WASI®

SOLAR

MOUNTING SYSTEMS FOR SOLAR INSTALLATIONS

2012

WE SECURE THE SUN

PRODUCT RANGE 2012

STAND: 01/2012 | SUBJECT TO AMENDMENT

SECTION PART I

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OPENING TIMES
DOMESTIC / OVERSEAS
Monday - Thursday 7.30 - 17.00
Friday 7.30 - 16.00 (Central European Time)

NOTE

All enquiry forms and order forms can be found in the individual sections on the particular products.
If you have any questions or require information please contact us by
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Photovoltaics

Photovoltaics is defined as the direct conversion of radiation energy (predominantly solar radiation) into electrical energy. It has been in use ever since it was first adopted for supplying energy to space satellites from solar cells in 1958. It is now used throughout the world to supply electrical power on roof surfaces, parking meters, soundabsorbing walls and open spaces. The name is made up of two parts: photos – the Greek word for light – and Volta – after Alessandro Volta, a pioneer in electrical technology. Photovoltaics forms part of the extensive area of solar technology which also includes other technical utilisations of solar energy.

Potenzial

The potential which can be achieved is very high: Despite the apparently unfavourable conditions in Germany, using the technology which is available today, approximately 2% of the total area of the country is theoretically sufficient to yield enough electrical energy to meet the total annual requirements of the country. The objection that the area in Central Europe would not be sufficient to support a significant proportion of photovoltaics for energy production is therefore not tenable. Also, the required surface area could be found by utilising previously built structures (mainly roofs) without building over new ground. This theoretical evaluation of 100% coverage by photovoltaics does not represent the aim of implementation but merely serves to show the magnitude of the surface requirement. In the long term, therefore, photovoltaics can make a significant contribution to climate protection and the saving of resources, even in Germany.

Grid feed-in rate

The valid rates for power feed into the grid for particular years can be taken from the following table (figures given are net prices). The payment rate is based on the year of entry into service and it remains constant over 20 years. If the rates based on power output are used (units fitted to buildings...), then the payment rate is pro rata: for a roof unit erected in 2009 with a maximum output of 40 kW, a payment rate of 43.01 cents/kWh is paid for 30 kW, and for the remaining 10 kW a rate of 40.91 cents/kWh is paid, both of these being valid until the end of 2029.

Equipment model	2006	2007	2008	2009	2010	July 2010	Oct. 2010	2011	2012 (at 9% reduction)	2013 (at 9% reduction)
On a building or noise protection wall										
up to 30 kW	51,80	49,21	46,75	43,01	39,14	34,05	33,03	28,74	26,15	23,80
30 kW to 100 kW	49,28	46,82	44,48	40,91	37,23	32,39	31,42	27,34	24,88	22,64
from 100 kW	48,74	46,30	43,99	39,58	35,23	30,65	29,73	25,87	23,54	21,42
from 1000 kW	48,74	46,30	43,99	33,00	29,37	25,55	24,79	21,57	19,63	17,86
Open space equipment (irrespective of output)										
Disadvantaged areas	40,6	37,96	35,49	31,94	28,43	26,16	25,37	22,07	20,08	18,27
Arable areas	40,6	37,96	35,49	31,94	28,43	-	-	-	-	-
Other open spaces	40,6	37,96	35,49	31,94	28,43	25,02	24,26	21,11	19,21	17,48
Payment rate for own consumption	-	-	-	25,01	22,76	17,67	16,65	14,36	13,07	11,89
Supplement for facade mounted equipment	5,00	5,00	5,00	-	-	-	-	-	-	-

Terms of shipment

We deliver small parts / pallet goods within Germany from 150.00 euro upwards free of charge.

Please note that you are responsible for unloading long items from the lorry. Please prepare your storage area or construction site accordingly. If it is not possible to deliver long items because the recipient is absent, we retain the right to invoice again for another delivery. Please supply a telephone number, particularly when the delivery is to a construction site.

We deliver long items such as mounting rails at 6.1 m from our outside storage area in Bitterfeld. The freight costs are calculated according to the table below:

