°C	190	190	190	190
• Max. perm. operating pressure	bar	10	10	10	10
• Permitted heat transfer medium					
• Specific flow rate approx.	l/(h m²)	15-40	15-40	15-40	15-40
• Nominal flow per collector approx.	l/h	40-100	40-100	40-100	40-100
• Min. collector pitch					
• Max. collector pitch					

¹ In relation to the aperture surface:

Efficiency with TM = TA

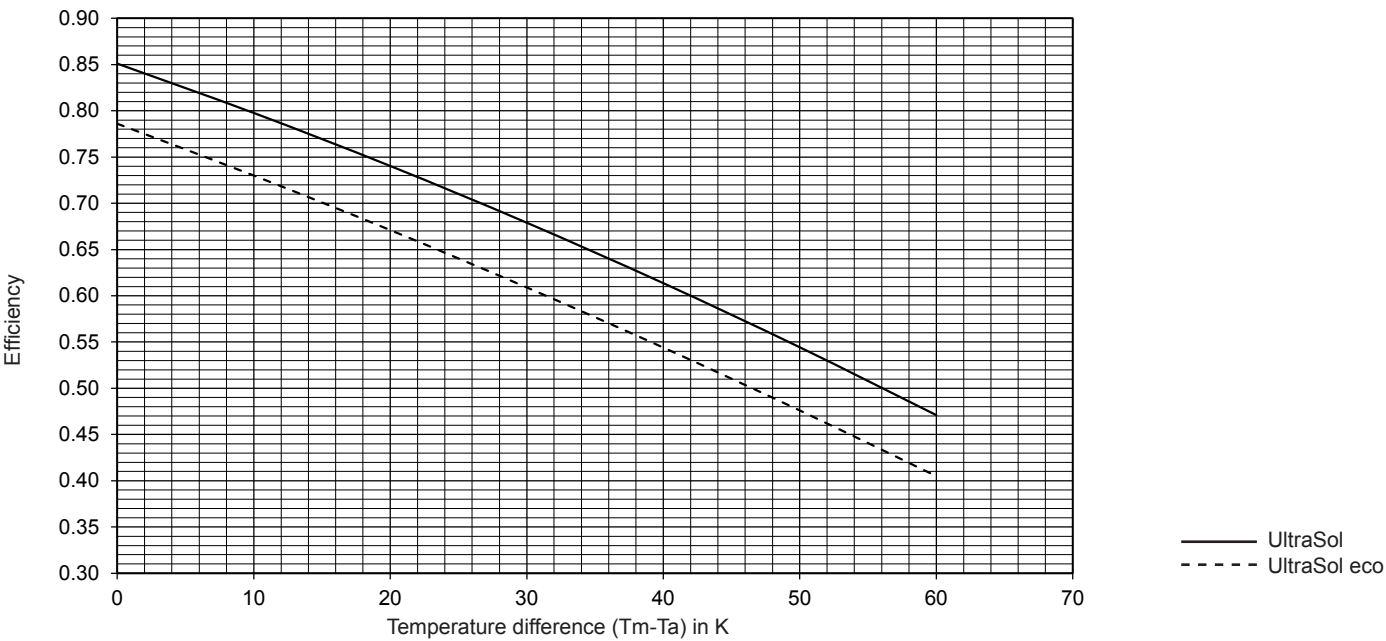
TM = Average temperature of the heat transfer medium in the collector

TA = Ambient air temperature

Technical data measured acc. to EN 12975-2: 2006.