Freight rates inside Germany per 100 kg								
	Minimum each dispatch	up to 500 kg	501-1000 kg	1001-2000 kg	2001-3000 kg	3001-5000 kg	5001-10000 kg	10001-15000 kg
up to 50 km	61,60 €	28,75 €	20,90 €	12,26 €	7,36 €	4,52 €	2,73 €	1,88 €
51-75 km	61,60 €	28,75 €	20,90 €	12,28 €	8,52 €	5,58 €	3,39 €	2,35 €
76-100 km	63,00 €	30,81 €	22,39 €	13,26 €	9,36 €	6,60 €	4,28 €	2,98 €
101-125 km	64,30 €	33,43 €	24,34 €	14,61 €	10,61 €	7,15 €	5,27 €	3,62 €
126-150 km	65,70 €	35,18 €	25,67 €	15,60 €	10,97 €	8,00 €	5,31 €	4,11 €
151-200 km	67,00 €	37,83 €	27,55 €	16,84 €	12,58 €	8,78 €	6,44 €	5,00 €
201-250 km	68,30 €	40,93 €	29,64 €	18,29 €	13,88 €	9,45 €	7,50 €	6,04 €
251-300 km	69,70 €	42,34 €	30,87 €	19,10 €	14,58 €	9,67 €	7,78 €	6,84 €
301-350 km	72,40 €	46,38 €	33,91 €	21,28 €	16,54 €	10,23 €	8,14 €	6,95 €
351-400 km	73,70 €	47,93 €	35,00 €	21,99 €	17,15 €	11,15 €	8,88 €	7,42 €
401-450 km	76,40 €	49,41 €	36,14 €	22,81 €	17,94 €	11,42 €	8,97 €	8,09 €
451-500 km	77,80 €	50,21 €	37,08 €	23,48 €	18,48 €	11,79 €	9,38 €	8,54 €
501-600 km	80,40 €	51,68 €	37,84 €	24,01 €	19,00 €	13,02 €	10,38 €	9,46 €
601-700 km	83,10 €	51,87 €	38,04 €	24,25 €	19,27 €	14,05 €	11,22 €	10,22 €
ex 701 km	88,40 €	52,73 €	38,83 €	24,87 €	19,90 €	15,44 €	12,39 €	11,30 €

Example invoice. dispatch of long items

Dispatch of 100 mounting rails 40 x 40 to Munich:

- Weight of mounting rail 40 x 40 = 921 grams / metre
- 100 rails at 6.1 metre therefore weigh 561.81 kg (calculation always to the nearest hundred)
- Distance Bitterfeld – Munich = 460 km
- Freight rate 37.08 euro / 100 kg
- Freight costs = 222.48 euro

Delivery times / lead times

Small parts from the warehouse at Wuppertal:

- Order input up to 12:00: Ready for dispatch on the same day
- Dispatch by parcel post (ordinary lead time 24 hours, maximum 72 hours) or courier (ordinary lead time 24 hours, maximum 72 hours)
- Extra charge for dispatch by express service on enquiry. Secure dispatch arriving on the following day

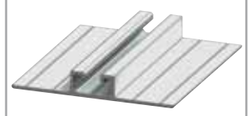
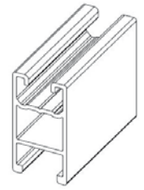
Long items from warehouse at Bitterfeld:

- Dispatch is usually one day after submission of the order with a lead time of 2-4 working days

1.1 - MOUNTING RAILS					
Item No.	**Illustration**	**Item**	**Notes**	**Length**	**Version**
9664-WASI 1		**Mounting rail 40 x 40 mm**	Span length: 1.6 m* Bottom fixings: DIN 933 M10 or WASI hammer head bolt Top fixings: T slot nut M8 or DIN 603 M8 Customer‘s required length is possible for call-off > 5 tonnes	2,0 m 3,0 m 6,0 m 6,1 m 6,1 m 6,1 m	mill finish mill finish mill finish mill finish silver anodised black anodised
9664-WASI 2		**Mounting rail 80 x 40 mm**	Span length: 3.2 m* Bottom fixings: DIN 933 M10 or WASI hammer head bolt Top fixings: T slot nut M8 or DIN 603 M8 Customer‘s required length is possible for call-off > 5 tonnes	3,0 m 3,42 m 6,0 m 6,1 m 6,1 m 10,6 m	mill finish mill finish mill finish mill finish silver anodised mill finish
9664-WASI 2-26		**Mounting rail 80 x 40 mm**	Frame: similar to 9664-WASI 2 Additional side fastening possible with mounting plate 9785-WASI 26 (e.g. for cruciform joint without angle) Customer‘s required length is possible for call-off > 5 tonnes	6,0 m 6,1 m 7,0 m 7,2 m	mill finish mill finish mill finish mill finish
9664-WASI 3		**Mounting rail 40 x 40 mm**	Span length: 1.55 m* Bottom fixings: DIN 933 M10 or WASI hammer head bolt Top fixings: square nut M8 or hexagon nut M8 Customer‘s required length is possible for call-off > 5 tonnes	6,0 m 6,1 m 6,1 m 6,1 m 6,85 m	mill finish mill finish silver anodised black anodised mill finish
9664-WASI 5		**Mounting rail 50 x 40 mm**	Span length: 2.0 m* Bottom fixings: DIN 933 M10 or WASI hammer head bolt Top fixings: T slot nut M8 or DIN 603 M8 Customer‘s required length is possible for call-off > 5 tonnes	6,1 m 6,1 m	mill finish black anodised