■ Technical data

Efficiency characteristic curve UltraSol, UltraSol eco

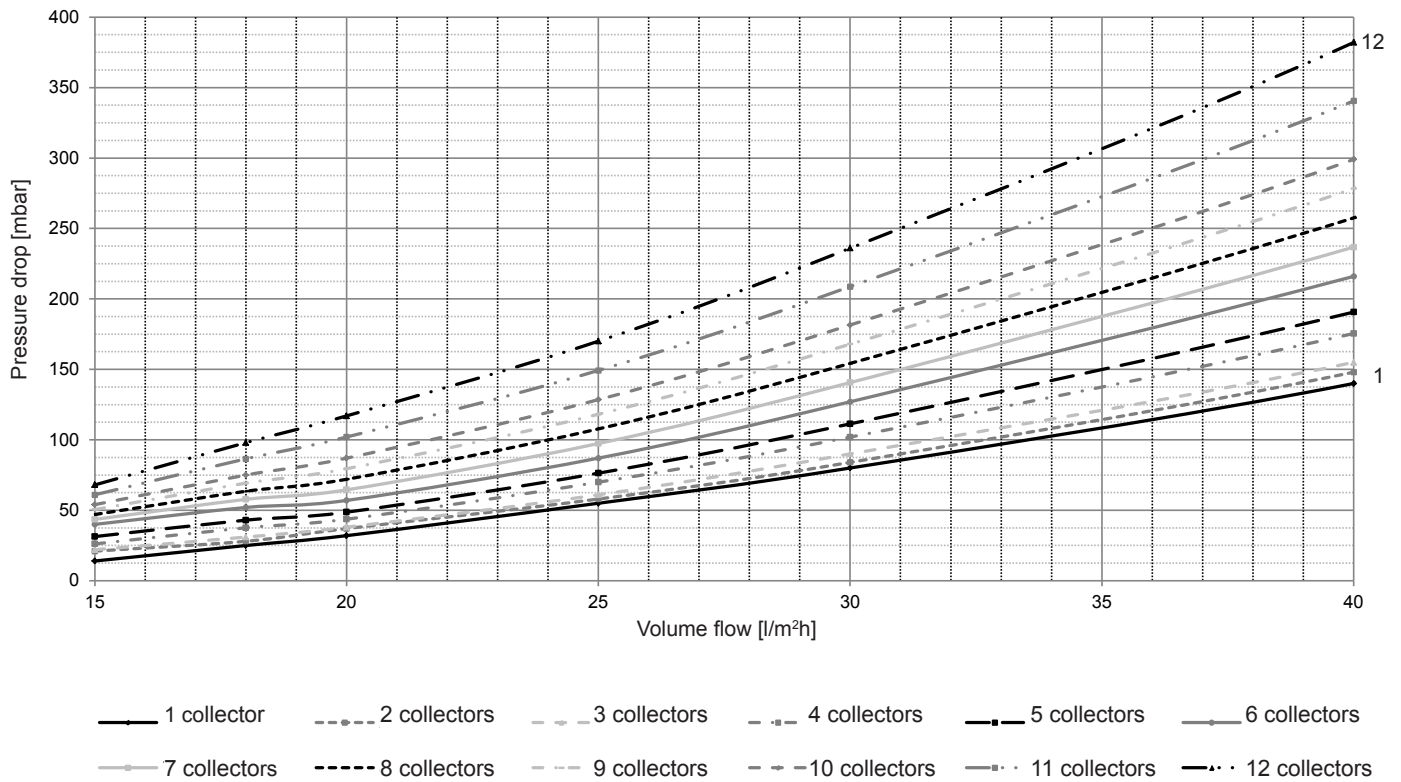


■ Technical data

Pressure drop - Hoval UltraSol

Glycol/water mixture (34 %) - temp. 15 °C

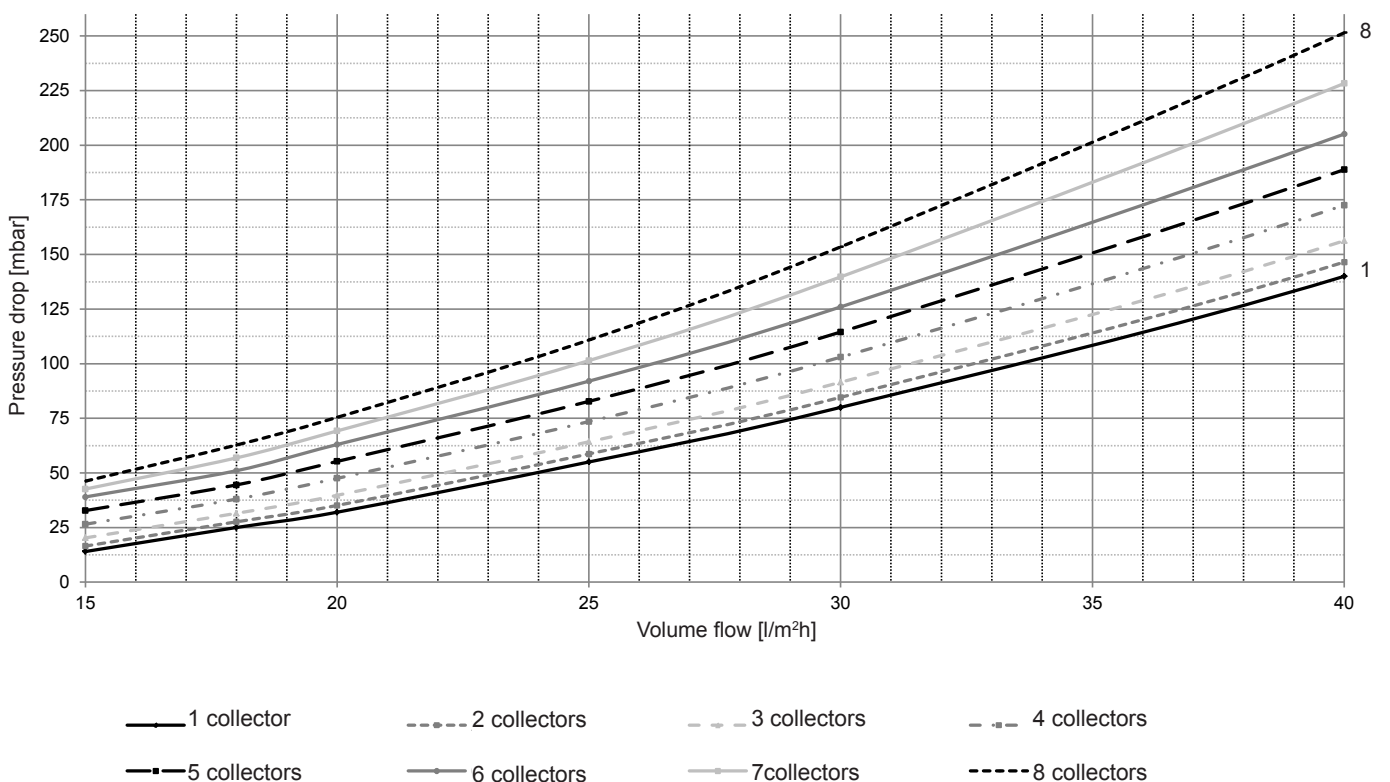
Connection: Tichelmann



Pressure drop - Hoval UltraSol

Glycol/water mixture (34 %) - temp. 15 °C

Connection: Not Tichelmann

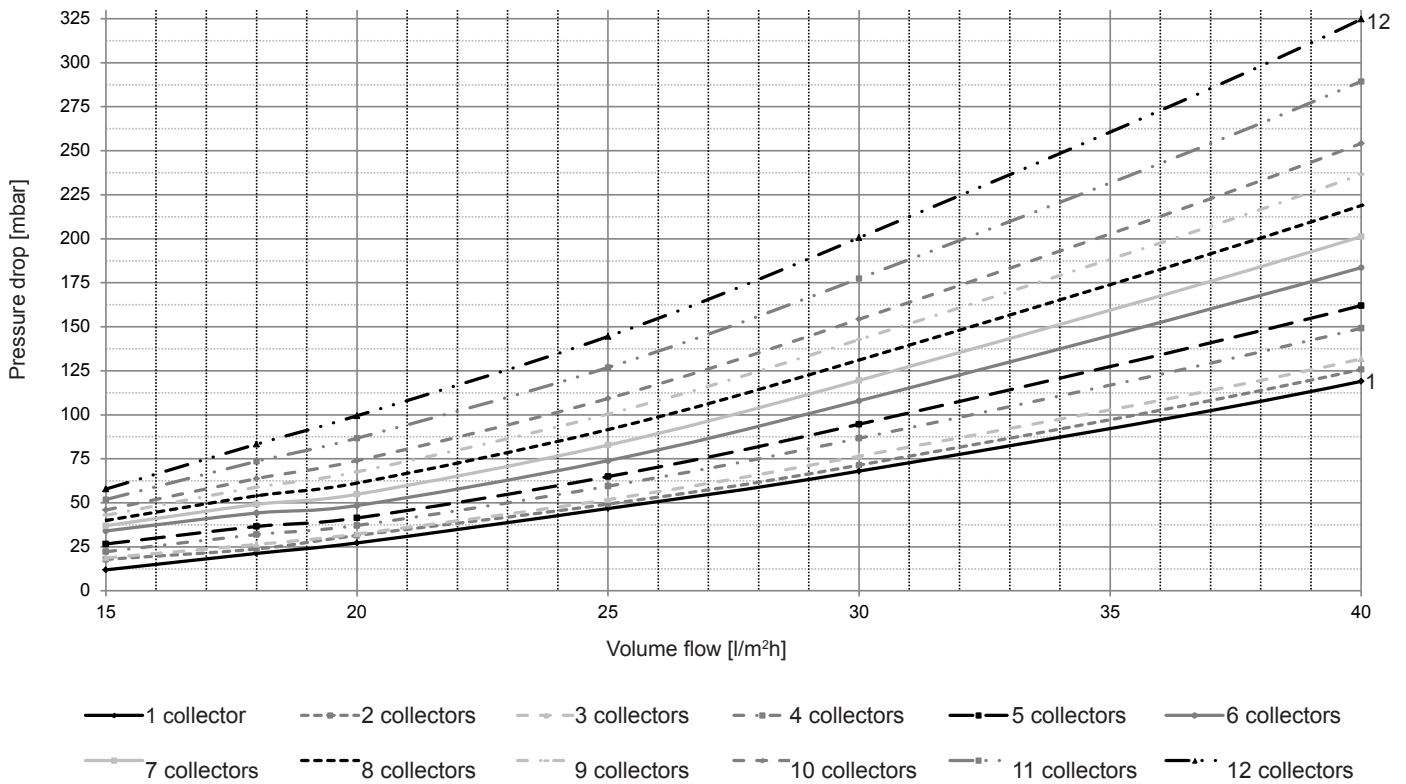


Technical data

Pressure drop - Hoval UltraSol eco

Glycol/water mixture (34 %) - temp. 15 °C

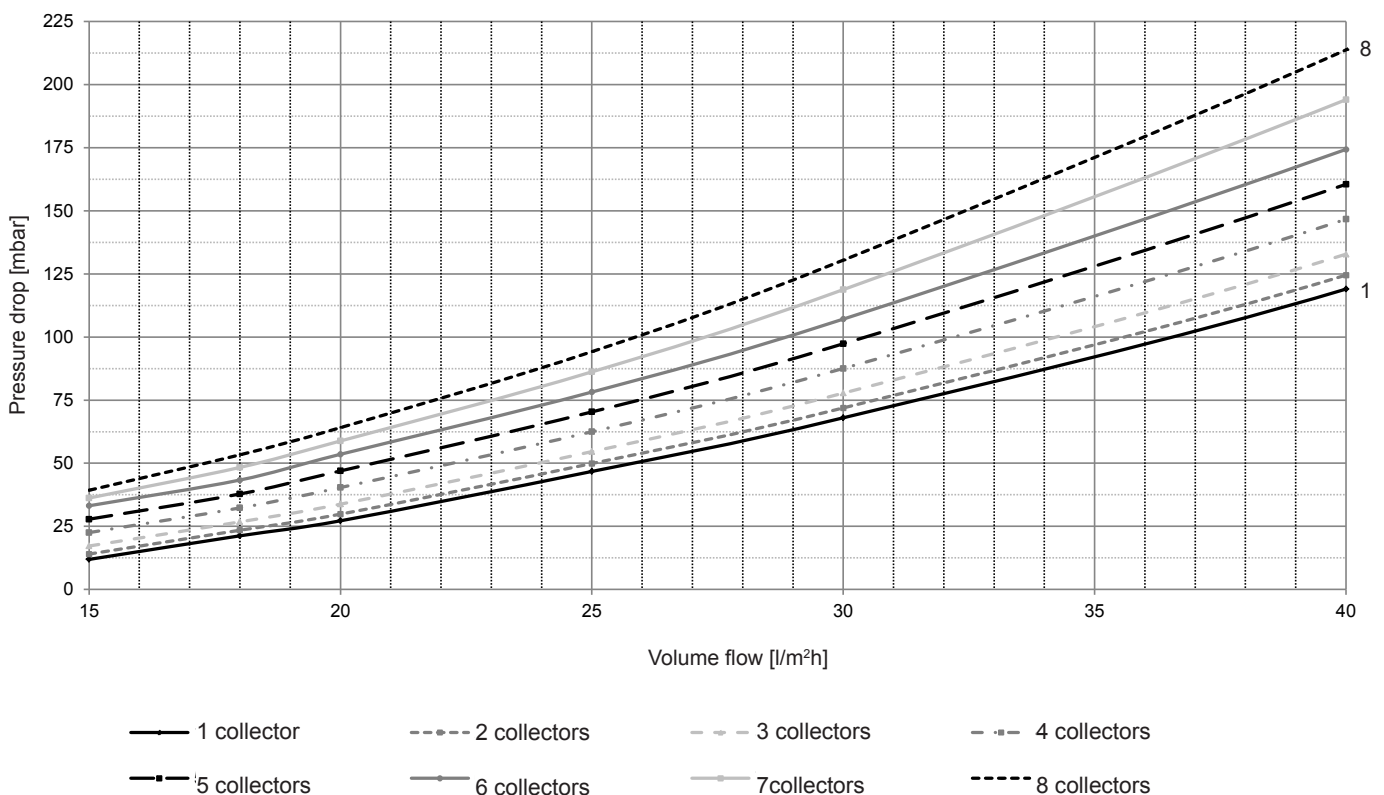
Connection: Tichelmann



Pressure drop - Hoval UltraSol eco

Glycol/water mixture (34 %) - temp. 15 °C

Connection: Not Tichelmann

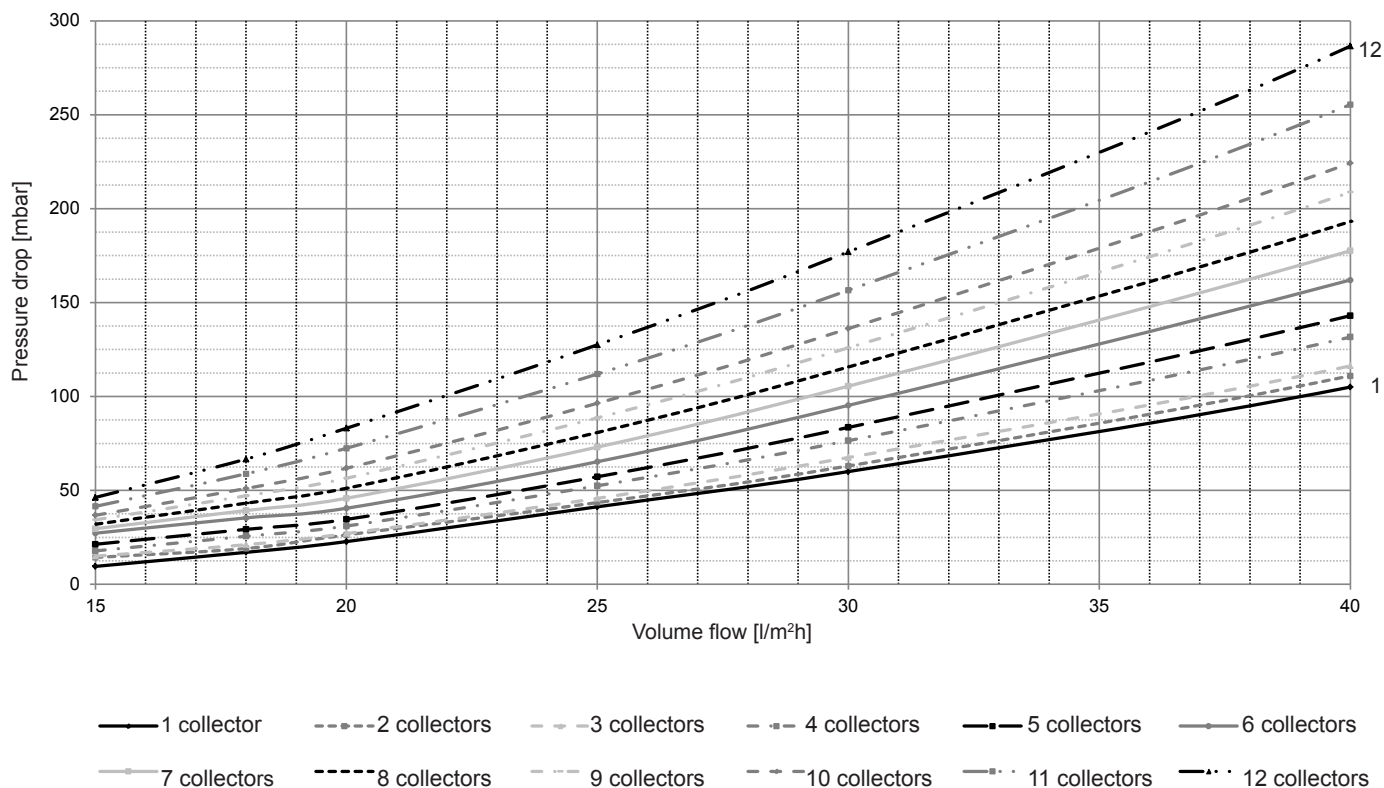


Technical data

Pressure drop - Hoval UltraSol, horizontal

Glycol/water mixture (34 %) - temp. 15 °C

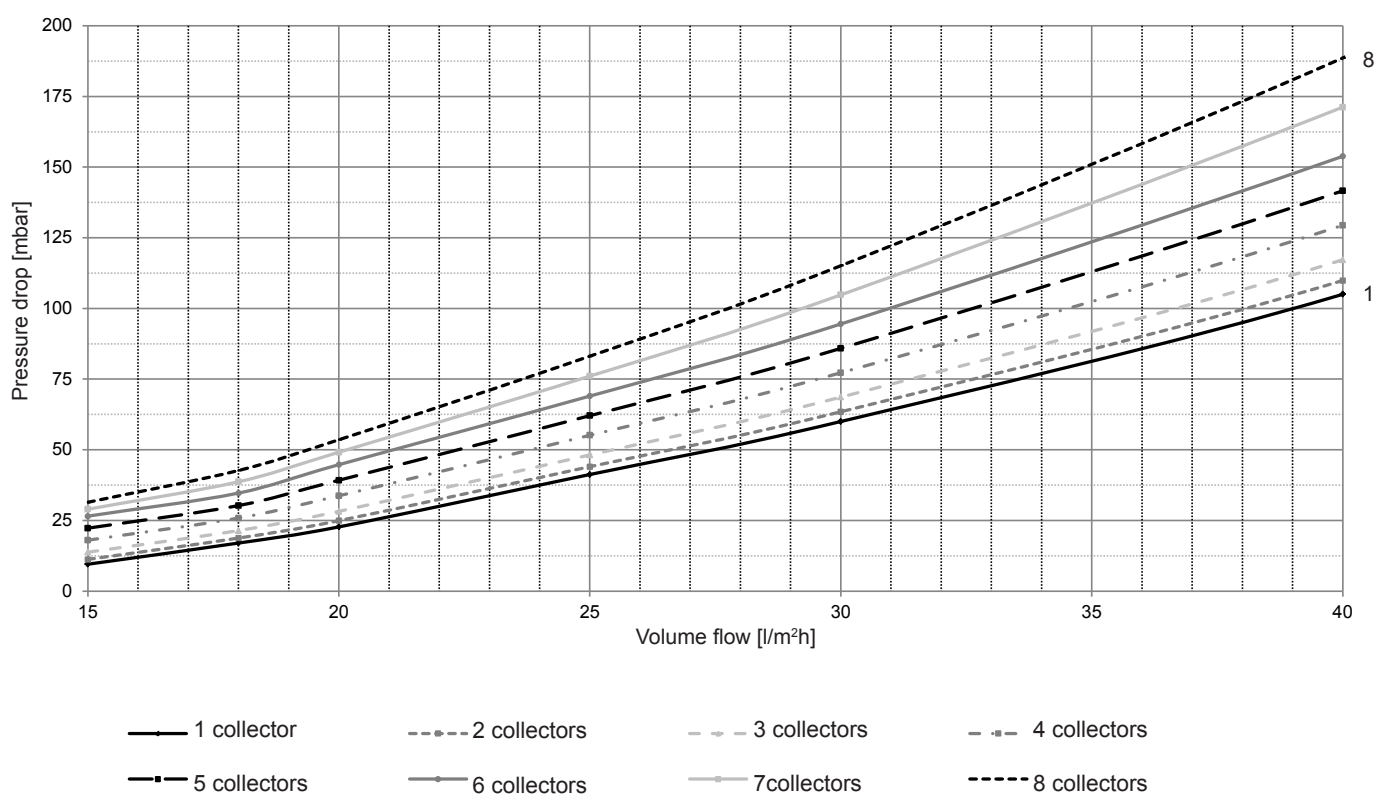
Connection: Tichelmann



Pressure drop - Hoval UltraSol, horizontal

Glycol/water mixture (34 %) - temp. 15 °C

Connection: Not Tichelmann

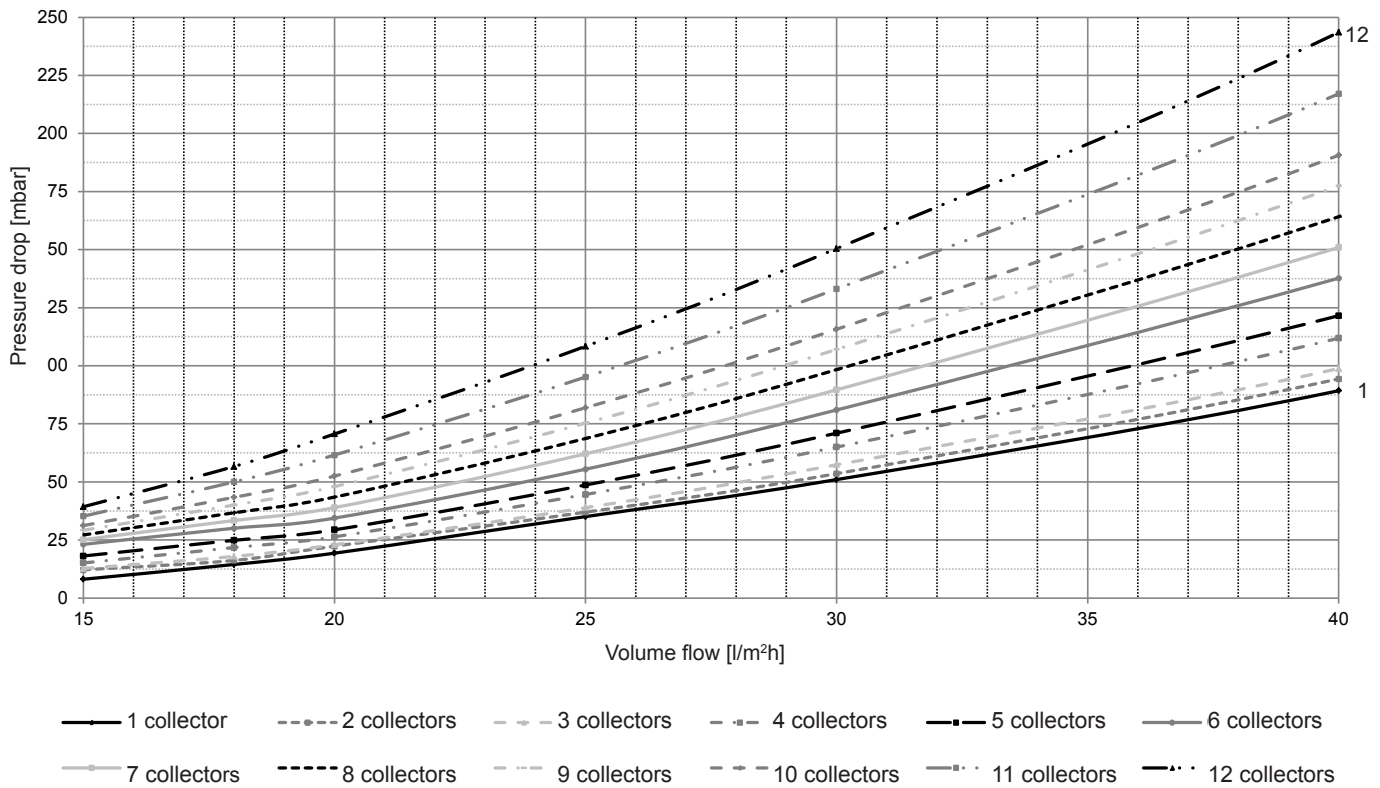


■ Technical data

Pressure drop - Hoval UltraSol eco, horizontal

Glycol/water mixture (34 %) - temp. 15 °C

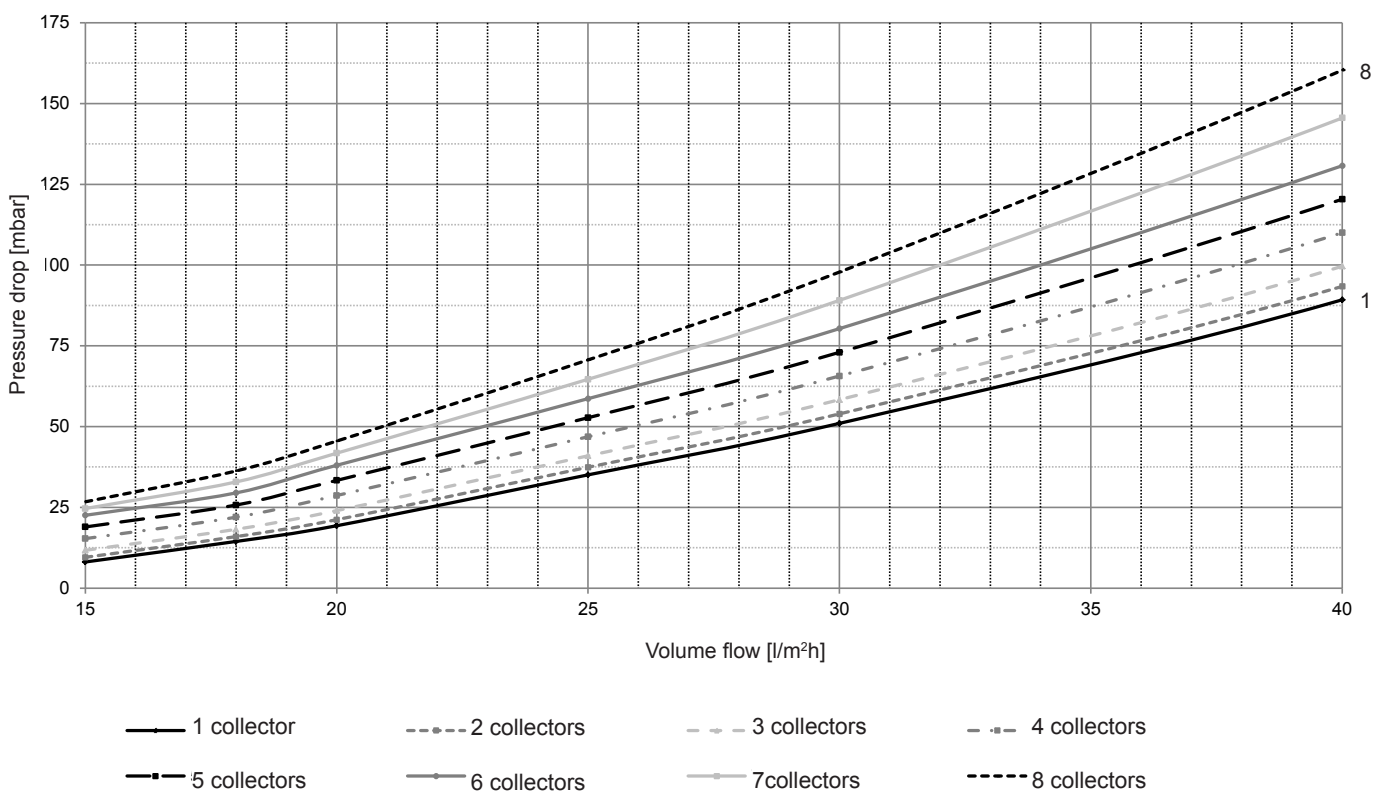
Connection: Tichelmann



Pressure drop - Hoval UltraSol eco, horizontal

Glycol/water mixture (34 %) - temp. 15 °C

Connection: Not Tichelmann



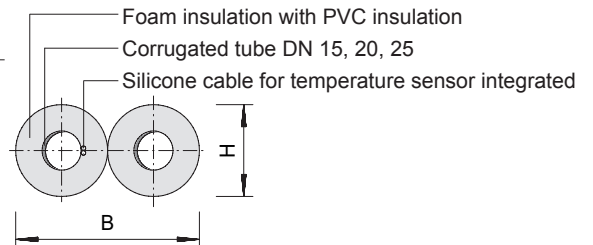
■ Technical data

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

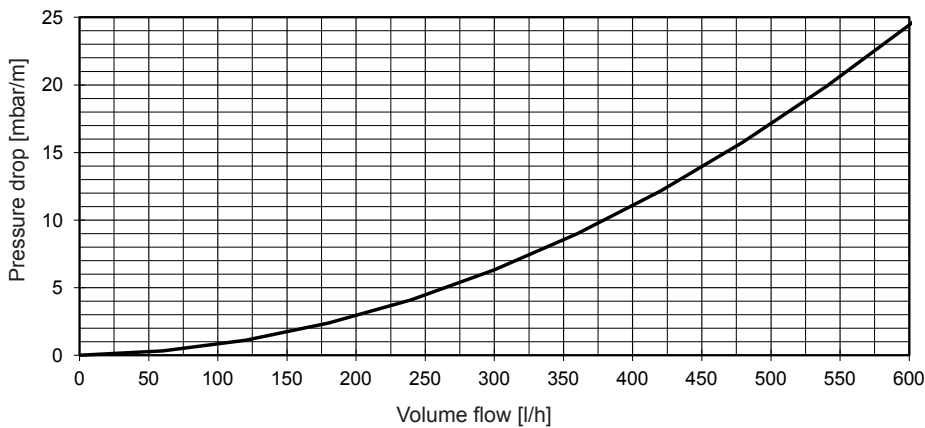
Type	Nominal pipe width DN	Internal diameter mm	External diameter mm	Bending radius min. mm	Burst pressure bar	Weight g/m	Wall thickness mm	Content l/m
SL 15	15 R ½"	16.6	21.4	25	44	140	0.18	0.28
SL 20	20 R ¾"	20.6	26.2	30	36	195	0.18	0.42
SL 25	25 R 1"	25.6	31.6	35	28	235	0.20	0.65

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

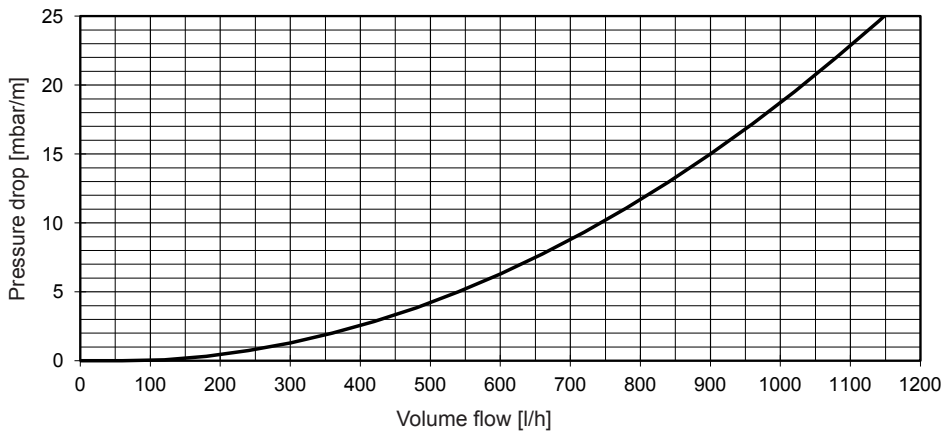


Specific pressure drop value (per metre individual pipe)
Glycol/water mixture 40/60 % and 40 °C

DN 15

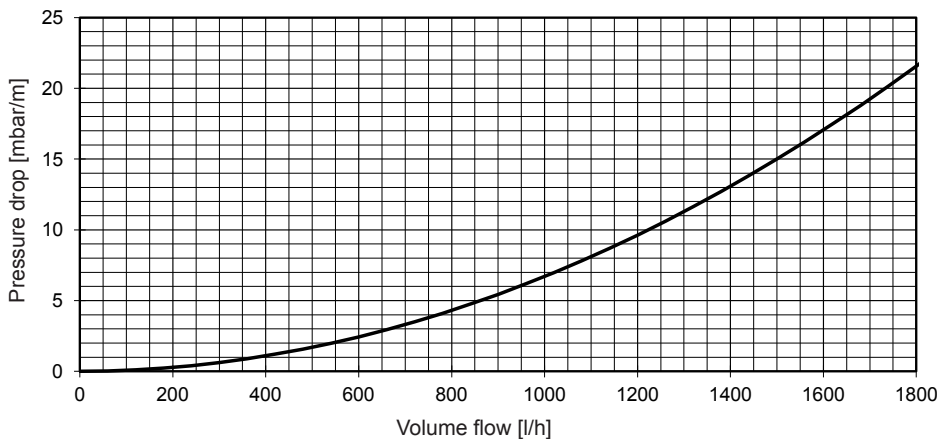


DN 20



1 mbar = 100 Pa = 0.1 kPa

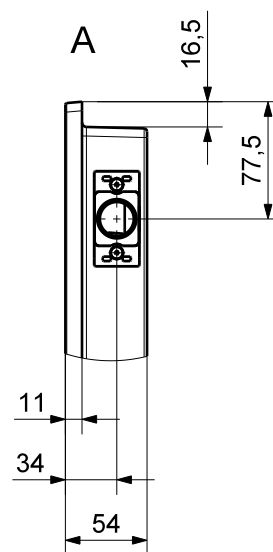
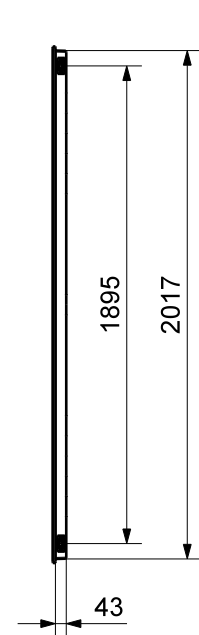
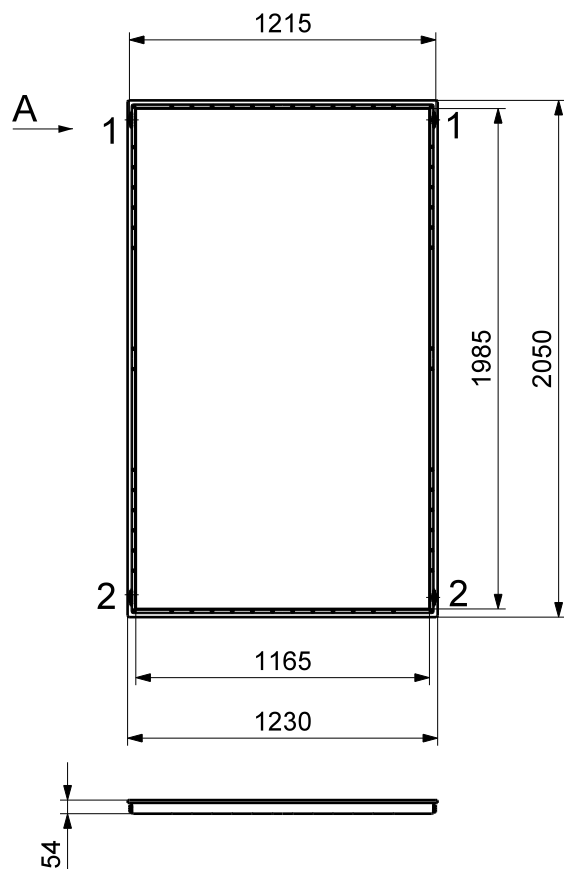
DN 25



■ Dimensions

Hoval UltraSol, UltraSol eco - vertical

(Dimensions in mm)

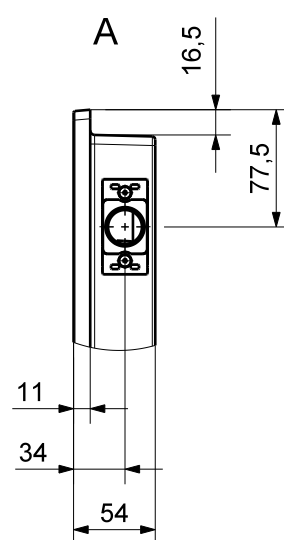
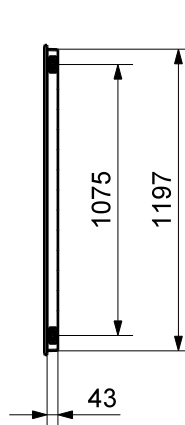
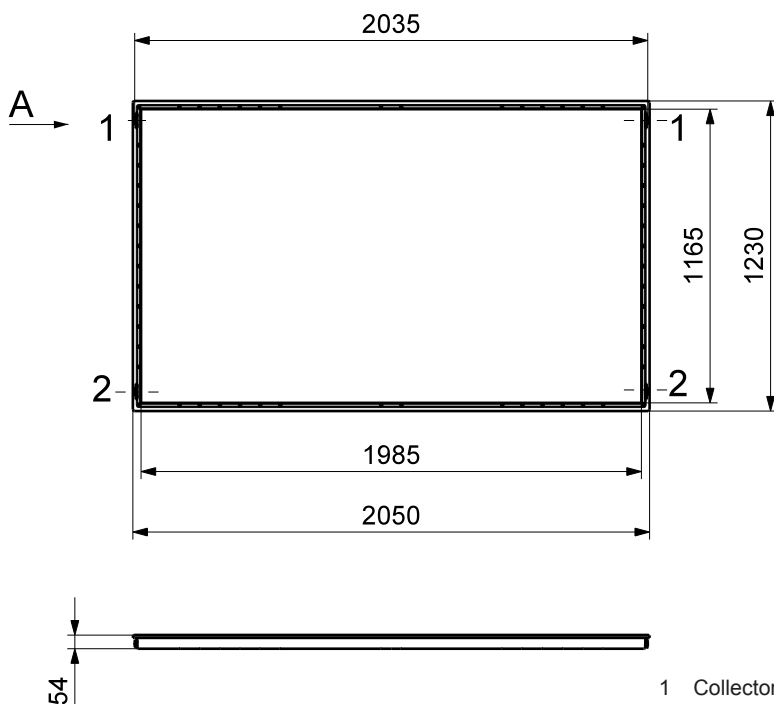


- 1 Collector connection, outlet 3/4" (with Hoval hydraulic connection brackets)
- 2 Collector connection, inlet 3/4" (with Hoval hydraulic connection brackets)

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

Hoval UltraSol, UltraSol eco - horizontal

(Dimensions in mm)



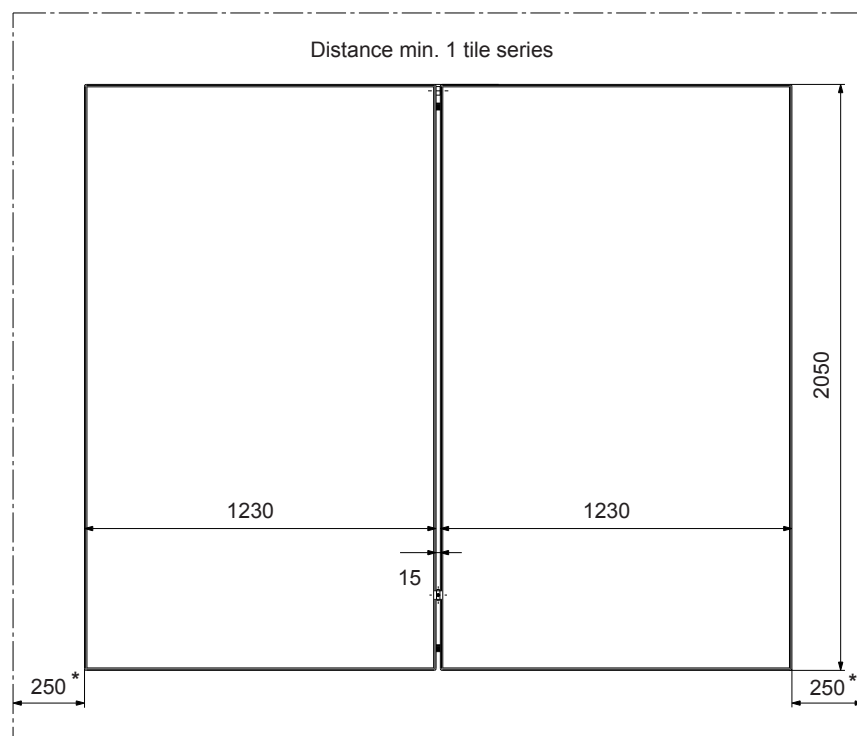
- 1 Collector connection, outlet 3/4" (with Hoval hydraulic connection brackets)
- 2 Collector connection, inlet 3/4" (with Hoval hydraulic connection brackets)

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

■ Dimensions

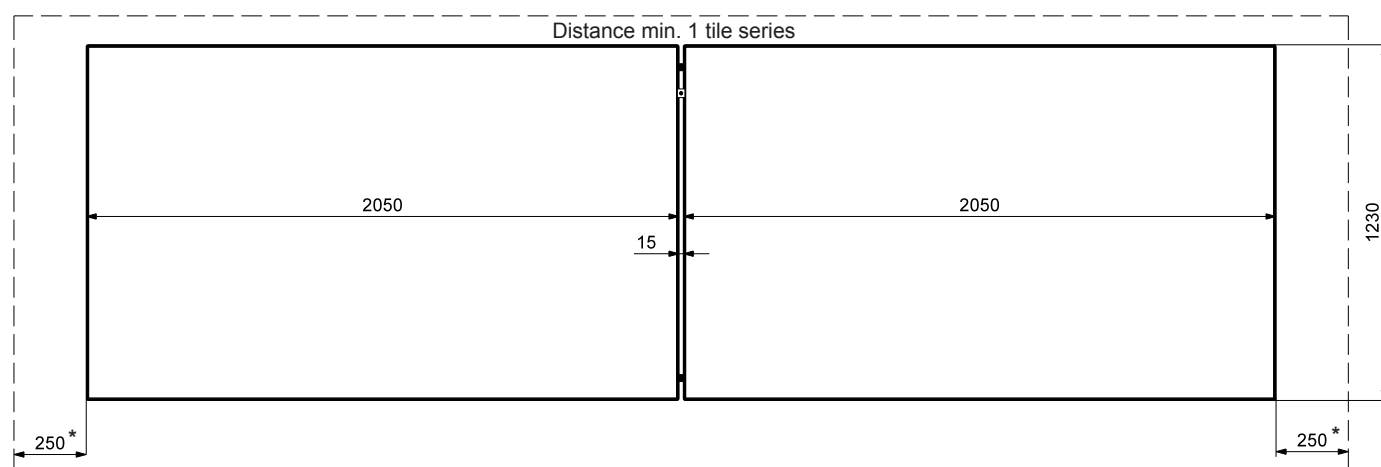
Space requirements

Hoval UltraSol, UltraSol eco - vertical (Dimensions in mm)



* Mounting/dismounting of connection brackets and collectors

Hoval UltraSol, UltraSol eco - horizontal (Dimensions in mm)



* Mounting/dismounting of connection brackets and collectors

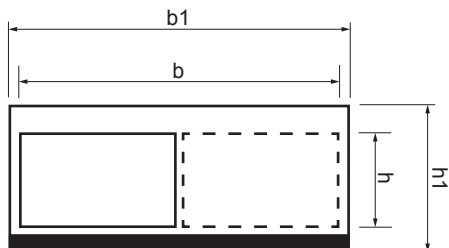
■ Dimensions

Space requirements

Collector field - roof inlay mounting, horizontal

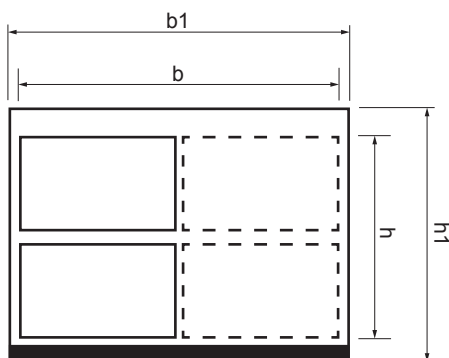
(Dimensions in cm)

1-row



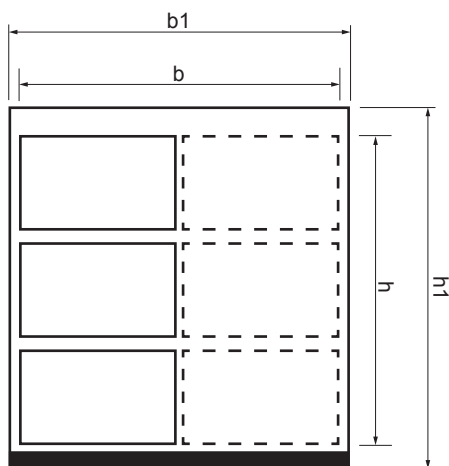
Number of collectors	Height h in cm	Height h1 Outer dim. sheet metal in cm	Width b in cm collectors	Width b1 Outer dim. sheet metal cm
2	123	192	412	448
3			618	654
4			825	861
5			1031	1067
6			1238	1274
7			1444	1480
8			1651	1687
9			1857	1893
10			2064	2100
11			2270	2306
12			2477	2513

2-row



Number of collectors		Height h in cm	Height h1 Outer dim. sheet metal in cm	Width b in cm collectors	Width b1 Outer dim. sheet metal cm
Total	per row				
2	1	253	322	205	241
4	2			412	448
6	3			618	654
8	4			825	861
10	5			1031	1067
12	6			1238	1274
14	7			1444	1480
16	8			1651	1687
18	9			1857	1893
20	10			2064	2100
22	11			2270	2306
24	12			2477	2513

3-row



Number of collectors		Height h in cm	Height h1 Outer dim. sheet metal in cm	Width b in cm collectors	Width b1 Outer dim. sheet metal cm
Total	per row				
3	1	383	452	205	241
6	2			412	448
9	3			618	654
12	4			825	861
15	5			1031	1067
18	6			1238	1274
21	7			1444	1480
24	8			1651	1687
27	9			1857	1893
30	10			2064	2100
33	11			2270	2306
36	12			2477	2513

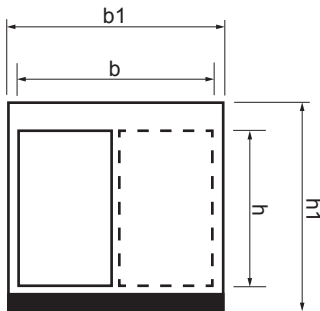
■ Dimensions

Space requirements

Collector field - roof inlay mounting, vertical

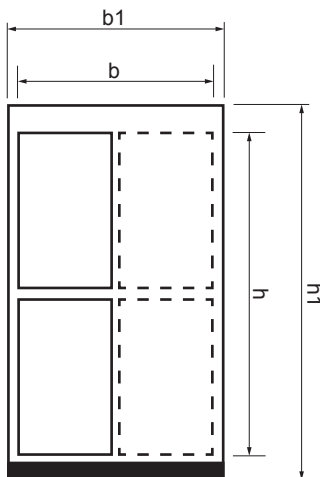
(Dimensions in cm)

1-row



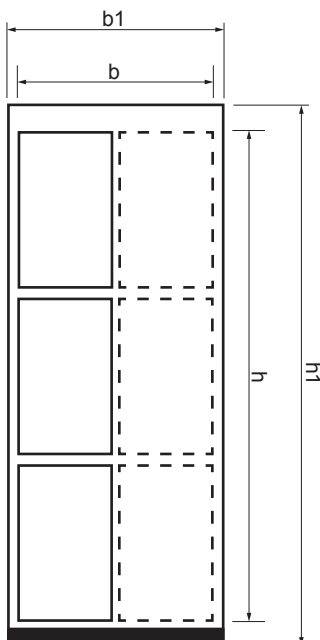
Number of collectors	Height h in cm	Height h1 Outer dim. sheet metal in cm	Width b in cm collectors	Width b1 Outer dim. sheet metal cm
2	205	274	248	284
3			372	408
4			497	533
5			621	657
6			746	782
7			870	906
8			995	1031
9			1119	1155
10			1244	1280
11			1368	1404
12			1493	1529

2-row



Number of collectors		Height h in cm	Height h1 Outer dim. sheet metal in cm	Width b in cm collectors	Width b1 Outer dim. sheet metal cm
Total	per row				
2	1	417	486	123	159
4	2			248	284
6	3			372	408
8	4			497	533
10	5			621	657
12	6			746	782
14	7			870	906
16	8			995	1031
18	9			1119	1155
20	10			1244	1280
22	11			1368	1404
24	12			1493	1529

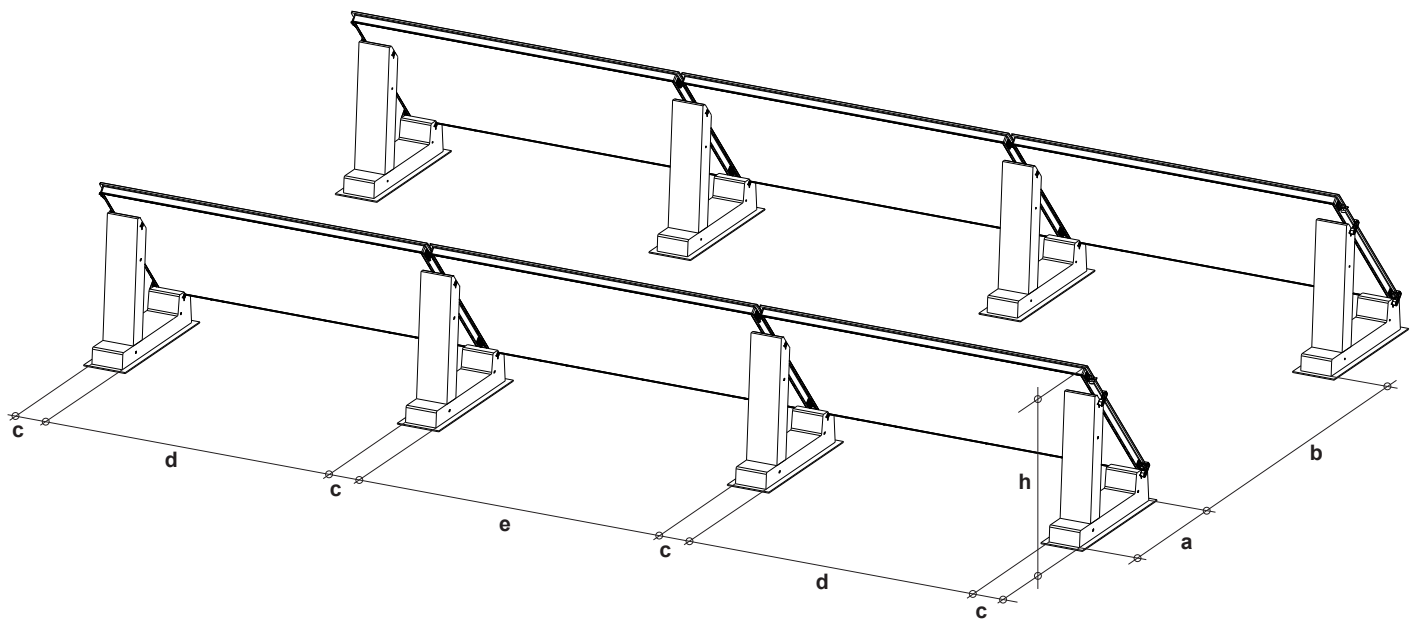
3-row



Number of collectors		Height h in cm	Height h1 Outer dim. sheet metal in cm	Width b in cm collectors	Width b1 Outer dim. sheet metal cm
Total	per row				
3	1	629	698	123	159
6	2			248	284
9	3			372	408
12	4			497	533
15	5			621	657
18	6			746	782
21	7			870	906
24	8			995	1031
27	9			1119	1155
30	10			1244	1280
33	11			1368	1404
36	12			1493	1529

■ Dimensions

Concrete base - installation
(Dimensions in mm)



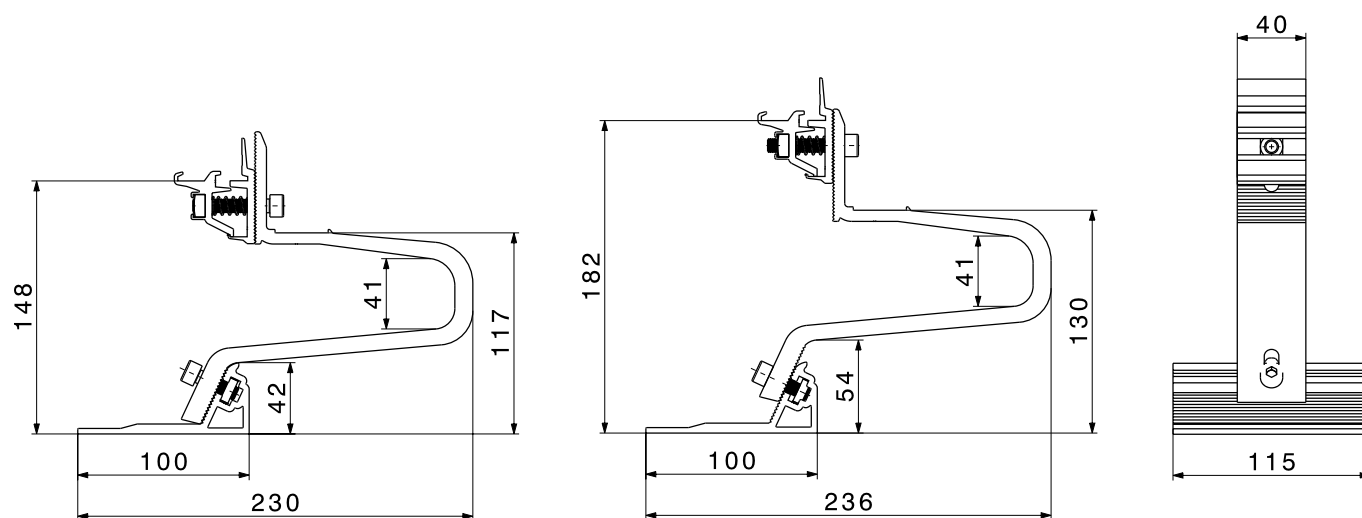
Type	Installation angle	h	a	b	c	d	e
UltraSol, UltraSol eco	45°	*1085	930	min. 1100	190	1777	1850

* With protective mat

■ Dimensions

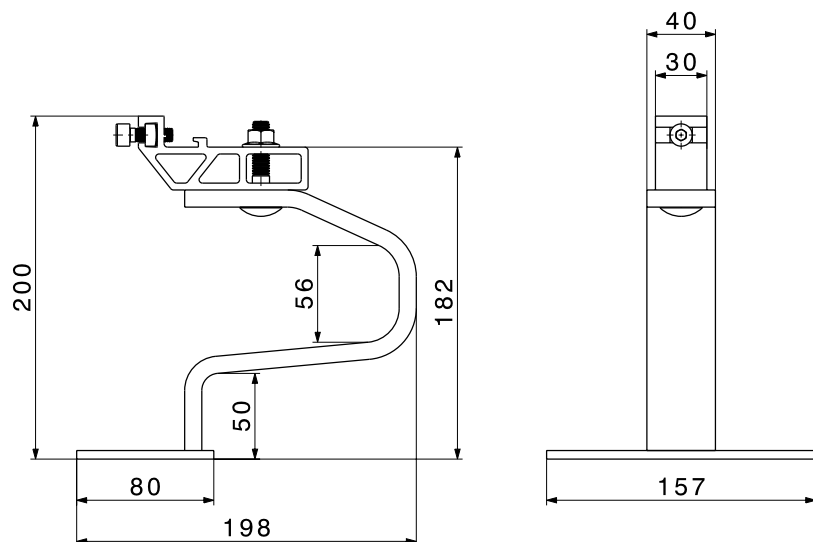
Roof bar tile adjustable - for on-roof installation

(Dimensions in mm)



Roof bar tile heavy duty - for on-roof installation

(Dimensions in mm)



■ Dimensions

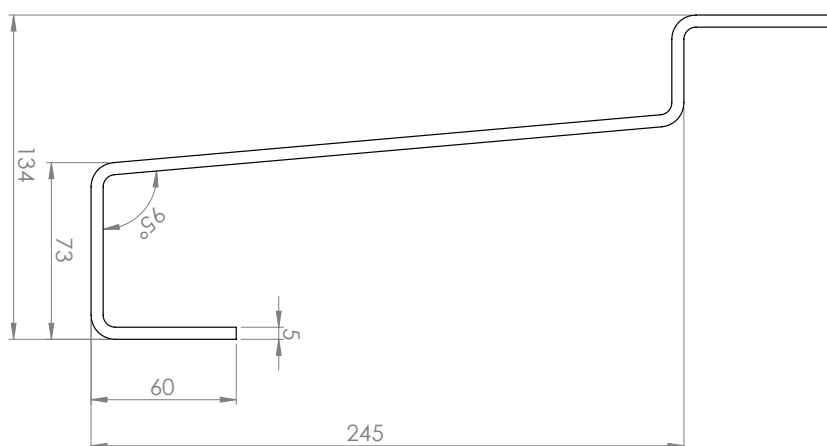
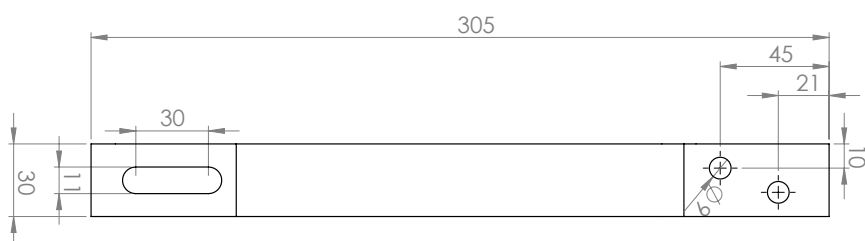
Roof bar slate - for on-roof installation

(Dimensions in mm)



Roof bar plain tile - for on-roof installation

(Dimensions in mm)



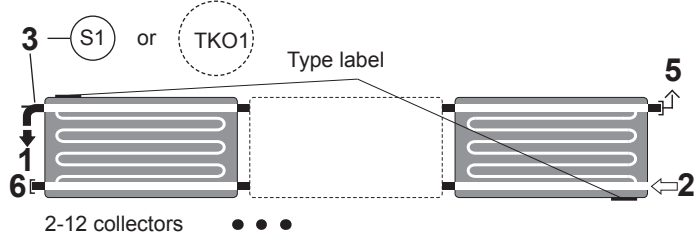
Examples

Piping of the collector series

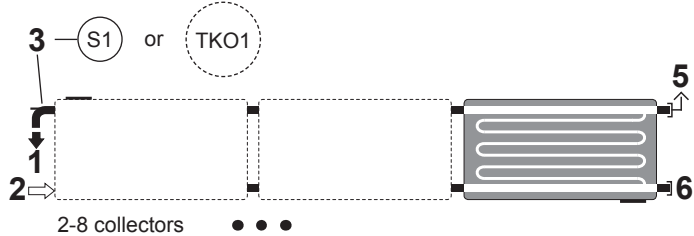
Connection example for collector series

UltraSol H, UltraSol eco H (collector vertical)

Connection variant: Tichelmann

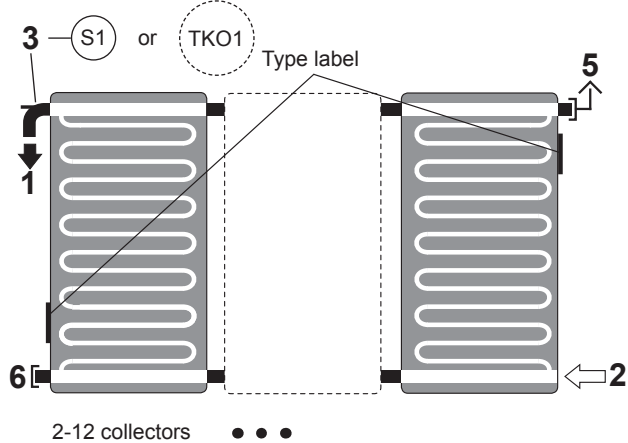


Connection variant: Not Tichelmann

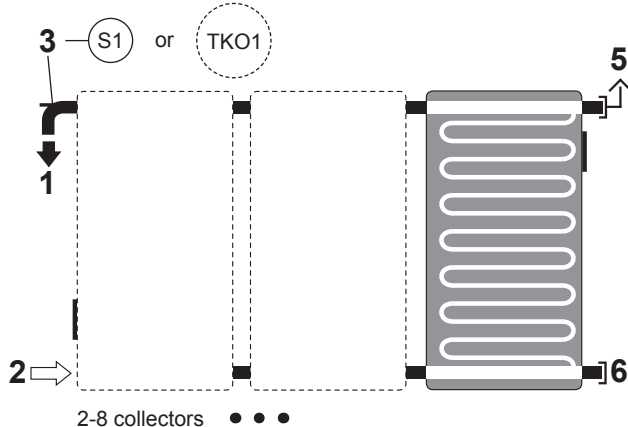


UltraSol V, UltraSol eco V (collector horizontal)

Connection variant: Tichelmann



Connection variant: Not Tichelmann



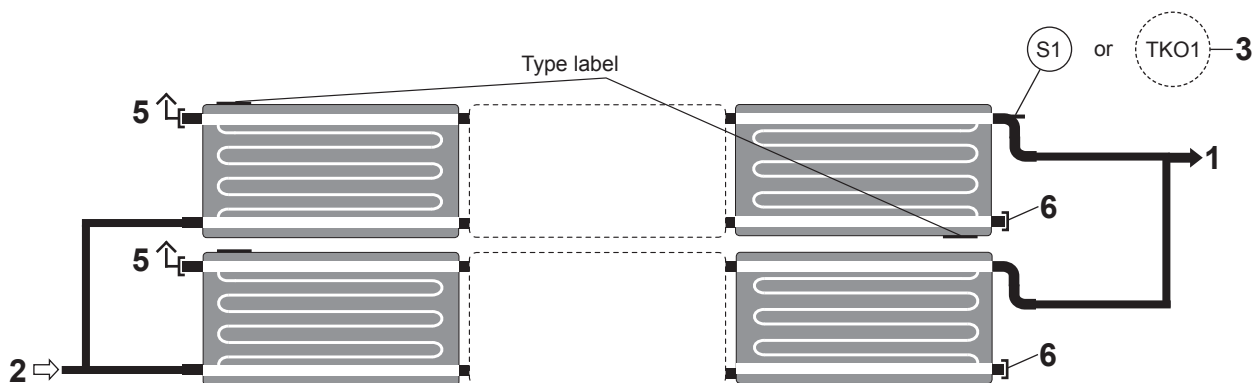
- 1 Line from collector field (collector flow, warm)
select short line routing
- 2 Line to collector field (collector return)
- 3 Differential control sensor
(connection bend 90° 3/4")
or
 Collector sensor 1
- 5 Dummy plug with integrated manual vent
- 6 Dummy plug

■ Examples

Connection example for several collector series

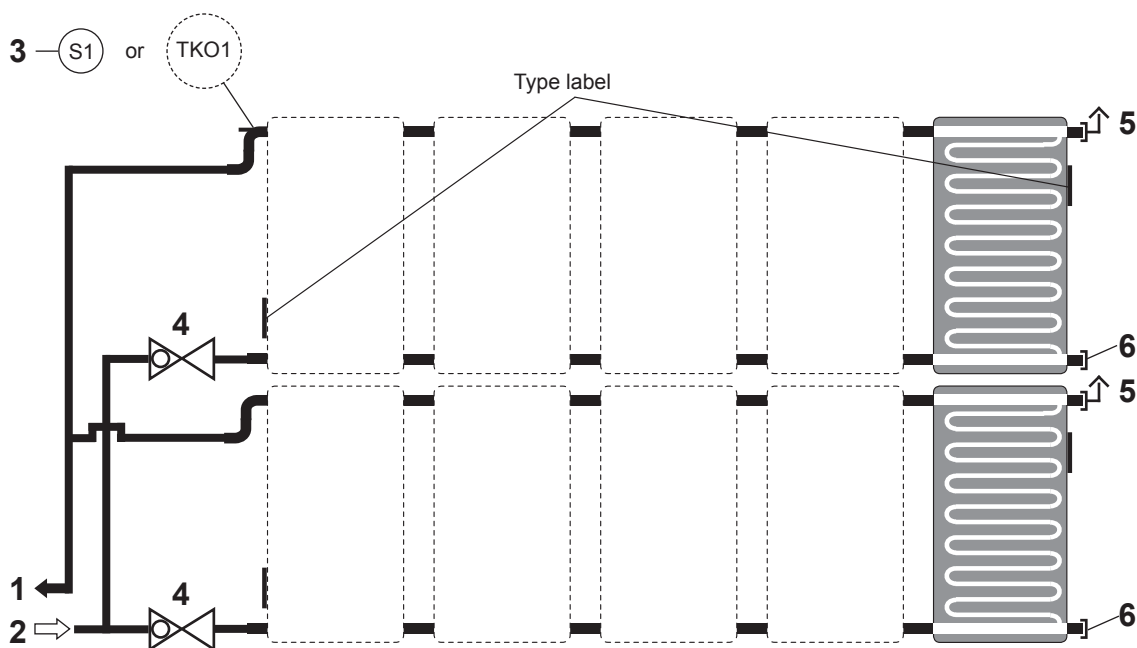
UltraSol H, UltraSol eco H (collector horizontal)

Connection variant: Tichelmann



UltraSol V, UltraSol eco V (collector vertical)

Connection variant: Not Tichelmann



- | | | |
|---|----------------|---|
| 1 | ← | Line from collector field (collector flow, warm)
select short line routing |
| 2 | ⇐ | Line to collector field (collector return) |
| 3 | (S1) or (TKO1) | Differential control sensor
(connection bend 90° ¾")
or
Collector sensor 1 |
| 5 | ⇑ | Dummy plug with integrated manual vent |
| 6 | ■ | Dummy plug |

■ Examples

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:



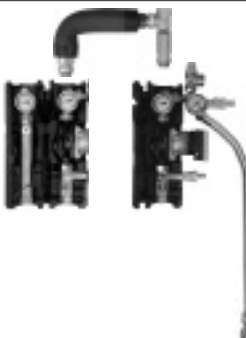
- In the outdoor area, UV radiation resistant and robust (temperature, small animals)
- In the indoor area, depending on requirement, provide with fire and/or with touch protection

Table does not apply for corrugated tube.

Further information see solar cable SL

■ Product overview and utilisation

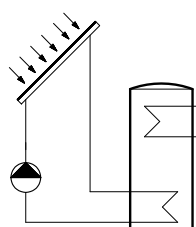
Solar armature groups without heat exchanger (direct)

	SAG20	SAG25/32	SAG20 and SAR20
			

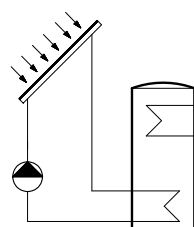
Collector surface	approx. m ²	20	40/60	40
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Examples

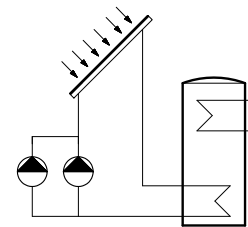
Solar system for hot water



Solar system with SAG20



Solar system with SAG25/32



Solar system with SAG20 and SAR20 combined for parallel pump operation

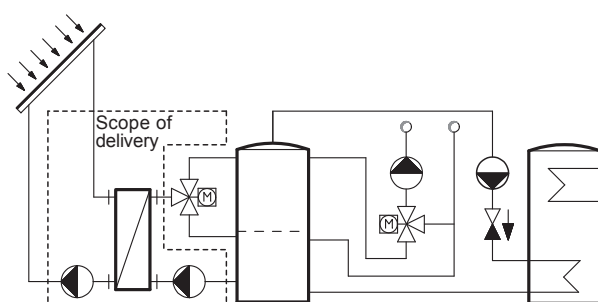
Solar armature groups with heat exchanger

		TransTherm solar			
		(25)	(50)	(100)	(200)
		A compact, rectangular solar armature assembly with a central horizontal tube and various mounting brackets and sensors.	A rectangular solar armature assembly, slightly larger than the (25) model, featuring a central horizontal tube and mounting hardware.	A rectangular solar armature assembly, similar in design to the (50) model, with a central horizontal tube and mounting components.	A larger, more complex solar armature assembly mounted on a metal frame. It features two vertical tubes and multiple sensors and mounting brackets.

Collector surface	approx. m ²	20	50	100	150 (on request)
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



■ Description

Hoval solar armature group**SAG20**

- Solar armature group DN 20 (¾")
- Circulation 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 6

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")
- Circulation 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 ¹1-35 ¹

•

•

•

SAG32/SPS 12 PM2

20-70 ¹5-100 ¹

•

•

•

¹ Optional accessory (recommended): calibration valve or FlowRotor**Hoval solar return armature group SAR20**

- Solar return armature group DN 20 (¾")
- Circulation 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 6

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.
	PWM2 or PM2	PWM control signal solar
	Δp-c	Constant differential pressure

■ Part No.


Hoval Solar armature groups
Part No.
Solar armature groups SAG20/25/32

Solar armature group/ pump	Continuous flow measurement range		Part No.
	Calibration valve l/min	Flow Rotor l/min	
Type			
SAG20/SPS 6	1-20	-	6040 927
SAG20/SPS 7 PM2 ^{2,3}	1-20	-	6040 928
SAG20FR/SPS 7 PM2 ^{2,3}	-	0,5-15	6040 929
SAG25/SPS 8 PM2 ²	10-40 ¹	1-35 ¹	6040 930
SAG32/SPS 12 PM2 ²	10-40 ¹	1-35 ¹	6040 931


Solar return armature groups SAR20

Solar return armature group / pump	Continuous flow measurement range		Part No.
	Calibration valve l/min	Flow Rotor l/min	
Type			
SAR20/SPS 6 ^{2,3}	1-20	-	6040 932
SAR20FR/SPS 7 PM2 ³	-	0.5-15	6040 933

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

■ Part No.


Accessories
Part No.
Solar controller set WM complete

6027 257

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
incl. wall mounting material

TopTronic® E control module as an option


Solar controller set AG complete

6037 492

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

TopTronic® E control module as an option


Calibration valve TN

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

DN	Measuring range [l/min]	Connection Rp x Rp	kvs ¹	
20	2-12	¾" x ¾"	2.2	2038 034
20	8-30	¾" x ¾"	5.0	2038 035
25	10-40	1" x 1"	8.1	2038 036
32	20-70	1¼" x 1¼"	17.0	2038 037

¹ Throughflow quantity in m³/h at 100 %
opening and with a pressure loss of 1 bar.


FlowRotor kit

for performance related control, system moni-
toring 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"	6037 631
25	1-35	1"	6037 632
32	5-100	1¼"	6037 693

■ Part No.

Part No.


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

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 (3/4"), self-sealing with O-ring,
metallic clamping ring and stilt sleeve.
Applicable up to 150 °C.
Connection 3/4" outer thread x 15 mm
Connection 3/4" outer thread x 18 mm
Connection 3/4" outer thread x 22 mm

6010 055

6010 056

6010 057

■ Part No.

Part No.

**Motorised straight way ball valve
type R2..., K2..B/LR230A, SR230A**

Connections with inner thread
with motor drive

Type	DN	Screw connection	kvs ¹	
R2015/LR230A	15	Rp 1/2"	15	6035 286
R2020/LR230A	20	Rp 3/4"	32	6035 287
K225B/SR230A	25	Rp 1"	39	6027 406

**Motorised switch ball valve
type R3..B/LR230A, NR230A**

Connections with inner thread
with motor drive

Type	DN	Screw connection	kvs ¹	
R320-BL2/LR230A	20	Rp 3/4"	8.5	6027 410
R325-BL2/LR230A	25	Rp 1"	10.0	6027 411
R332-BL3/NR230A	32	Rp 1 1/4"	15.0	6027 412

**Thermostatic water mixer TM200**

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

Material: brass

Connection dimension R 3/4"

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

2005 915

**Thermostatic water mixer 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)

Type	Dimension	Connection size	kvs value m ³ /h	
JRG 25	1"	1 1/2"	4.0	2061 407
JRG 32	1 1/4"	2"	8.5	2061 408
JRG 40	1 1/2"	2 1/4"	12.0	2061 409
JRG 50	2"	2 3/4"	16.0	2061 410
JRG 65	DN 65	DN 65	28.0	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

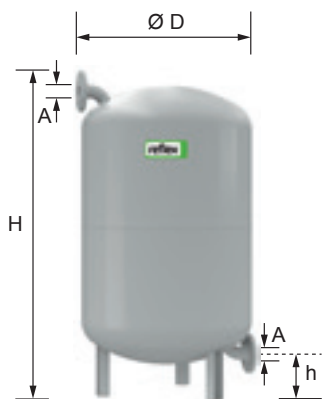
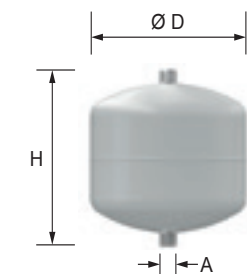
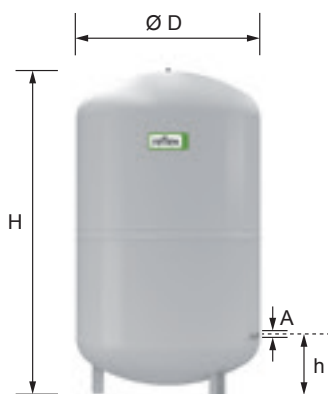
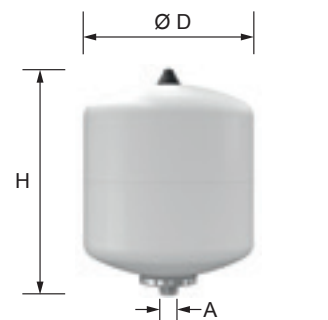
Frost protection: -20 °C with

40% mixture ratio

Content plastic container: 10 kg

2009 987

■ Part No.


Hoval pressure expansion tanks
Part No.
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"	2006 634
S 12	280	300	-	G ¾"	2006 635
S 18	280	410	-	G ¾"	2006 636
S 25	280	520	-	G ¾"	2006 637
S 33	354	455	-	G ¾"	2006 638
S 50	409	469	158	R ¾"	2006 639
S 80	480	565	166	R 1"	2006 640
S 100	480	670	166	R 1"	2006 641
S 140	480	941	166	R 1"	2017 376
S 200	634	758	205	R 1"	2006 642
S 250	634	888	205	R 1"	2017 384
S 300	634	1092	235	R 1"	2006 643
S 400	740	1102	245	R 1"	2017 385
S 500	740	1321	245	R 1"	2006 644
S 600	740	1559	245	R 1"	2017 386

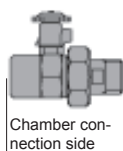
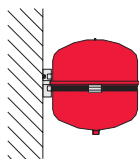
Reflex V

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).

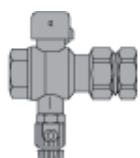
Reflex type	Ø D mm	H mm	h mm	A	
V 6	206	244	-	R ¾"	2032 084
V 12	280	287	-	R ¾"	2032 085
V 20	280	360	-	R ¾"	2032 086
V 40	409	562	113	R 1"	2057 249
V 60	409	732	172	R 1"	2006 864
V 200	634	901	142	DN 40/PN 16	242 824
V 300	634	1201	142	DN 40/PN 16	242 825
V 350	640	1341	210	DN 40/PN 16	242 827

Technical data and engineering
see separate brochure

■ Part No.



Chamber connection side



Chamber connection side

Accessories

Part No.

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

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

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

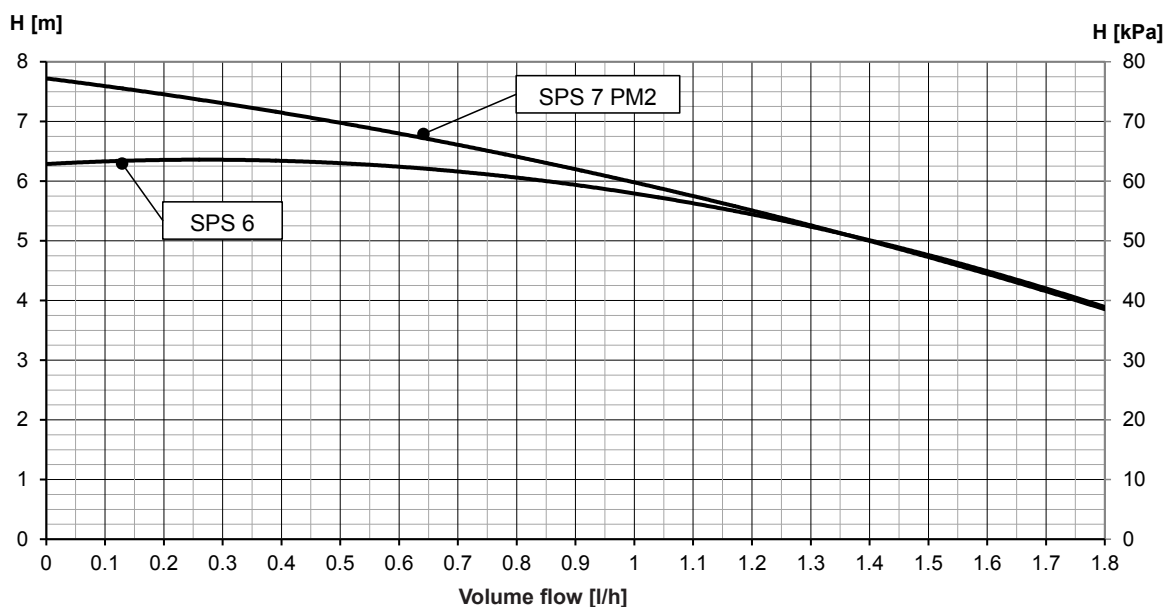
■ Technical data

Hoval solar armature group/solar return armature group DN 20

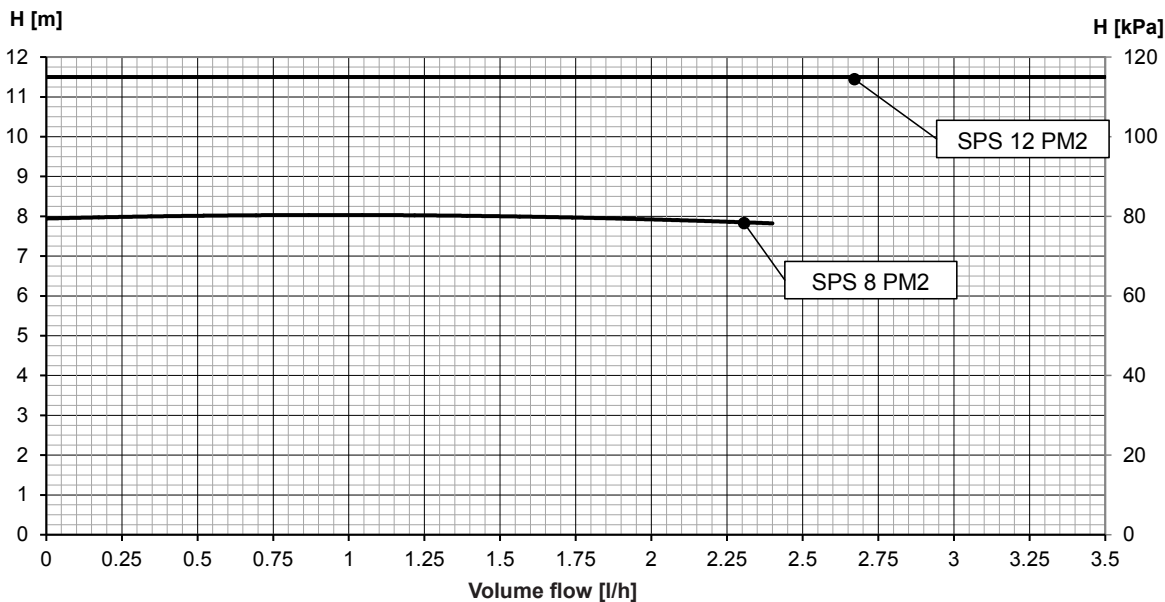
Type			SAR20	SAR20FR	SAG20	SAG20	SAG20FR	SAG25	SAG32
• Pump			SPS 6	SPS 7 PM2	SPS 6	SPS 7 PM2	SPS 7 PM2	SPS 8 PM2	SPS 12 PM2
• Voltage			1x230 V	1x230 V	1x230 V	1x230 V	1x230 V	1x230 V	1x230 V
• Maximum power consumption			45 W	45 W	45 W	45 W	45 W	130 W	310 W
• Maximum current			0.44 A	0.44 A	0.44 A	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

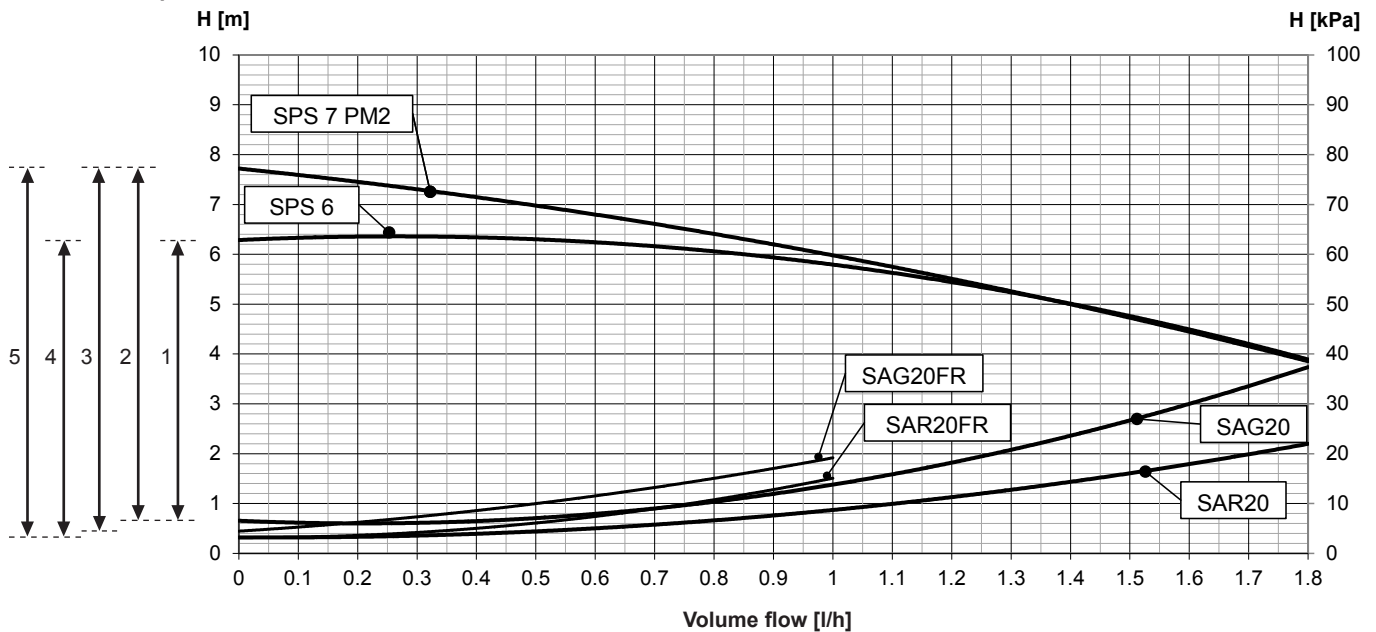


Pump characteristic curves SAG25 and SAG32



Technical data

Residual overpressure SAG20, SAG20FR, SAR20 and SAR20FR

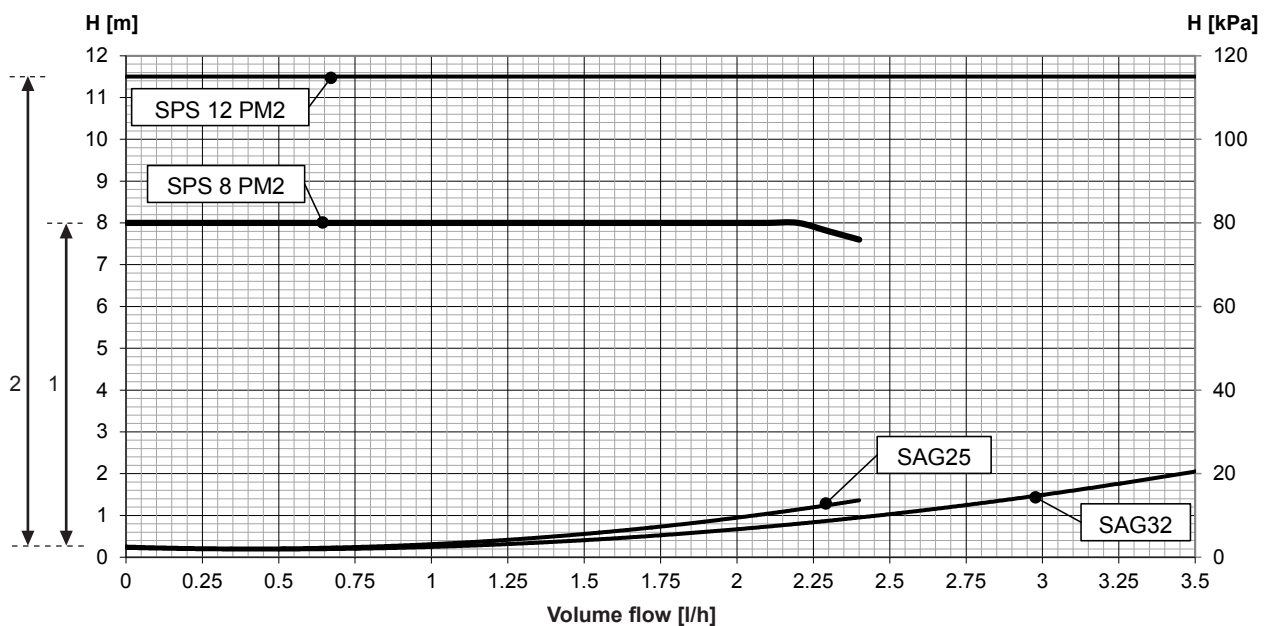


Max. residual overpressure

- 1 SAG20/SPS 6
- 2 SAG20/SPS 7 PM2
- 3 SAG20FR/SPS 7 PM2
- 4 SAR20/SPS 6
- 5 SAR20FR/SPS 7 PM2

1 mbar = 100 Pa = 0.1 kPa

Residual overpressure SAG25 and SAG32



Max. residual overpressure

- 1 SAG25/SPS 8 PM2
- 2 SAG32/SPS 12 PM2

1 mbar = 100 Pa = 0.1 kPa

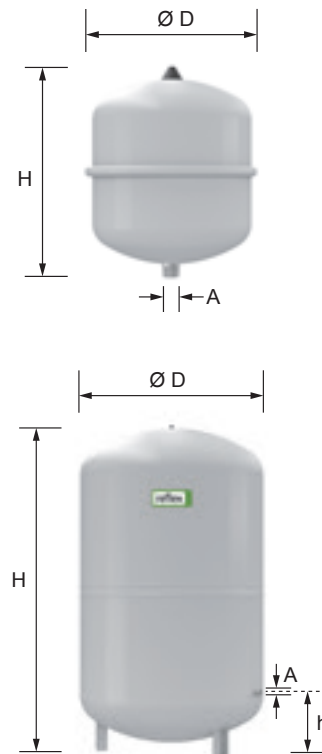
■ Technical data

Hoval 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

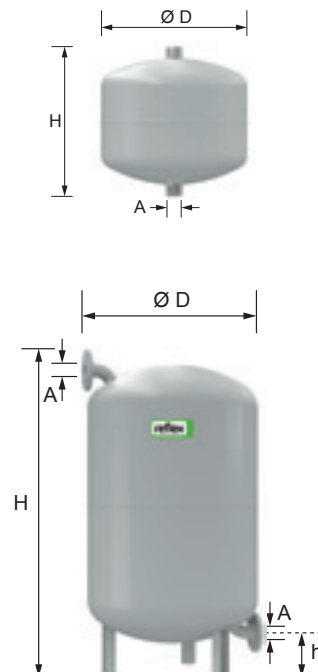
Type 10 bar/120 °C	Weight kg	Ø D mm	H mm	h mm	A	Pre-pressure bar
S 8	2.5	206	316	-	G ¾"	1.5
S 12	2.5	280	300	-	G ¾"	1.5
S 18	3.2	280	374	-	G ¾"	1.5
S 25	4.5	280	496	-	G ¾"	1.5
S 33	6.3	354	455	-	G ¾"	1.5
S 50	9.5	409	469	158	R ¾"	3.0
S 80	14.6	480	538	166	R 1"	3.0
S 100	15.5	480	644	166	R 1"	3.0
S 140	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

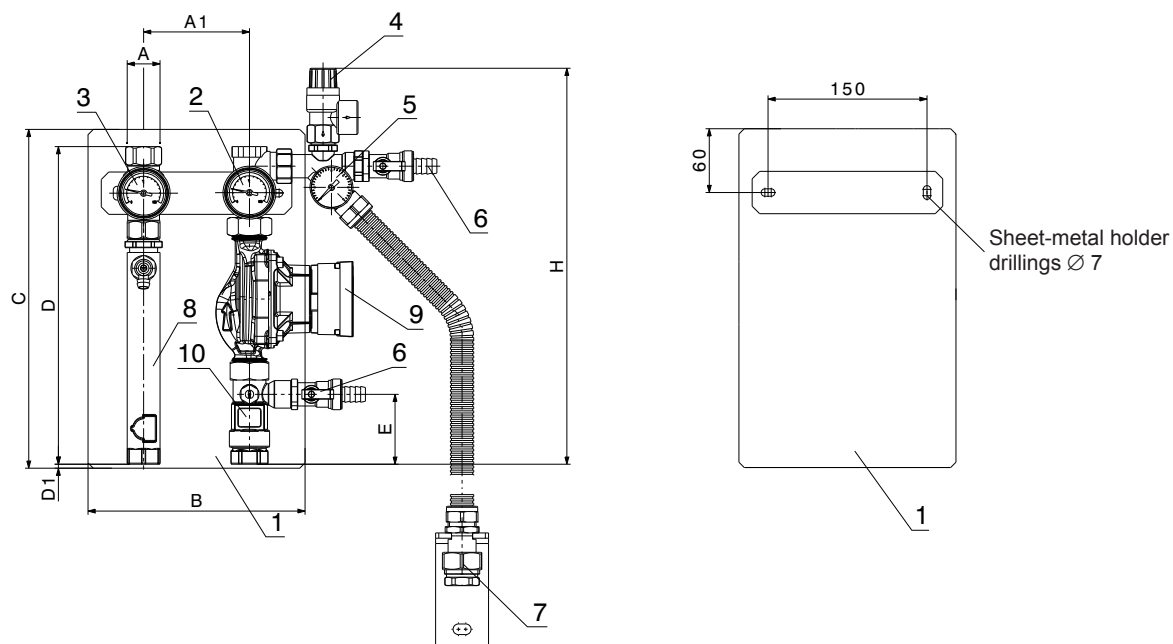
- Intermediate tank made of sheet steel from Reflex V 40 on feet
- Required for installations with return temperatures > 70 °C
- Use also as buffer storage tank
- Permitted operating temperature 120 °C and for operating pressures up to 10 bar

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

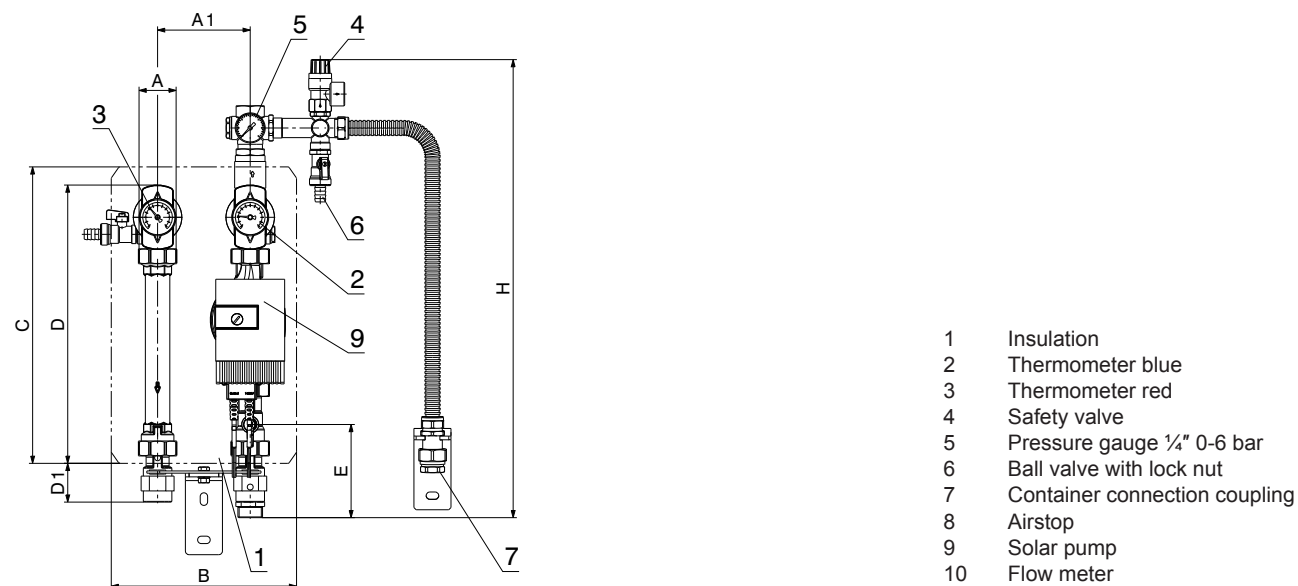


■ Dimensions

Solar armature group SAG20



Solar armature group SAG25/30



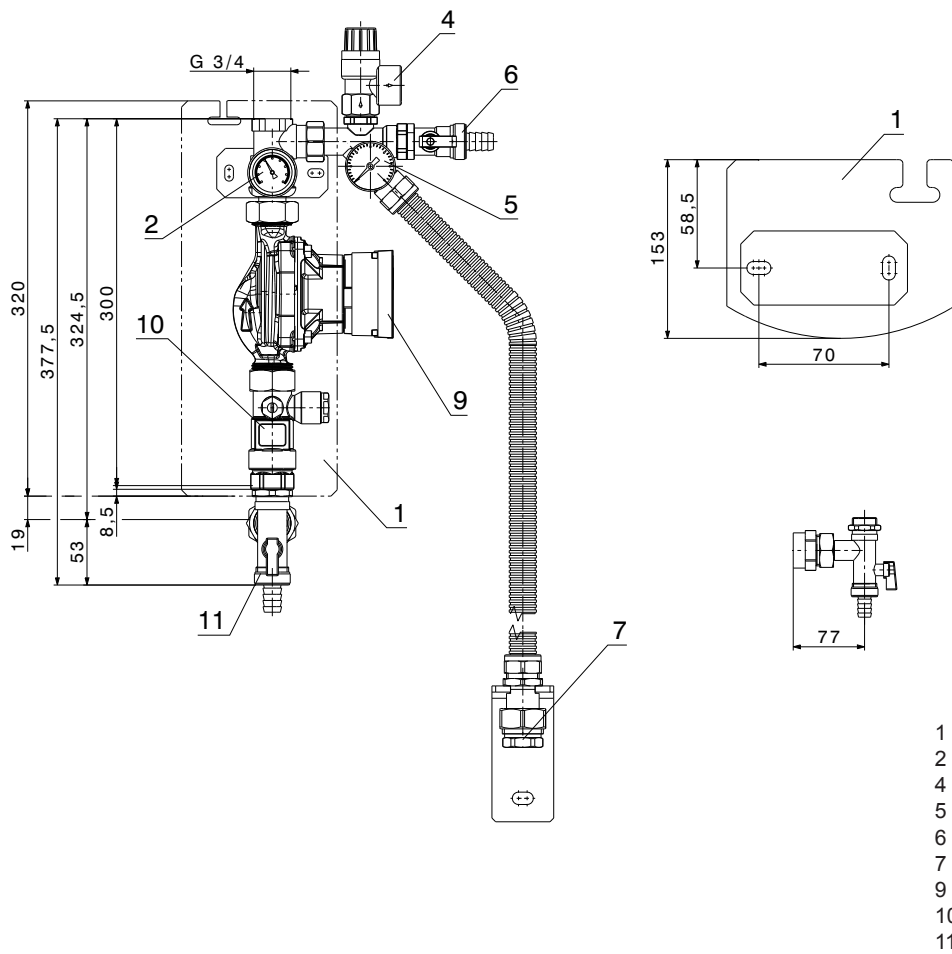
Wall mounting SAG 25/32

Bracket with variably adjustable distance to the wall

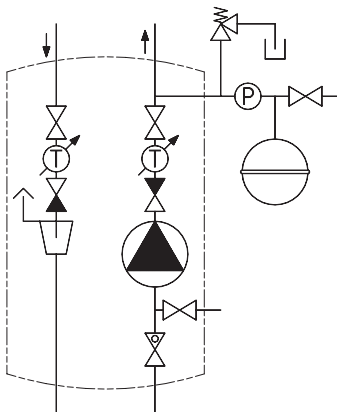
Type	A	A1	B	C	D	D1	E	H
DN 20	Rp 3/4"	100	205	320	300	7	66	371
DN 25	Rp 1"	125	250	438	498	88.5	171.5	744
DN 32	Rp 1 1/4"	125	250	400	375.5	52.3	125.7	618.1

■ Dimensions

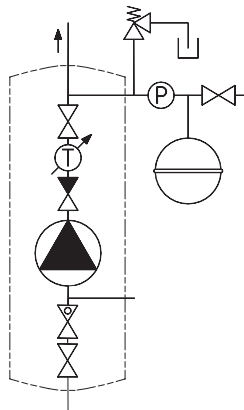
Solar return armature group SAR20



**Schematic diagram
of the solar armature group
SAG20**



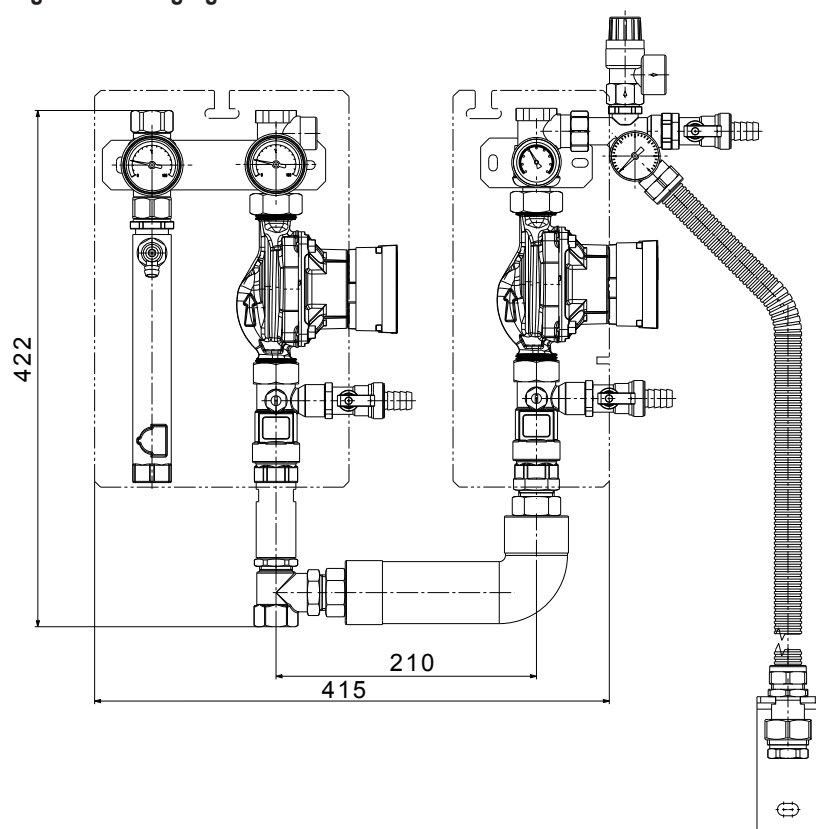
**Schematic diagram
of the solar return armature group
SAR20**



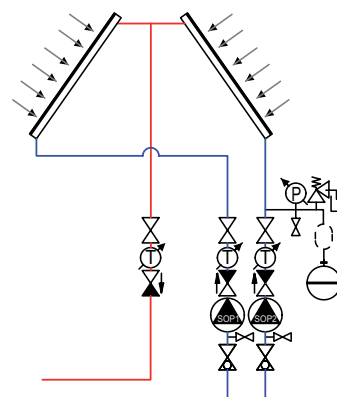
■ Dimensions

Connection set VS-DSA 20

Connection of two solar armature groups bottom
e.g. when charging one tank from two collector fields

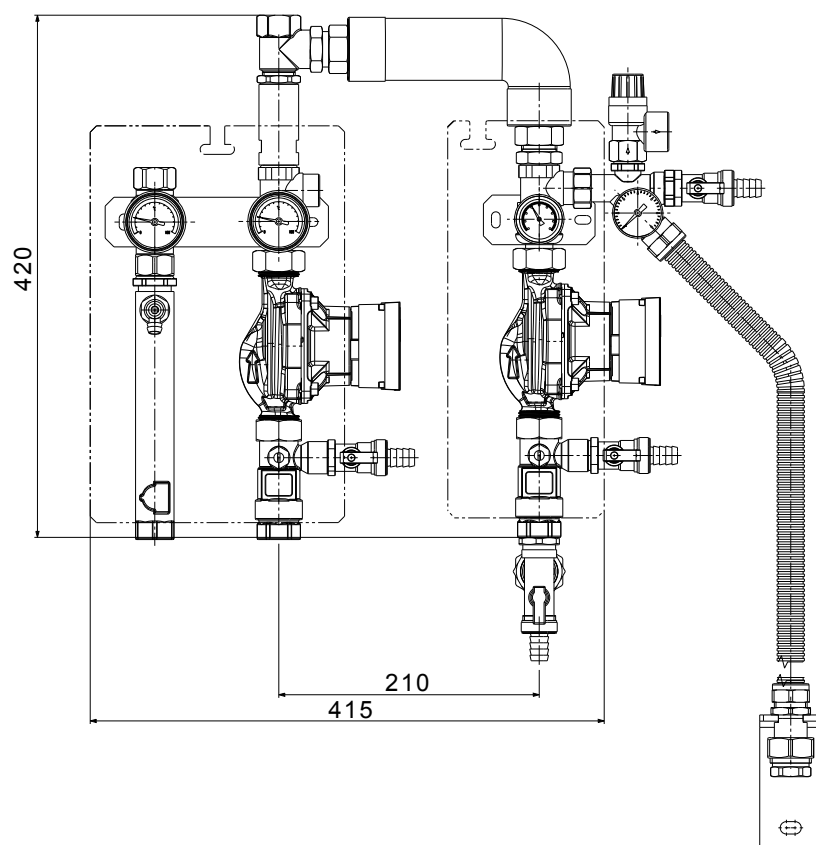


Schematic diagram

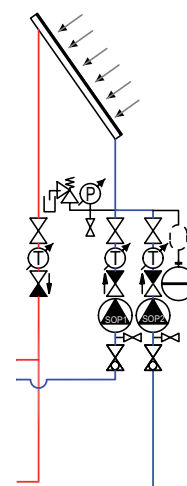


Connection set VS-DSA 20

Connection of two solar armature groups top
e.g. when charging two tanks from one collector field



Schematic diagram



■ Engineering

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 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 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 tR > 70 °C!)

Contents collectors = 15.2 litres

selected: intermediate tank type **V20**

Execution:

A system-based configuration is mandatory!

Selection table Reflex NG/N

			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

■ Description

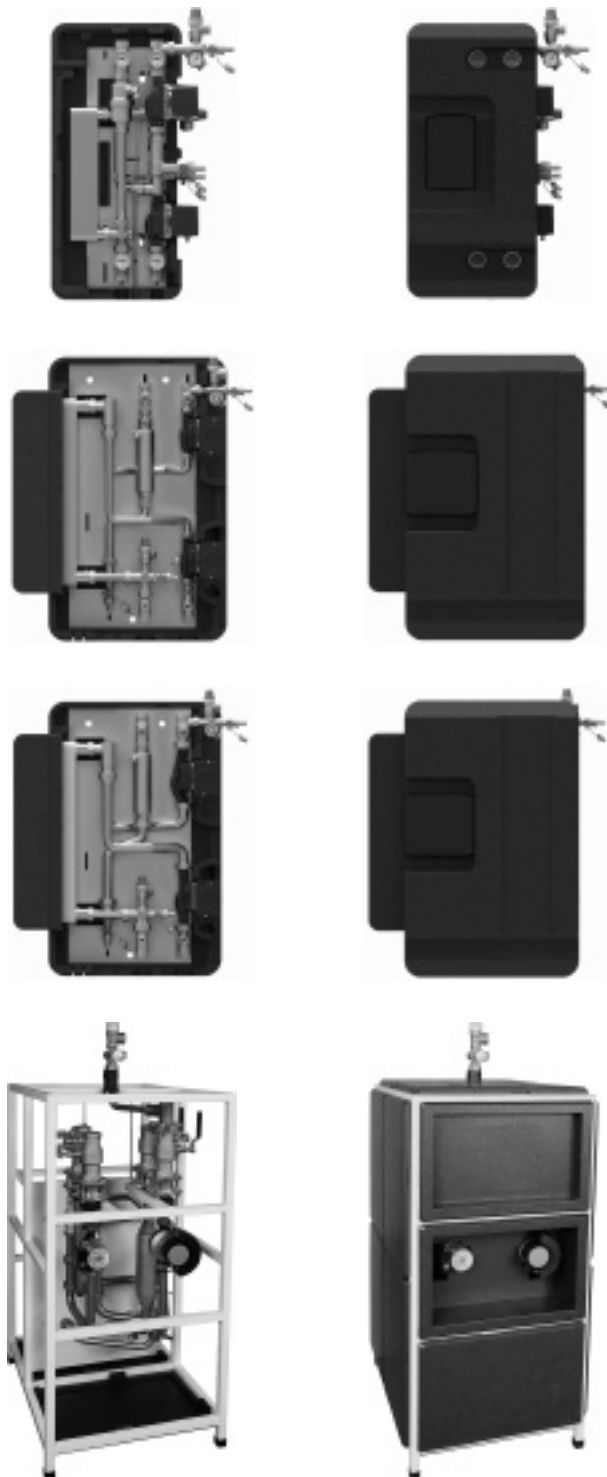
Hoval Solar charging modules

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 (storage circuit)
- Circulation pump pre-installed for primary and secondary circuit
- Flow rate sensor FlowRotor with PT1000 sensors installed in the primary 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 (3 bar) for the secondary circuit
 - TransTherm solar (25,50,100): 3 bar
 - TransTherm solar (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)

Part No.



Hoval Solar heat transfer stations

Part No.

Solar charging modules TransTherm solar

Type	Possible measuring range l/min	Pump primary circuit Type	Pump secondary circuit Type	Part No.
(25)	0.5-15	PM2 15-145 ¹	PM2 15-65 ¹	6037 694
(50)	0.5-15	PM2 15-145 ¹	PM2 15-65 ¹	6037 695
(100)	1-35	PML 25-145 ¹	UPM2 25-75 ¹	6037 696
(200)	5-100	UPM XL 25-125 ¹	UPML 25-105 ¹	6037 697

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

Accessories

Calibration valve TN

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

DN	Measuring range [l/min]	Connection Rp x Rp	kvs	Part No.
20	2-12	¾" x ¾"	2.2	2038 034
20	8-30	¾" x ¾"	5.0	2038 035
25	10-40	1" x 1"	8.1	2038 036
32	20-70	1¼" x 1¼"	17.0	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	Part No.
20	0.5-15	¾"	6037 631
25	1-35	1"	6037 632
32	5-100	1¼"	6037 693

Permanent air vent AirStop

for permanent degassing.

Manual exhaust valve.

Installation in the collector flow.

Connections: top R ¾", bottom Rp ¾"

641 311

Connections: top R 1", bottom Rp 1"

641 463

Motorised straight way ball valve type R3..BL / LR230A, SR230A

Enables layering in the storage tank.

Connections with inner thread with motor drive

Type	DN	Screw connection	kvs ¹	Part No.
R3020-BL2/ LR230A	20	Rp ¾"	8.5	6027 410
R3025-BL2/ LR230A	25	Rp 1"	10.0	6027 411
R3040-BL4/ SR230A	40	Rp 1½"	47.0	6027 413

Further accessories

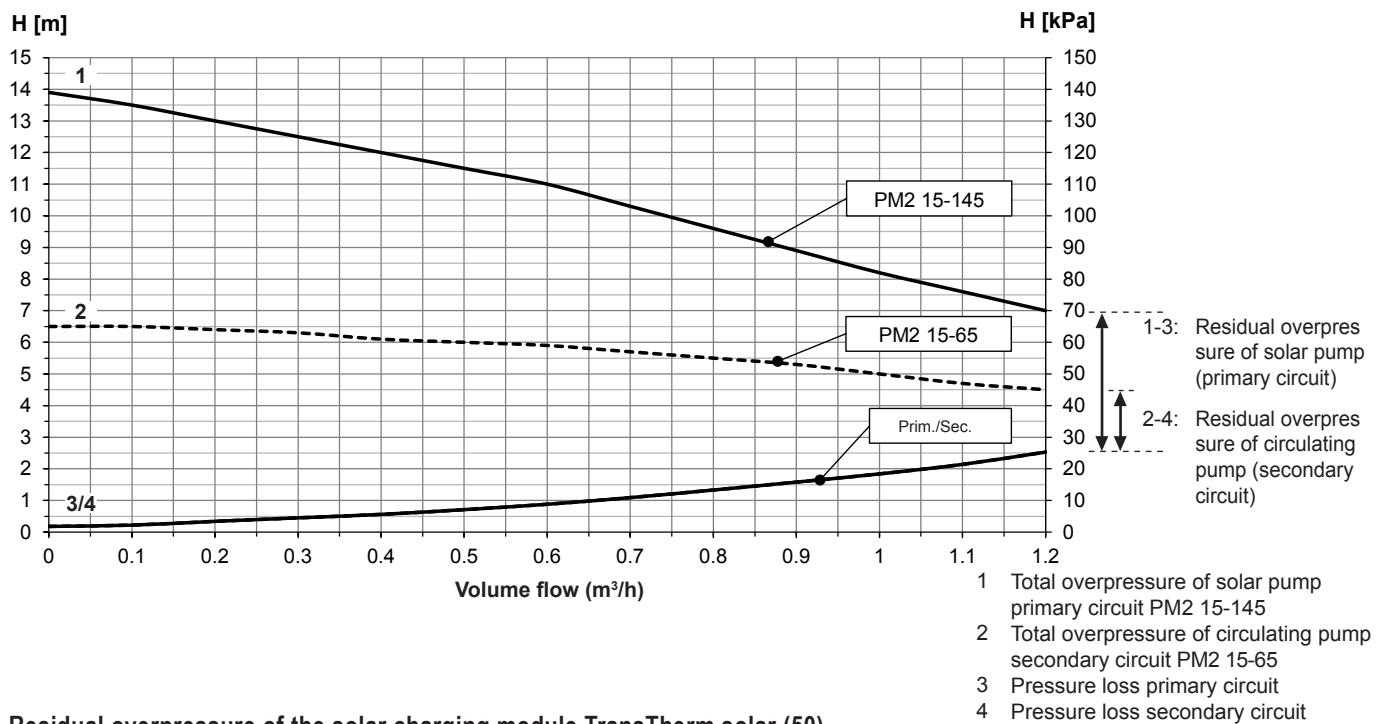
see chapter "TopTronic® E solar module",
"Solar armature groups" resp.
"System components"

Technical data

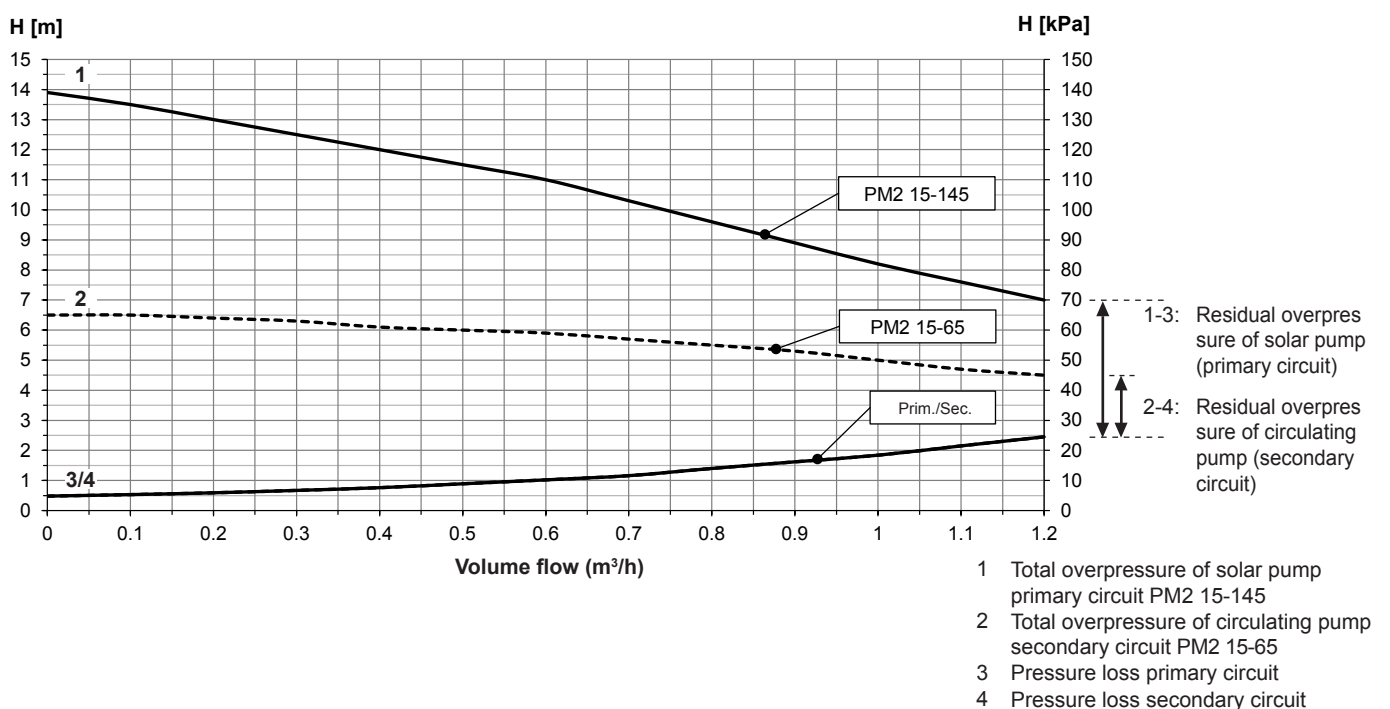
TransTherm solar		(25)	(50)	(100)	(200)
Pump - primary/secondary circuit		PM2 15-145/ PM2 15-65	PM2 15-145/ PM2 15-65	PML 25-145/ UPM2 25-75	UPM XL 25-125/ UPML 25-105
Voltage	V	1x230	1x230	1x230	1x230
Max. power consumption - primary/secondary circuit	W	69/48	69/48	140/70	180/140
Max. current - primary/secondary 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	6/3	6/3	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

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

Residual overpressure of the solar charging module TransTherm solar (25)

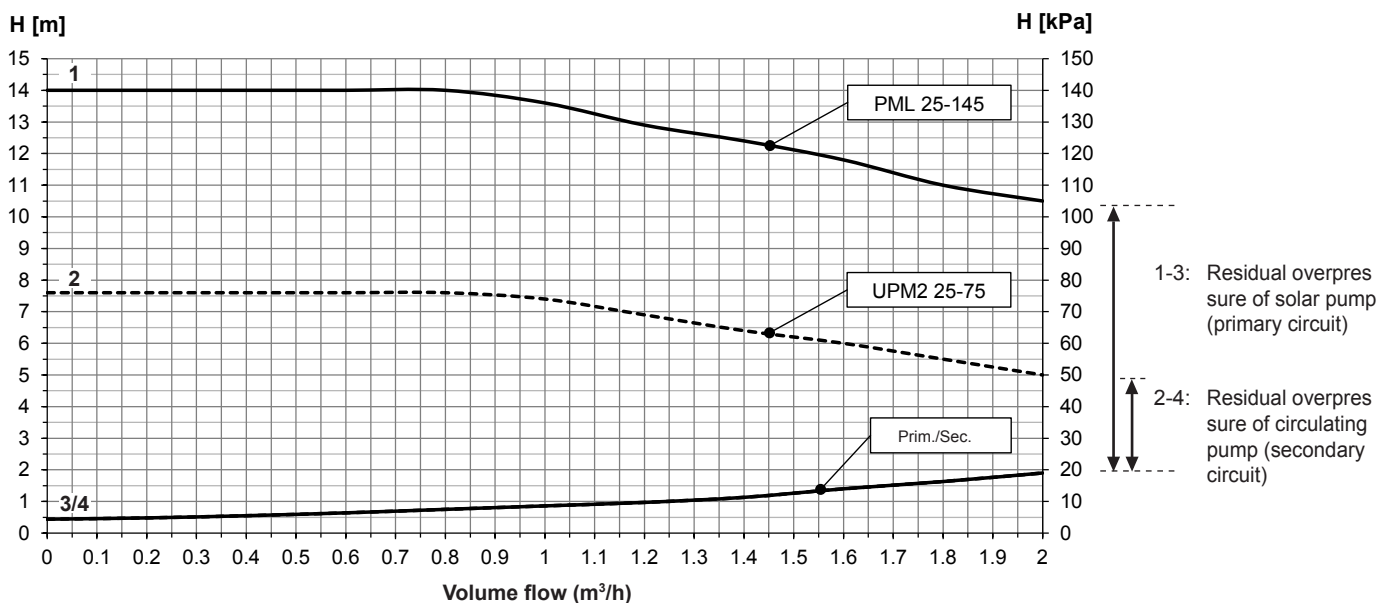


Residual overpressure of the solar charging module TransTherm solar (50)



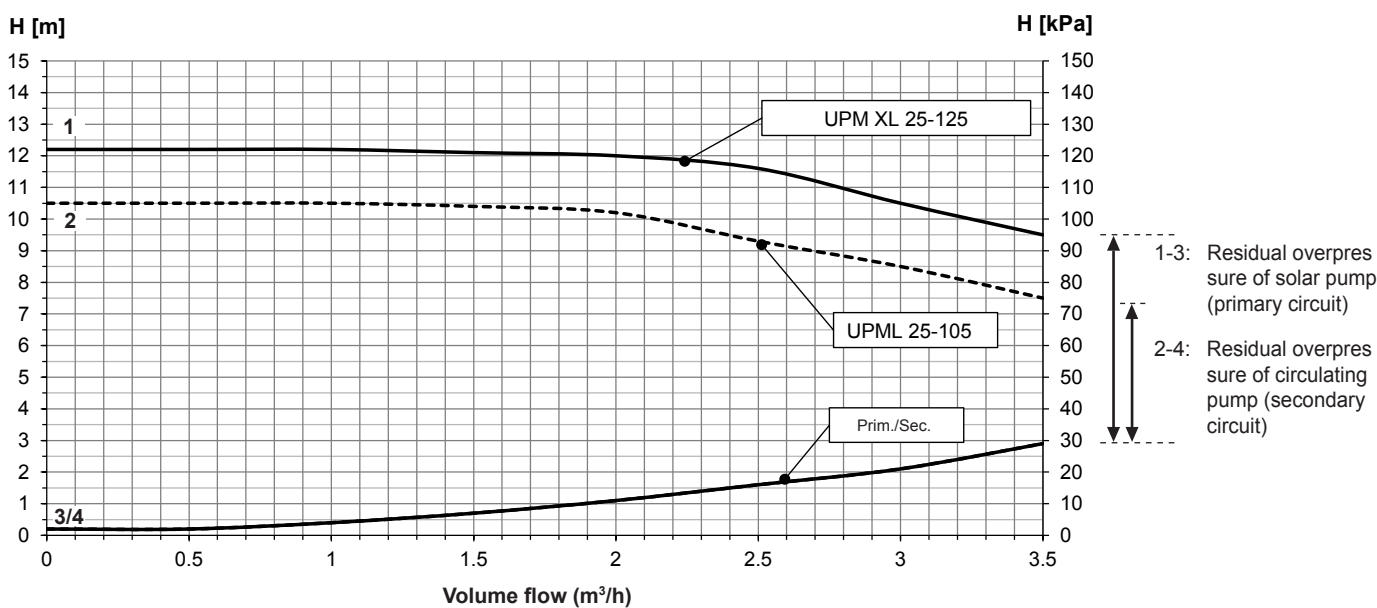
Technical data

Residual overpressure of the solar charging module 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 loss primary circuit
- 4 Pressure loss secondary circuit

Residual pumping head of the solar charging module TransTherm solar (200)

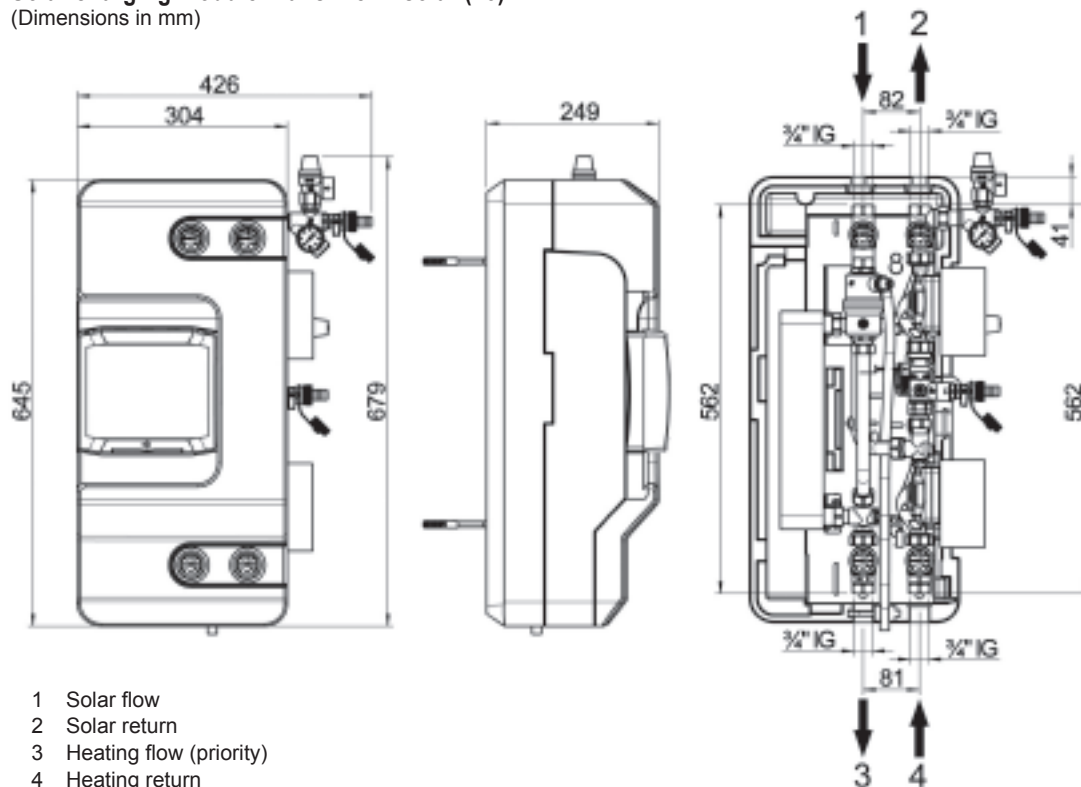


- 1 Total pumping head of the solar pump primary circuit UPM XL 25-125
- 2 Total pumping head of the circulating pump secondary circuit UPML 25-105
- 3 Pressure drop primary circuit
- 4 Pressure drop secondary circuit

■ Dimensions

Solar charging module TransTherm solar (25)

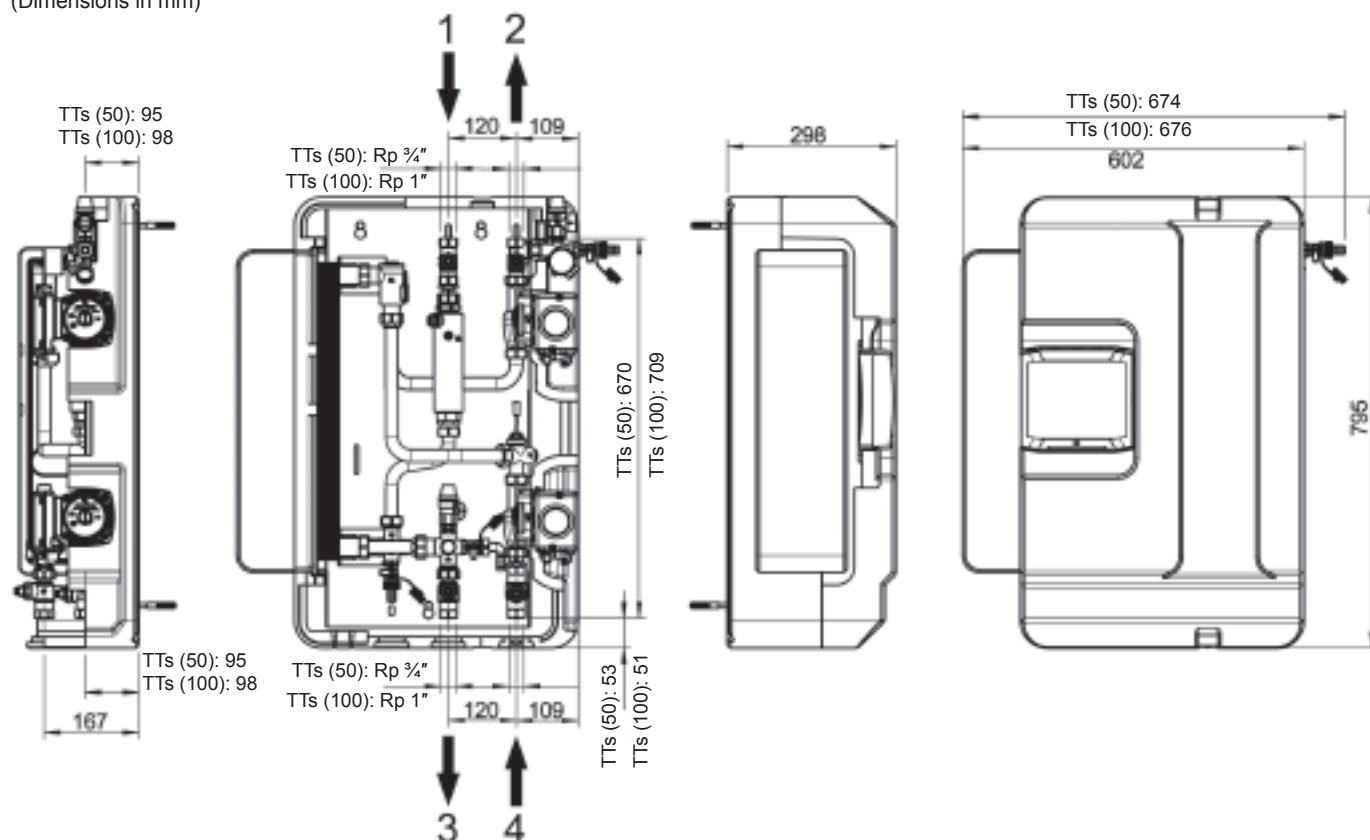
(Dimensions in mm)



- 1 Solar flow
- 2 Solar return
- 3 Heating flow (priority)
- 4 Heating return

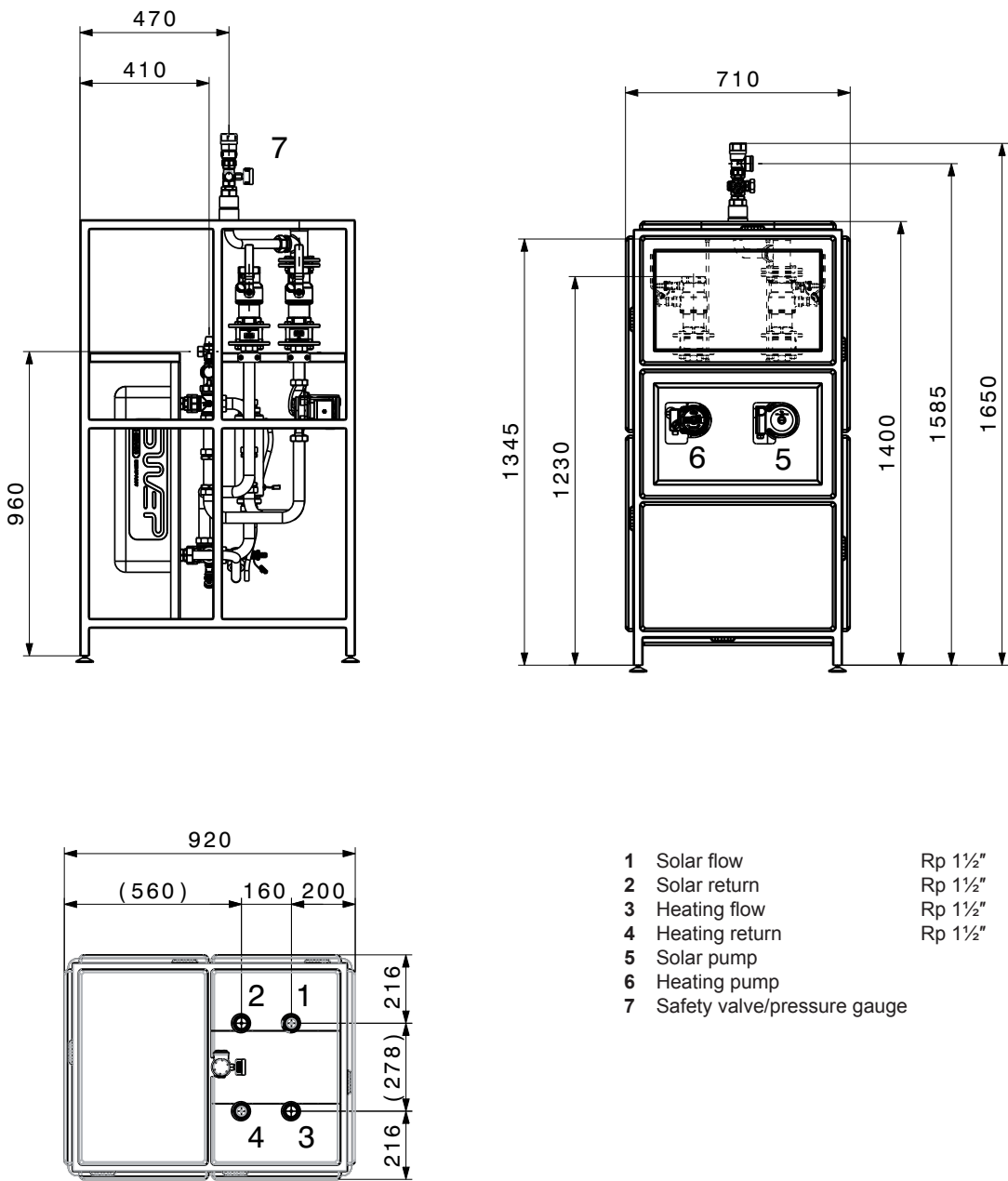
Solar charging modules TransTherm solar (50,100)

(Dimensions in mm)



■ Dimensions

Solar charging module TransTherm solar (200)
(Dimensions in mm)



Description

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

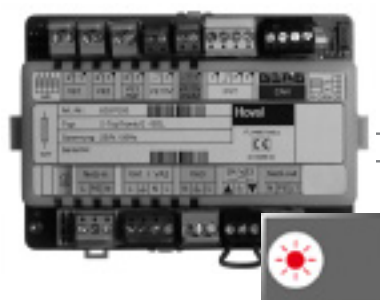
Operation of the controller module is generally via the TopTronic® E control module installed in the heat generator! If the control module is used without Hoval heat generator, the control module for operating the solar module and a wall casing must be ordered separately!

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
- 0-10V input
- 0-10V or PWM output for controlling a variable-speed pump
- Connection of a flow rate sensor (vortex or 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



TopTronic® E solar module



TopTronic® E module expansion Universal



TopTronic® E module expansion Universal

Max. 2 module expansions can be connected.

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
- 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 TopTronic® E online

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 230V output (VA3)
 - Plug for 2x 230V 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

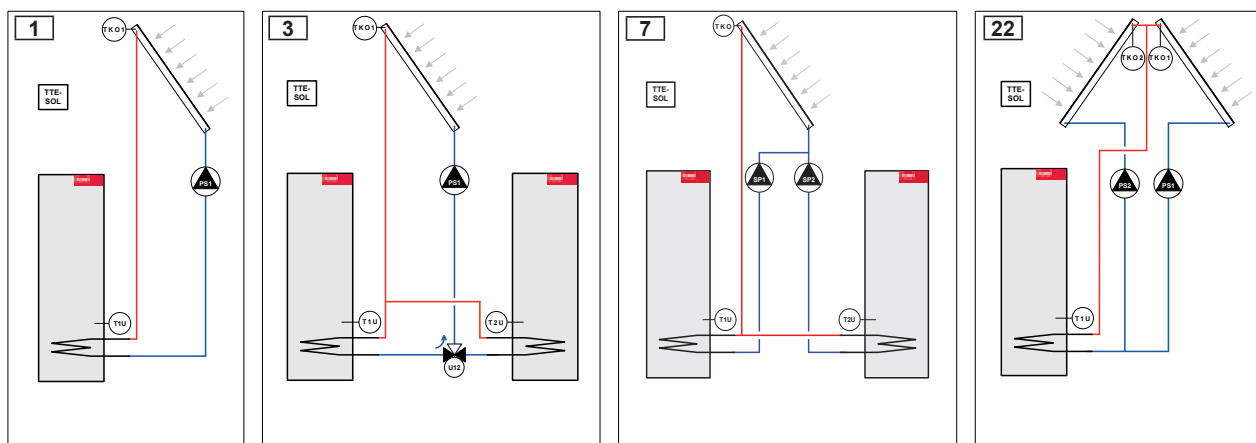
The supplementary plug set may have to be ordered to implement functions differing from the standard!

Description

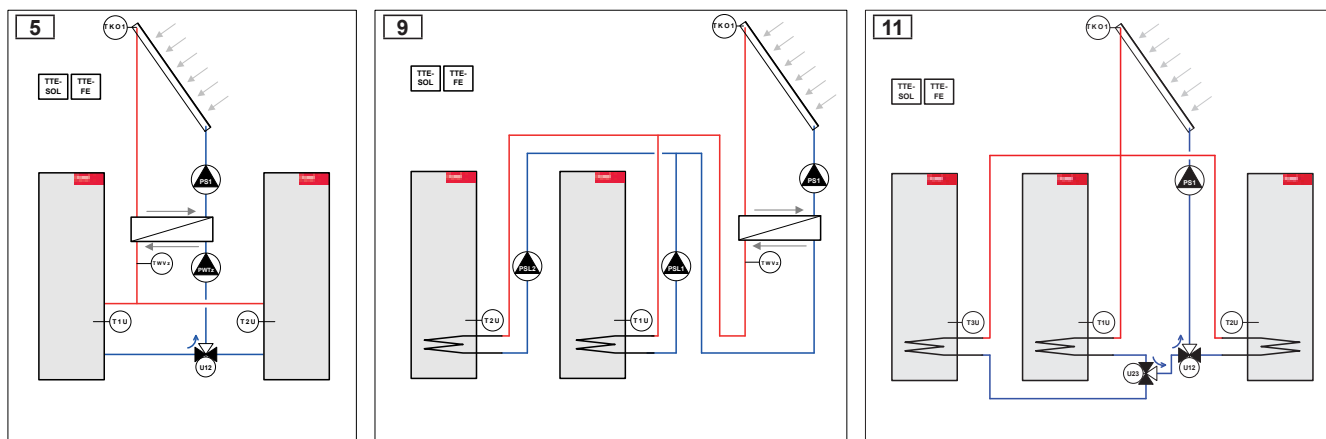
Functions that can be implemented

TopTronic® E solar module

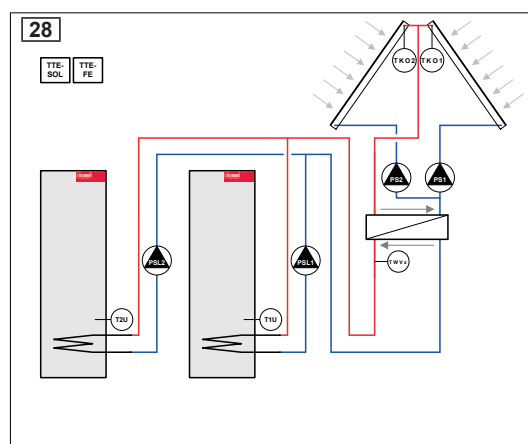
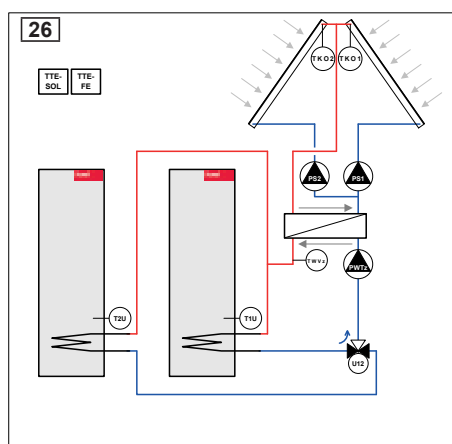
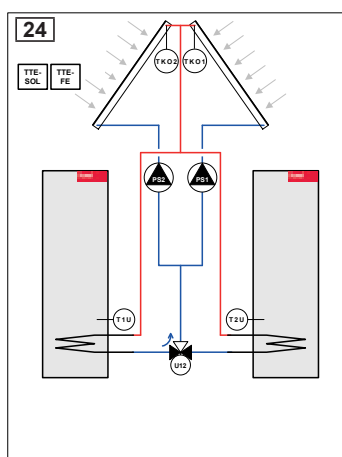
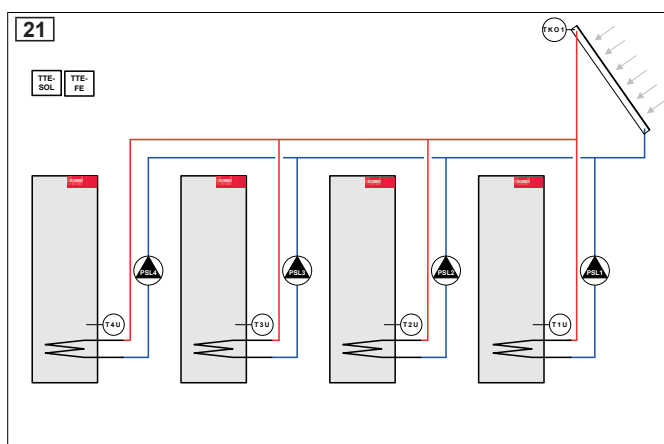
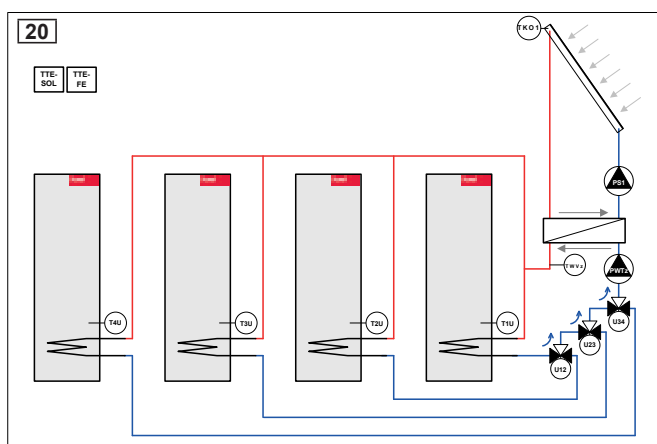
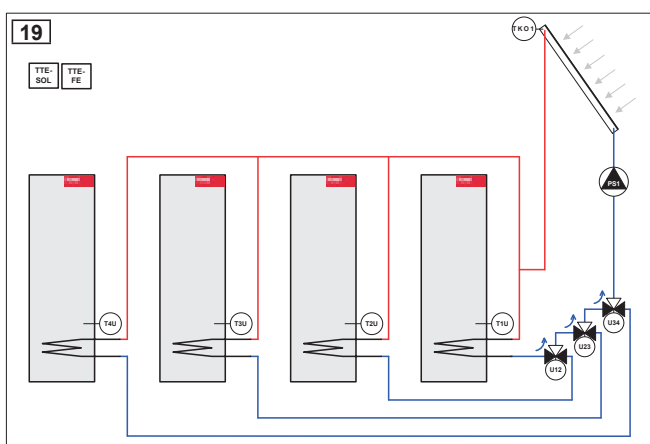
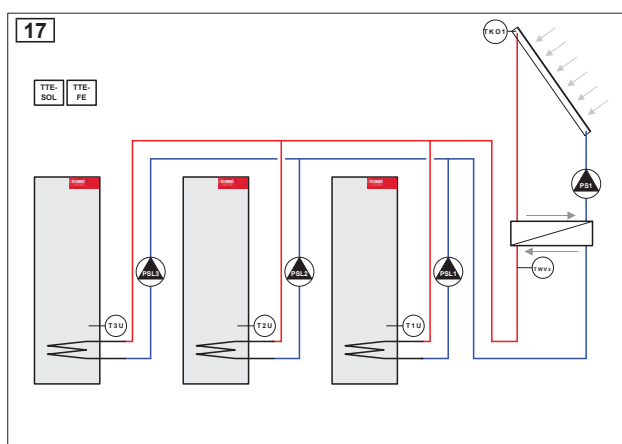
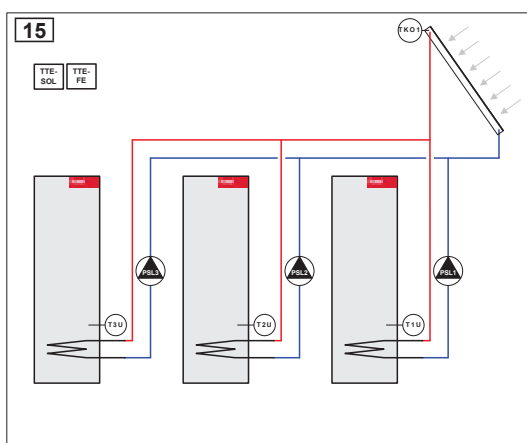
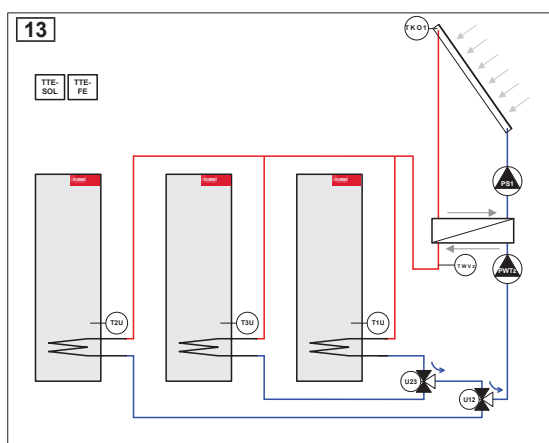
TTE-SOL	1 collector	2 collectors	Ext. HE	1 consumer	2 consumers	3 consumers	4 consumers	Change-over unit	Shut-off unit
Hydr. 1	x			x					
Hydr. 3	x			x	x			x	
Hydr. 5	x		x	x	x			x	
Hydr. 7	x			x	x				
Hydr. 9	x		x	x	x				
Hydr. 11	x			x	x	x		x	
Hydr. 13	x		x	x	x	x		x	
Hydr. 15	x			x	x	x			
Hydr. 17	x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



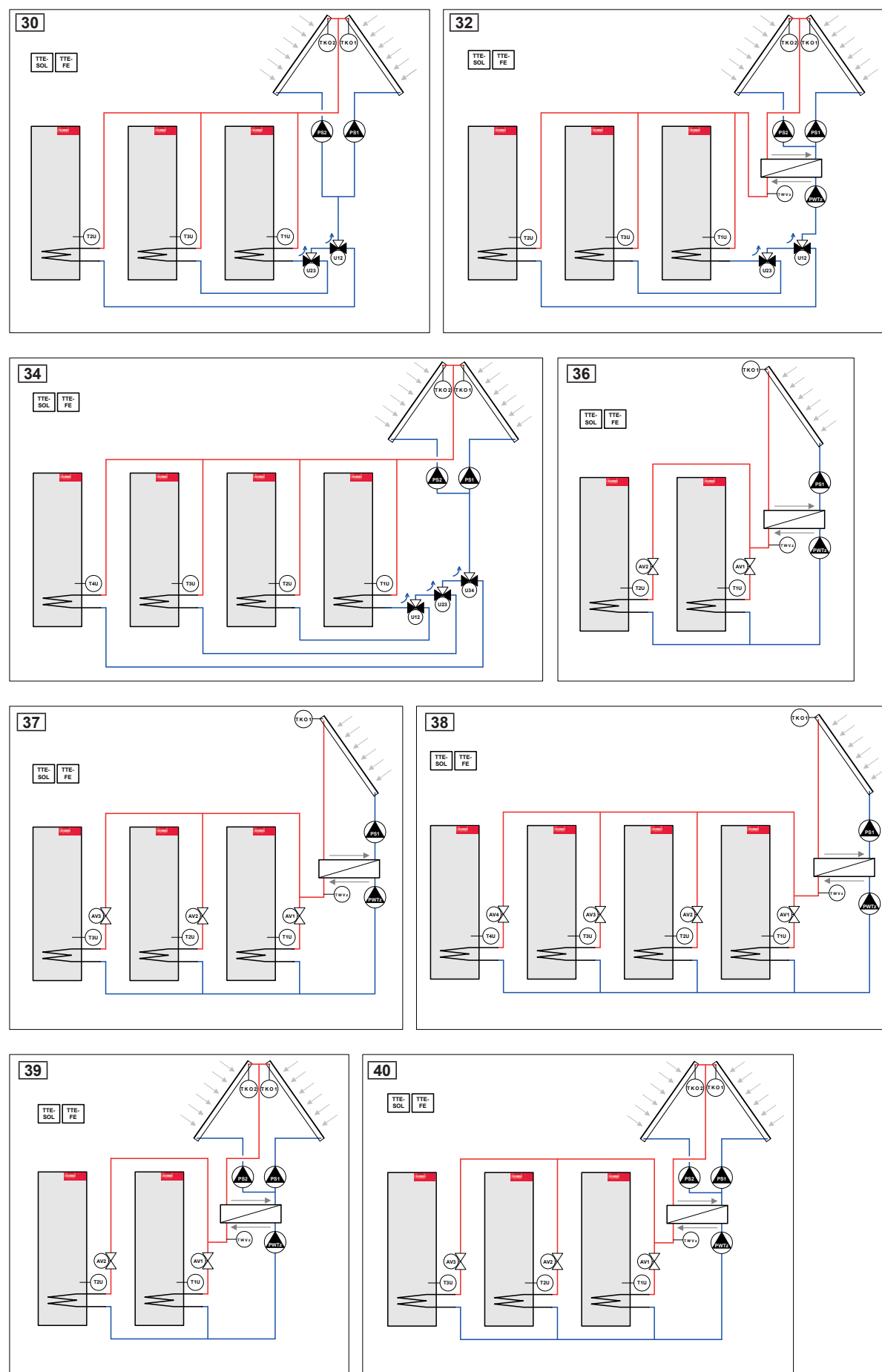
TopTronic® E solar module and 1 module expansion



Description

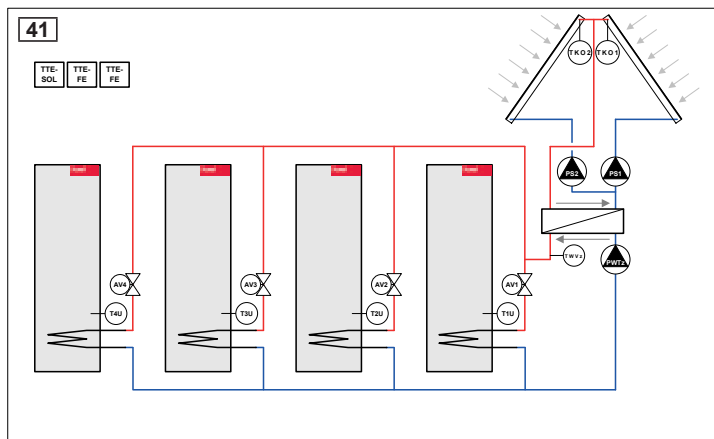
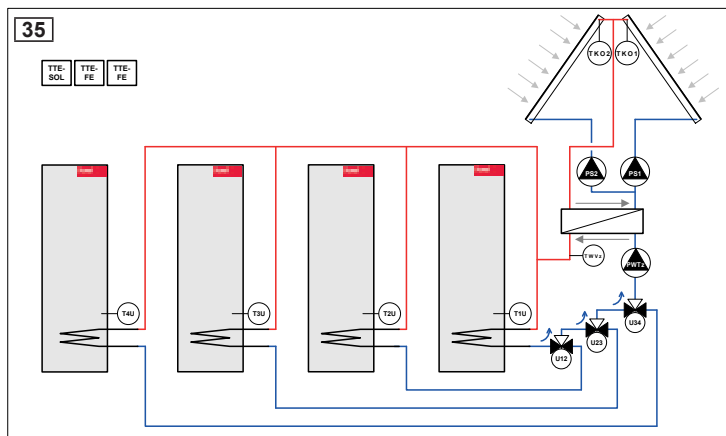


Description

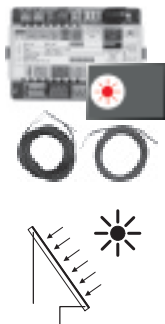


■ Description

TopTronic® E solar module and 2 module expansions



■ Part No.


TopTronic® E solar module
Part No.
TopTronic® E solar module TTE-SOL

6037 058

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

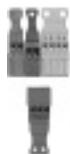
In a standalone application, the control module for operating the solar module and a wall casing must be ordered separately!!

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

6034 503

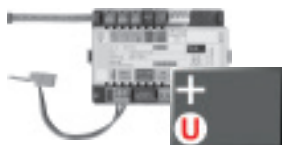
for controller modules and module expansion TTE-FE HK

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 vortex sensor input

■ Part No.

**TopTronic® E module expansion
for TopTronic® E solar module****Part No.****Max. 2 expansions can be connected.****TopTronic® E module expansion Universal
TTE-FE UNI**

6034 575

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

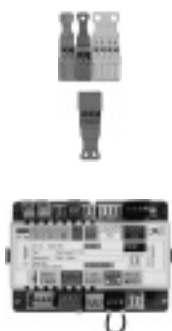
Consisting of:

- 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.



Accessories for TopTronic® E

Part No.

Supplementary plug set

for basic module heat generator (TTE-WEZ)

6034 499

TopTronic® E controller modules

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

6034 571

TTE-PS TopTronic® E buffer module

6037 057

TTE-MWA TopTronic® E measuring module

6034 574

TopTronic® E room control modules

TTE-RBM TopTronic® E room control modules

easy white

6037 071

comfort white

6037 069

comfort black

6037 070

Enhanced language package TopTronic® E

6039 253

one SD card required per control module

Consisting of the following languages:

HU, CS, SK, RO, PL, TR, ES, HR, SR, PT,
NL, DA, JA

TopTronic® E remote connection

TTE-GW TopTronic® E online LAN

6037 079

TTE-GW TopTronic® E online WLAN

6037 078

SMS remote control unit

6018 867

System component SMS remote
control unit

6022 797

TopTronic® E interface modules

GLT module 0-10 V

6034 578

Gateway module Modbus TCP/

6034 579

RS485

Gateway module KNX

6034 581

TopTronic® E wall casing

WG-190 Wall casing small

6035 563

WG-360 Wall casing medium

6035 564

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

6035 565

WG-510 Wall casing large

6035 566

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

6038 533

TopTronic® E sensors

AF/2P/K Outdoor sensor

2055 889

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

2055 888

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

2056 775

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

2056 776

System housing

System housing 182 mm

6038 551

System housing 254 mm

6038 552

Bivalent switch

2061 826

Further information
see "Controls"

■ Part No.

Part No.



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
incl. wall mounting material

6027 257

TopTronic® E control module as an option



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

6037 492

TopTronic® E control module as an option

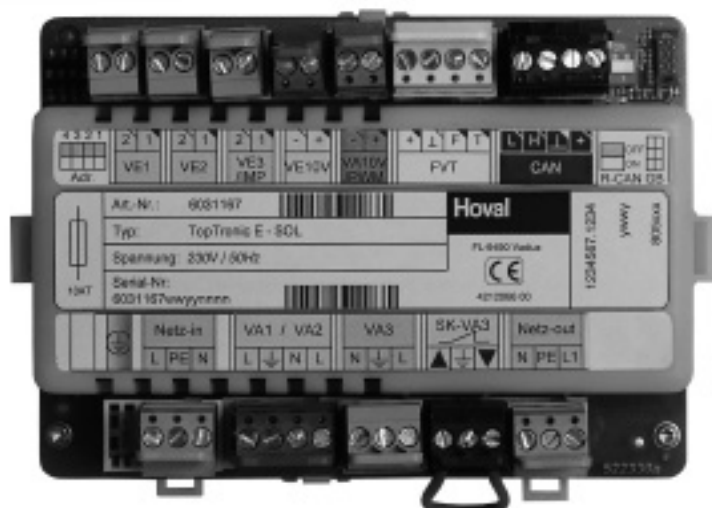
■ Technical data

TopTronic® E solar module

Model	TTE-SOL
• Power supply max.	230 V AC +6/-10%
• Frequency	50-60 Hz
• Min. power consumption	0.8 W
• Max. power consumption	7.8 W
• Fuse	10 A slow-blow
Output (low voltage)	
• Electromechanical relays	3
Output (extra-low voltage)	
• Signal output PWM or 0-10 V	1
Switching capacity	
• Electromechanical relays	3 A
Input (low voltage)	
• Optocoupler input	1
Inputs (extra-low voltage)	
• Input 0-10 V	1
• Inputs sensors	2
• Inputs vortex sensor (or alternative flow rate sensor)	1
• Pulse input	1 (can be switched over to sensor)
Expansion (module expansion)	
• Max. number	2
Casing	
• Installation	Top hat rail mounting
• Dimensions (W x H x D) incl. plug	150 x 100 x 75 mm
• Ambient temperature (during operation)	0...50 °C
• Humidity (in operation)	20...80% RH, non-condensing
• Storage temperature	-20...60 °C
Bus system (Hoval CAN bus)	
• Capacity	max. 4 control modules / 3 control modules + 1 gateway
• Bus supply	yes
• Bus line	4-wire bus
• Bus length	twisted, shielded, max. 100 m
• Line cross-section	min. 0.5 mm ²
• Cable type (recommended)	JY-(ST) 2 x 2 x 0.6
Other bus interfaces	Internal unit bus (master)
Miscellaneous	
• Spring reserve	approx. 10 years, battery buffered
• Type of protection	IP 20
• Protection class	I – EN 60730
• Plug types	Rast 5 (coloured, coded)

Electrical connection

TopTronic® E solar module



■ Examples

Heat quantity balancing

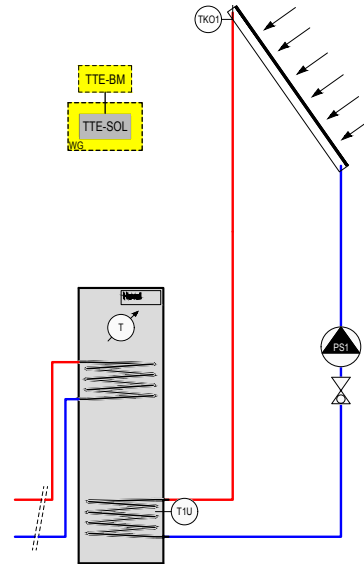
Heat quantity balancing for solar systems

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.

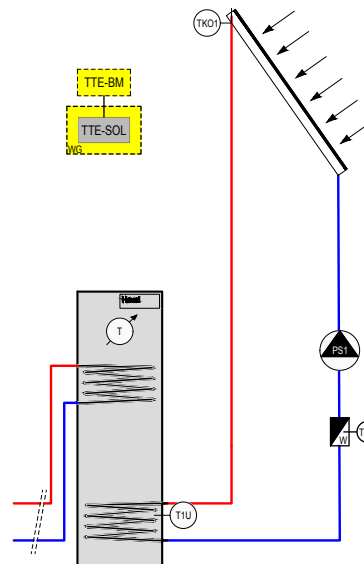
- Application: energy yield calculation collector circuit
- Flow: constant or speed-controlled - balancing valve TN necessary
- Flow sensor: collector sensor (TKO1)
- Return sensor: calorifier sensor (T1U)



Variant 2 (310)

Energy balancing with heat meter

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



■ Engineering

General information

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 kWh 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 > 20° 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 angle of inclination of the collectors is freely selectable between 20° and 88°.

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.

■ Engineering

Components 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, UltraSol eco 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 layed 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) necessary for the normal function of the solar circuit.

With the solar storage tank SolarCompact, the solar armature group is being mounted completely on the storage tank, so that only the connection pipes to the collector field must be installed.

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 circulation 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 (SolarCompact, 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.

The solar armature group and the solar expansion tank are already integrated in the solar station SolarCompact available with storage contents of 300 to 500 litres, whereby a space-saving and assembly-friendly compact solution results.

For concepts with solar heating support either the combi storage tank with a high-grade steel calorifier on the inside (Hoval CombiSol) and equipped with an integrated solar register can be used, or the ordinary energy storage tank, which is warmed up by solar power either by means of two integrated solar heat exchangers inside the flange or an external plate-type heat exchanger. With this type water heating can also take place by the external fresh water module.

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 circulation 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.

■ Engineering

Collector data

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.

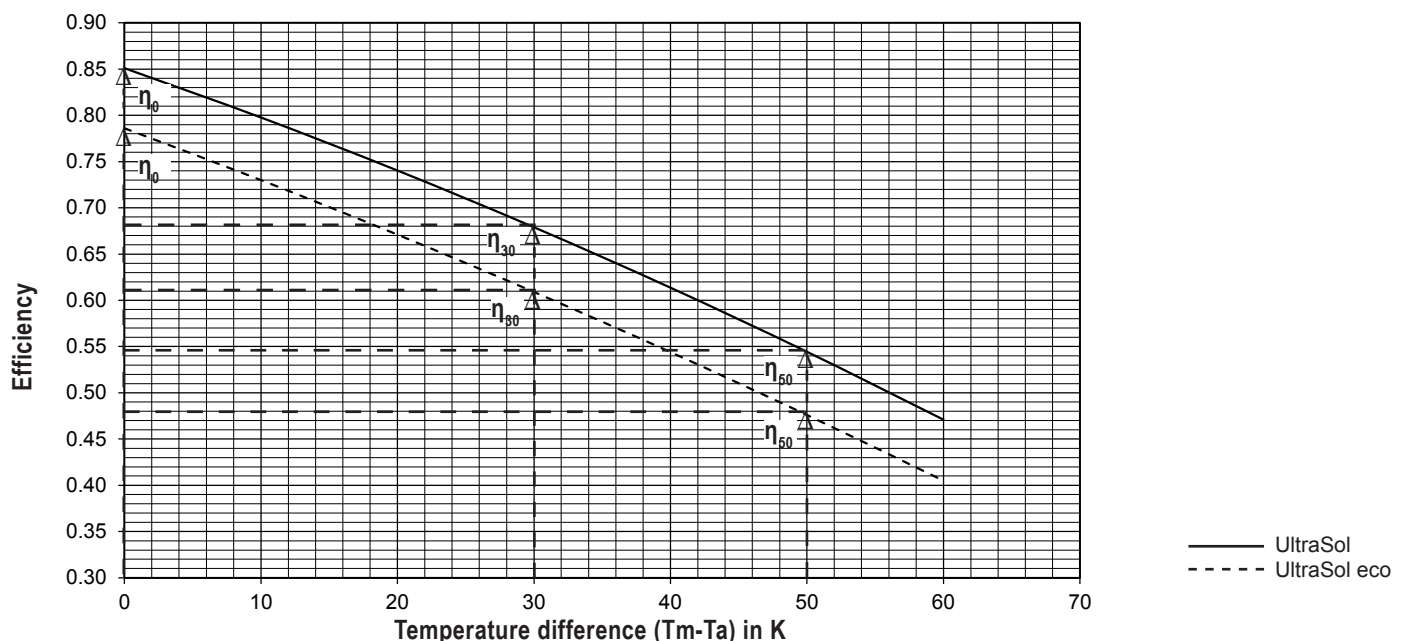
4 Collector testing

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.

Collector characteristic on irradiation $E_g = 800 W/m^2$

related to absorber surface in accordance with tests of SPF, Rapperswil



η_0 = Collector efficiency at average collector temperature = ambient temperature

η_{30} = Collector efficiency at 30 K temperature difference between average collector and ambient temperature

η_{50} = Collector efficiency at 50 K temperature difference between average collector and ambient temperature

■ Engineering

Dimensioning guidelines

Valid for flat collectors under the following conditions

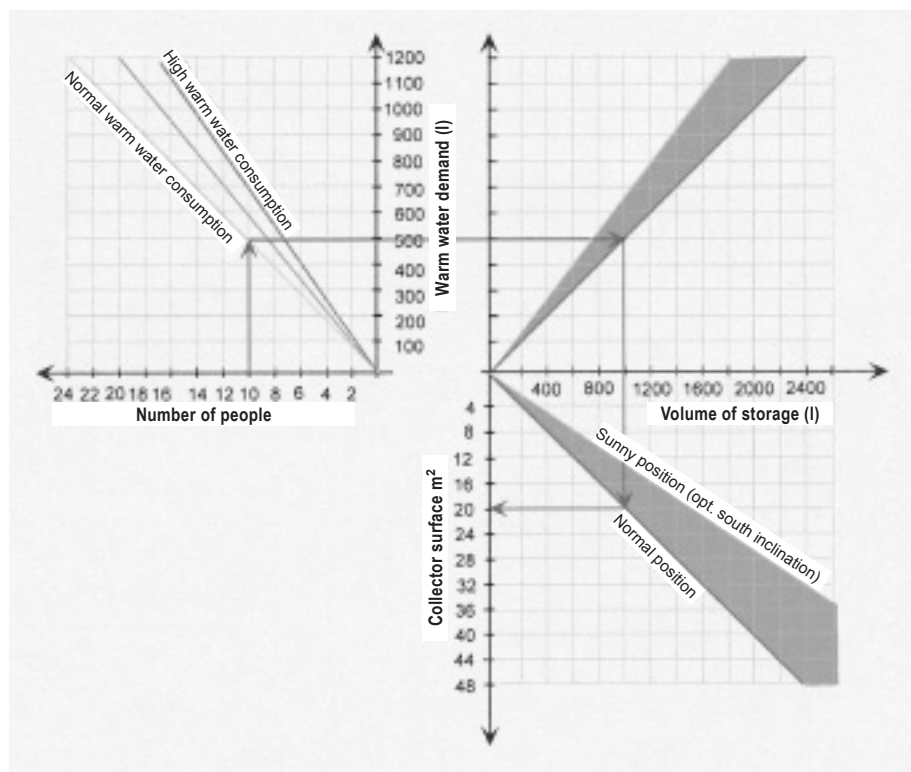
1. Average sun exposure about 1200 kWh per square meters and year, related to the horizontal irradiation surface and the Central European climate conditions.
2. Sunshine on the collector surface more than 90 %, no shade
3. Collector angle of inclination depending upon type of use and period of use:
 - 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.

■ Engineering

Dimensioning guidelines

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.

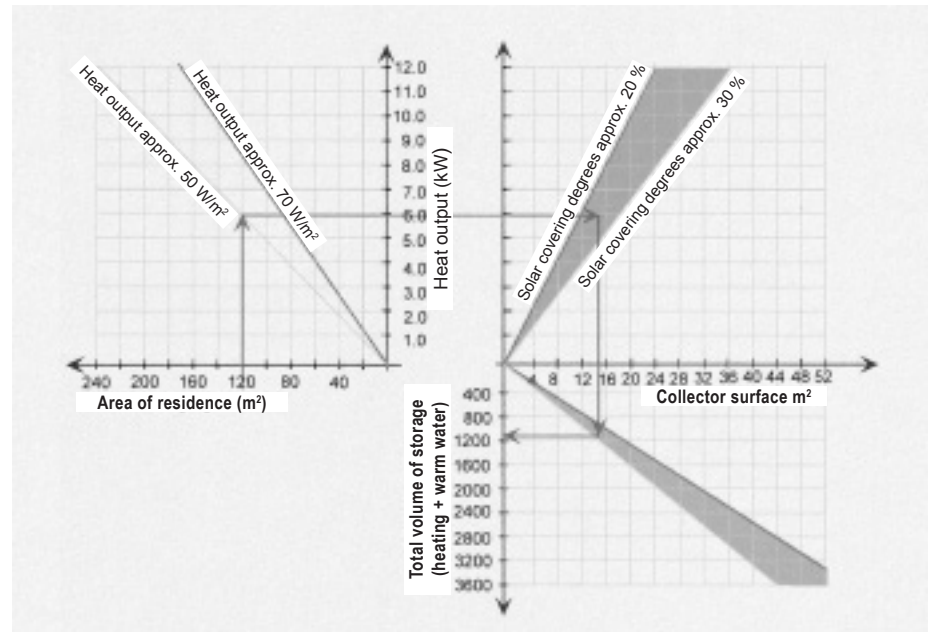
As approximate value 1.5-2 m² collector surface are to be planned additionally for water heating per 10 m² living space, respectively 15-20 % of the surface which has to be heated.

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



■ Engineering

Dimensioning recommendations for the components

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	1.25	-
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 %
	0-20°	not permissible
South	20-25°	approx. 10
South-west	25-60°	0
South-east	60-75°	approx. 10
	75-90°	30-50
	0-20°	not permissible
West	20-30°	15-20
East	30-50°	0
	50-75°	30-50
	75-90°	50-80

Hot water and heating support

Orientation	Slope degrees	Flat %
	0-20°	not permissible
South	20-25°	20-30
South-west	25-60°	10
South-east	60-75°	0
	75-90°	20-40
	0-20°	not permissible
West	20-30°	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	0-20°	5
	20-40°	0
	40-60°	15
South-west	0-20°	15
South-east	20-40°	0
	40-60°	20
West	0-20°	10
East	20-40°	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*.

■ Engineering

Dimensioning recommendations for the components

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

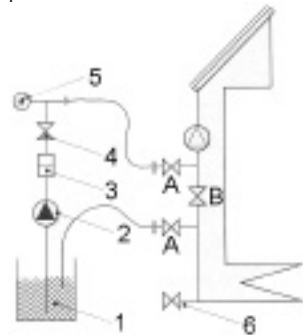
Flushing, filling and venting

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!

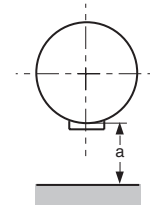
The system may only be filled if it can be put into operation at the same time. A pump should be used to fill the system, the system should be fully installed, filled and connected on-site and the heat transfer medium mixed and prepared.



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

Necessary space

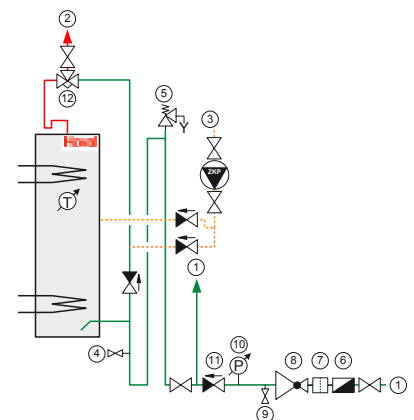
- The inspection opening has to be well accessible.
- Distance to the wall for the installation and removal of the electrical heating inset (a):



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
CombiSol	900,1200	≥ 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 |

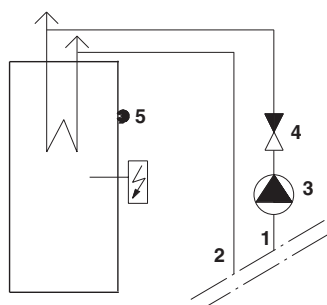
■ Engineering

Dimensioning recommendations for the components

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 loading 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 loading 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	
<i>Technician</i>	
Heat transfer medium	every
Safety components	2-4
Regulator functions	years

Static requirements for solar collectors

- Regionally applicable standards and regulations must be observed.
- EN 1991 describes the regulations generally recognised Europe-wide.
- The installer is responsible for ensuring compliance with local regulations.

Substructure

- Installation is only permissible on roof areas or substructures of sufficient load-bearing capacity. The static load-bearing capacity of the roof or the substructure must be tested on site prior to installation of the collectors, if necessary in consultation with a structural engineer, with a view to local and regional conditions.
- In the area of corners and edges of flat roofs, swirling effects can cause high wind suction which was not taken into consideration in the calculations. For this reason, a distance of at least 1.2 m from the roof edge must be maintained on the eave side and a distance of 1.5 m on the gable end.
- The collectors are mounted on concrete blocks; this means that they can be installed without piercing the roofing. Rubber underlays or construction protection mats must be used to increase static friction between the roof and the concrete ballast blocks and to avoid damage to the roofing.
- The following information is important for correct design of the mounting systems:
 - snow load (snow load zone)
 - wind speed
 - height of the building (~ reference height)
 - terrain category

In many countries, information on the snow and wind load zones is available on the Internet.

Wind speed

The decisive dynamic wind pressure is calculated via the reference speed, the terrain category and the height of the upper collector edge above the terrain.

The *reference speed*

- is the mean 10-minute value of a gust of wind, measured in terrain category II at a height of 10 m
- occurs once in 50 years, according to statistics
- is defined in national standards.

The *terrain category* describes the type of landscape in which the object stands (coastal or urban area, etc.).

Proof of the following must be furnished to ensure that the system is stable:

- *Overturning analysis:*
torsional moment = holding torque
- *Proof of safety against sliding:*
Permissible horizontal force = vertical force x friction coefficient

A friction coefficient of $\mu \sim 0.6$ [-] is allowed for where non-slip underlays are used.

Snow loads

On-site inspection of the entire collector structure is required, especially in areas with abundant snowfall.

■ Engineering

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.

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.

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

■ Engineering

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 10 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 V / UltraSol eco V	Number of collectors									
	1	2	3	4	5	6	7	8	9	10
Rafter spacing 1000 mm	2	3	4	5	7	8	9	10	12	13
Rafter spacing 900 mm	2	3	5	6	7	9	10	12	13	14
Rafter spacing 800 mm	2	4	5	7	8	10	12	13	15	16
Rafter spacing 700 mm	2	5	6	8	10	12	13	15	17	19
Rafter spacing 600 mm	2	5	7	9	11	13	16	18	20	22
Rafter spacing 500 mm	3	6	8	11	13	16	18	21	23	26

UltraSol H / UltraSol eco 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

Selection of the concrete base**The decisive factors are:**

- reference height
- wind speed -> reference speed
- terrain category

The *reference height H [m]* is the height of the upper collector edge above the terrain.

Reference speed $v_{b,0}$ in accordance with EN 1991-1-4:

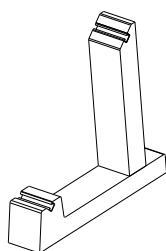
The speeds given apply to a collector row with a maximum of 4 collectors.

The values given are limit values above which the collector system tilts or slides.

Terrain categories see above

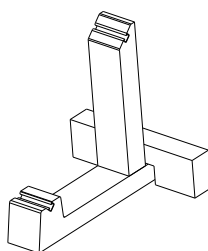
			H ≤ 5 m	H ≤ 10 m	H ≤ 15 m	H ≤ 20 m	H ≤ 25 m
Var. 1	GK II	V _{b,0} [m/s]	12.7	11.7	11.1	10.8	10.5
	GK III		14.7	13.6	12.9	12.5	12.1
	GK IV		19.2	17.7	16.8	16.3	15.8
Var. 2	GK II		12.8	12.8	12.1	11.6	11.2
	GK III		14.8	14.8	14.0	13.4	13.0
	GK IV		19.4	19.4	18.3	17.5	17.0
Var. 3	GK II		14.3	14.3	14.3	13.6	13.0
	GK III		16.6	16.6	16.6	15.7	15.1
	GK IV		21.7	21.7	21.7	20.5	19.7

Var. 1
Installation with a concrete base



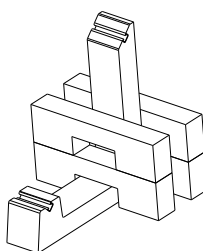
Weight: approx. 92 kg

Var. 2
Installation with a concrete base and 1 additional weight



Weight: approx. 126 kg

Var. 3
Installation with a concrete base and 4 additional weights



Weight: approx. 228 kg

Terrain categories in accordance with EN 1991-1-4:

- | | |
|--------|---|
| GK 0 | Lakes, coastal areas exposed to open seas |
| GK I | Lakes or areas with low vegetation and without obstacles |
| GK II | Areas with low vegetation such as grass and sporadic obstacles (trees, buildings) at intervals of at least 20 times the obstacle height |
| GK III | Areas with even vegetation or buildings or with sporadic objects at intervals of less than 20 times the obstacle height (e.g.: villages, suburban development, areas of forest) |
| GK IV | Areas in which at least 15 % of the surface is occupied by buildings with an average height exceeding 15 m |

1. General

- 1.1 The following Terms and Conditions shall apply to all our present and future contracts for deliveries and other services (even if the said Terms and Conditions are not specifically mentioned in verbal, telephonic or fax communications).
- 1.2 All deviations from the present Terms and Conditions, ancillary verbal agreements and subsequent contractual amendments shall only be valid if they have been confirmed by us in writing.
- 1.3 Buying terms and conditions of the client shall not be valid even if they are not specifically rejected by us. Our Standard Terms and Conditions of Delivery shall be regarded as accepted at the latest upon receipt of our goods and services by the client.
- 1.4 If a provision of the present Terms and Conditions of Delivery proves to be wholly or partially invalid, the contracting parties shall replace the aforesaid provision by a new provision which comes as close as possible to the legal and economic intention of the invalid provision.

2. Offers

- 2.1 Our offers shall be subject to change without notice.
- 2.2 Orders shall only be regarded as accepted when they have been confirmed by us in writing.
- 2.3 Illustrations, drawings and all technical details in catalogues and printed material shall be approximate values as customary within the industry. They shall only be binding if specific reference is made to them in the contract. We shall also reserve the right to make technical and design changes after the conclusion of the contract.
- 2.4 Cost estimates, drawings and other documents shall remain our property and shall be subject to copyright protection; they may not be made available to third parties.

3. Regulations in the country of destination

- 3.1 At the latest at the time of the order, the buyer shall draw our attention to the regulations and standards in force in the country of destination relating to the design of the delivered goods and the operation thereof and also to the execution of services.
- 3.2 Our deliveries and services shall comply with the regulations and standards in the country of destination provided the buyer has drawn our attention thereto in accordance with Section 3.1.
- 3.3 The buyer shall duly inform us of any special application features of goods ordered from us if these differ from our general recommendations.

4. Prices

- 4.1 Our prices shall be ex works, net, excluding packaging.
- 4.2 All ancillary costs, e.g. freight, insurance, export, transit, import and other approvals, licenses and authentications, shall be for the account of the buyer. The buyer shall also bear all taxes, charges, customs duty, etc., which are levied in connection with the contract.
- 4.3 We shall reserve the right to make price adjustments if wage rates or material prices change between the date of the order confirmation and the contractual performance of the contract. Price increases shall normally be notified three months in advance. We shall be bound to the price stated in the order confirmation for a period of three months after the effective date of the price increase.

5. Payment terms

- 5.1 Unless otherwise agreed in writing, our invoices shall be payable within thirty days with no cash discount. Payment shall be deemed to have been made when the amount in question is at our unrestricted disposal on our account in Swiss Franks.
- 5.2 Payment dates shall be observed even if any delays whatsoever occur after shipment of the goods from our works. The buyer shall not be permitted to reduce or withhold payments on account of complaints or counterclaims not recognised by us.
- 5.3 Payments shall also be made if insignificant components are missing but usage of the delivered goods is not rendered impossible as a result or if rectification work has to be carried out on the delivery. We shall be entitled to reject rectification of the defect as long as the buyer has not discharged his/its obligations to us.
- 5.4 If the buyer fails to comply with the agreed payment dates, default interest shall be paid from the agreed due date without a reminder being issued; the aforesaid interest shall be based on the interest rates prevailing at the domicile of the buyer, but shall be not less than four percent above the current discount rate of the Swiss Central Bank.
- 5.5 We shall be entitled to make deliveries of pending orders dependent upon settlement of outstanding claims.

6. Reservation of title

- 6.1 Delivered goods shall remain our property (reserved goods) pending full and complete payment of all present and future claims to which we are entitled regardless of their legal cause. This shall also apply if payments are made in settlement of specifically designated claims.
- 6.2 The buyer shall be entitled to process and sell reserved goods in the ordinary course of business.
- 6.3 If our reserved goods are combined or intermingled with other goods, the buyer shall hereby transfer his/its ownership rights in the new goods or chattels to us upon the conclusion of the contract in the amount of the invoice value of the reserved goods.
- 6.4 If the goods are resold by the buyer, he/it shall hereby transfer to us upon the conclusion of the contract with us his/its claims arising from the aforesaid resale in the amount of the invoice value of the reserved goods.
- 6.5 If the reserved goods are used by the buyer to perform a works or works delivery contract, his/its claim from the aforesaid works or works delivery contract shall hereby be assigned to us in the same amount and on the same date as for the purchase price claim (Section 6.4).
- 6.6 As long as he/it is honouring his/its payment obligations, the buyer shall, however, be authorised to collect his/its resale claim which has been assigned to us. He/it may not dispose of such claims by way of assignment to third parties, however. The empowerment of the buyer to collect the claim may be revoked by us at any time. We shall be entitled to notify third party debtors of the assignment. The buyer shall be entitled to provide us with the necessary information and documents in order to enable us to enforce our rights.
- 6.7 If the value of our securities exceeds our total claims by more than 10 %, we shall be obliged to release securities of our choice at the request of the buyer.
- 6.8 The buyer shall inform us immediately of any pledge or other impediment to our property enforced by third parties.
- 6.9 The buyer shall be obliged to collaborate in measures required to protect our title. He/it shall, in particular, empower us upon the conclusion of the contract to make entries or prior notice of the reservation of title at his/its cost in public registers, books and documents, etc., in accordance with the relevant national laws and shall perform all formalities in this respect.
- 6.10 The buyer shall maintain the reserved goods at his/its cost for the duration of the reservation of title and shall insure the said goods against theft, breakage, fire, water and other risks in our favour. He/it shall also take all steps to ensure that our property claims are neither adversely affected nor rescinded.

7. Delivery periods

- 7.1 Delivery periods and deadlines stated by us shall be approximate unless we have given an express written confirmation of a deadline as binding.
- 7.2 Delivery periods shall be deemed to have been met if notification of readiness to deliver has been sent to the buyer before the end of the delivery period.
- 7.3 The delivery period shall be prolonged if details required for the performance of the contract are not received on time or if they are subsequently changed by the buyer.
- 7.4 The delivery period shall also be reasonably prolonged if impediments arise which we cannot avert despite exercise of the necessary care (e.g. major operational disruptions, industrial disputes, delayed or defective deliveries, force majeure, etc.).
- 7.5 If an agreed delivery date is met by more than 14 days, the buyer shall be obliged to set us a reasonable period of grace. The buyer may only withdraw from the contract if our goods have not been delivered by the end of the said period of grace. Compensation claims for non-performance, delayed performance or any consequential losses shall be excluded unless there was gross negligence on our part.

8. Transfer of risk

- 8.1 Unless expressly agreed otherwise in writing, our "ex works" deliveries shall be made in accordance with the international rules on the interpretation of commercial clauses of the International Chamber of Commerce (Incoterms) in the version in force on the date of the order confirmation.
- 8.2 The transfer of risk shall be determined by the aforesaid Incoterms.
- 8.3 Insurance against damages of any kind shall be the responsibility of the buyer.

- 8.4 Complaints in connection with the transport shall be immediately notified by the buyer to the last carrier upon receipt of the delivery.
- 8.5 If despatch is delayed at the request of the buyer or for any other reasons not attributable to us, the risk shall pass to the buyer on the original date envisaged for the "ex works" delivery. We shall be entitled to demand payment from this date onwards.
- 9. Delivery inspection**
- 9.1 The buyer shall be required to inspect deliveries immediately. If the goods do not comply with the order or the delivery note or if visible defects are identified, he/it shall be obliged to notify the aforesaid to us in writing within eight days of receipt. Later complaints shall not be recognised. (Re transport damages, cf. Section 8.4)
- 10. Assembly and operations**
- 10.1 The assembly, putting into operation, operation and maintenance of the delivered goods shall be carried out in accordance with our guidelines. They may be executed by our staff or by appropriately trained third parties as agreed with the buyer.
- 10.2 If we require a commissioning certificate for certain product groups, warranty claims for the proper functioning of the equipment can only be enforced if a proper hand-over has been documented by a confirmed commissioning certificate received by us within one month of the hand-over.
- 11. Warranty**
- 11.1 Warranty period
- 11.1.1 The general warranty period shall be 12 months from the first commissioning but no longer than 18 months from the date on which the relevant goods left our works.
If despatch is delayed for reasons not attributable to us, the warranty shall lapse no later than 18 months after notification of the readiness to deliver.
The general warranty period shall exclude electrical components for which the warranty period shall be 6 months from the first commissioning but no later than 12 months from the date of shipment from our works.
- 11.1.2 We refer to Section 11.6.1 with regard to the warranty period for third party products.
- 11.1.3 The warranty period for components which we have repaired during the warranty period or have delivered as replacement shall be 12 months from the completion of our repair or from the date of the replacement delivery but no longer than the end of a period equivalent to twice the original warranty period as per Section 11.1.1.
- 11.2 Liability for material, design and workmanship defects
- 11.2.1 The contractual condition of the goods shall be based on the condition upon the transfer of risk.
- 11.2.2 Defects shall be notified to us immediately in writing.
- 11.2.3 We shall be liable for all components which can be shown to have become defective or unusable before the end of the warranty period as a result of defective materials, defective design or defective workmanship, with such components being repaired or replaced ex works immediately at our choice.
- 11.3 Liability for warranted qualities
- 11.3.1 Warranted qualities shall only be those which are specifically designated as such in the order confirmation or in the relevant specifications.
- 11.3.2 The aforesaid assurance shall apply at the latest until the end of the warranty period. If a taking-over test has been agreed with the buyer, the assurance shall be deemed as performed if proof of the relevant qualities is furnished during the aforesaid test.
- 11.3.3 If the warranted qualities are not performed or only partially performed, the buyer shall be entitled to an immediate rectification. The buyer shall grant us the necessary time and opportunity for this purpose.
- 11.3.4 If the rectification is abortive or only partially successful, the buyer shall be entitled to a reasonable reduction of the purchase price. If the defect is so serious that it cannot be rectified within a reasonable period of time, and if deliveries or services for the notified purpose are not usable or are only usable to a much lesser extent, the buyer shall be entitled to refuse acceptance of the defective component or to withdraw from the contract if part-acceptance is economically unreasonable. We shall only be obliged to refund amounts which have been paid to us for the components affected by the aforesaid withdrawal.
- 11.4 Exclusion of liability for defects
- 11.4.1 Our liability shall exclude damages which cannot be proved to have been sustained as a result of defective material, defective design or defective workmanship.
- 11.4.2 Damages shall therefore be excluded for example which were caused by
- improper work of other persons with regard to planning, site preparation, assembly, operation and maintenance;
 - plant concepts and designs which do not comply with the latest state of the art;
 - non-observance of our guidelines for planning, assembly, commissioning, operations and maintenance;
 - force majeure (e.g. thunderstorms).
- 11.4.3 The following shall be excluded in particular
- corrosion damages (e.g. as a result of aggressive water, unsuitable water treatment, oxygen intakes, emptying the plant over a longer period of time, falling below the dew point, chemical or electrochemical effects, etc.);
 - damages caused by air pollution (e.g. the accumulation of intense dust, aggressive vapours, etc.);
 - damages caused by unsuitable equipment and fuels;
 - damages caused by overcharging, excessive water pressure, scaling, improper electrical connections and inadequate fuse protection.
- 11.4.4 Components shall also be excluded from the warranty which are subject to natural wear and tear (e.g. burner nozzles, combustion chamber inserts, ignition and monitoring components in contact with fire, fireclay and wall facings, fuses, seals and flexible tubes).
- 11.5 Commissioning certificate
- 11.5.1 We hereby draw attention to the due and proper hand-over and - if envisaged - the commissioning certificate in accordance with Section 10.2 as prerequisites for our warranty.
- 11.6 Deliveries and services of sub-contractors
- 11.6.1 Our liability for third party products which form a major part of the delivered goods (e.g. warehouse and conveying equipment, burners, measuring and control equipment, electrical components, flue gas and waste water cleaning equipment) shall - if permissible - be limited to an assignment of our claims against the suppliers of the said third party products.
- 12. Exclusion of further liability**
- 12.1 The buyer shall have no rights and claims for materials, design and workmanship defects or the lack of warranted qualities unless specifically mentioned in Sections 11.1 to 11.6.
- 12.2 All claims for compensation, reduction in the contract price, rescission of the contract or withdrawal from the contract shall be excluded in particular unless these are specifically mentioned. Under no circumstances shall the buyer have any compensation claim for damages which were not sustained by the delivered goods themselves (e.g. replacement costs, cost for establishing the cause of the damage, expertises, production stoppages, production losses, lost orders, lost profit and other direct or indirect damages). The aforesaid liability exclusion shall not apply in the event of gross negligence on our part.
- 12.3 The exclusion as per Section 12.2 shall apply for all breaches of contract and all claims of the buyer regardless of why they were lodged from a legal point of view. It shall therefore also apply for a breach of any ancillary obligations (e.g. inadequate advice, etc.).
- 13. Jurisdiction**
- 13.1 The place of jurisdiction for the buyer and for us shall be Vaduz. We shall be entitled to bring action against the buyer at his/its domicile, however.
- 13.2 The legal relationship between the parties shall be governed by the substantive laws of Switzerland. The application of the UN convention on contracts for the international sale of goods (CISG) shall be excluded.

Responsibility for energy and environment.

The Hoval brand is internationally known as one of the leading suppliers of indoor climate control solutions. More than 66 years of experience have given us the necessary capabilities and motivation to continuously develop exceptional solutions and technically advanced equipment. Maximising energy efficiency and thus protecting the environment are both our commitment and our incentive. Hoval has established itself as an expert provider of intelligent heating and ventilation systems that are exported to over 50 countries worldwide.

Hoval Aktiengesellschaft
Austrasse 70
FL-9490 Vaduz
Principality of Liechtenstein
(Swiss customs territory)
Phone +423 3992 400
Fax +423 3992 618
E-Mail info@hoval.com
www.hoval.com



Hoval heating technology

As an energy-neutral supplier with a full range of products, Hoval helps its customers to select innovative system solutions for a wide range of energy sources, such as heat pumps, biomass, solar energy, gas, oil and district heating. Services range from private residential units to large-scale industrial projects.



Hoval residential ventilation

Increased comfort and more efficient use of energy from private housing to industrial halls: our controlled residential ventilation products provide fresh, clean air for living and working space. Our innovative system for a healthy room climate uses heat and moisture recovery, while at the same time protecting energy resources and providing a healthier environment.



Hoval indoor climate systems

Supplying fresh air, removing extract air, heating, cooling, filtering and distributing air, utilising heat gains or recovering cold energy – no matter what the task, Hoval indoor climate systems provide tailor-made solutions with low planning and installation costs.