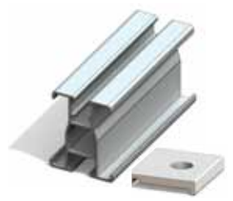
*** Load bearing assumptions:** snow load sk = 1.21 kN/m2; module load: 0.22 kN/m2; wind load: WSog = 0.80 kN/m2; wind pressure = 0.40 kN/m2

1 RAIL SYSTEM I MOUNTING RAILS
MOUNTING RAILS

1.1 - MOUNTING RAILS					
Item No.	**Illustration**	**Item**	**Notes**	**Length**	**Version**
9664-WASI 15		**Mounting rail 40 x 40 mm**	Span length: 1.6 m* Side fixings: T slot nut M8 or DIN 603 M8 Top fixings: T slot nut M8 or DIN 603 M8 Customer‘s required length is possible for call-off > 5 tonnes	6,1 m 6,1 m 6,1 m	mill finish silver anodised black anodised
9664-WASI 16		**Mounting rail 80 x 40 mm**	Span length: 3.2 m* Side fixings: T slot nut M8 or DIN 603 M8 Top fixings: T slot nut M8 or DIN 603 M8 Customer‘s required length is possible for call-off > 5 tonnes	6,1 m 6,1 m	mill finish silver anodised
9664-WASI 31		**Mounting rail** Width: 90 mm	Bottom fixings: Profile can be screwed or riveted directly onto the corrugated metal. The whole assembly should always be checked on site. Top fixings: Top channel for T slot nut M8 or DIN 603 M8	2,0 m 3,0 m 6,0 m	mill finish mill finish mill finish
9664-WASI 31-60		**Rail for trapezoidal corrugated metal** Width: 90 mm	Bottom fixings: Profile can be screwed or riveted directly onto the corrugated metal. The whole assembly should always be checked on site. Top fixings: Top channel for T slot nut M8 or DIN 603 M8	6,0 m	mill finish
Z289921-001		**Mounting rail 20,4 x 39 mm**	Mounting rail 20,4 x 39 mm Bottom fixings: DIN 933 M10 Top fixings: T slot nut M8 or DIN 603 M8	6,0 m	mill finish

*** Load bearing assumptions:** snow load sk = 1.21 kN/m2; module load: 0.22 kN/m2; wind load: WSog = 0.80 kN/m2; wind pressure = 0.40 kN/m2

1.2 - WASI LIGHT MOUNTING RAILS

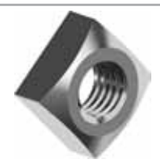
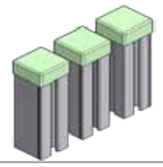
Item No.	Illustration	Item	Notes	Length	Version
9664-Light 1		**Mounting rail 50 x 39 mm**	Span length: 1.55 m* Bottom fixings: DIN 933 M10 or WASI hammer head bolt Top fixings: T slot nut M8 Cruciform joint with mounting plate 9785-WASI 26 Customer‘s required length is possible for call-off > 5 tonnes	6,0 m 6,1 m	mill finish mill finish
9664-Light 3		**Mounting rail 50 x 39 mm**	Span length: 1.55 m* Bottom fixings: DIN 933 M10 or WASI hammer head bolt Top fixings: square nut M8 or hexagon nut M8 Cruciform joint with mounting plate 9785-WASI 26 Customer‘s required length is possible for call-off > 5 tonnes	6,1 m	mill finish
9664-WASI 1 UL		**Mounting rail 40 x 40 mm**	Span length: 1.6 m* Bottom fixings: DIN 933 M10 or WASI hammer head bolt Top fixings: T slot nut M8 Customer‘s required length is possible for call-off > 5 tonnes	6,1 m 6,1 m	mill finish black anodised
9664-WASI 3 UL		**Mounting rail 40 x 40 mm**	Span length: 1.6 m* Bottom fixings: DIN 933 M10 or WASI hammer head bolt Top fixings: square nut M8 or hexagon nut M8 Customer‘s required length is possible for call-off > 5 tonnes	6,1 m 6,1 m	mill finish black anodised
9664-WASI 15 UL		**Mounting rail 40 x 40 mm**	Span length: 1.6 m* Side fixings: T slot nut M8 Top fixings: T slot nut M8 Customer‘s required length is possible for call-off > 5 tonnes	6,1 m 6,1 m	mill finish black anodised

* **Load bearing assumptions:** snow load sk = 1.21 kN/m2; module load: 0.22 kN/m2; wind load: WSog = 0.80 kN/m2; wind pressure = 0.40 kN/m2

1.3 - MOUNTING RAILS - ALUMINIUM

Item No.	Illustration	Item	Notes	Length	Version
9671-40 x 40 x 3		**Aluminium angle profile 40 x 40 x 3**	40 x 40 x 3 mm from stock Customer‘s required length possible	6,0 m	mill finish
9671-40 x 40 x 4		**Aluminium angle profile 40 x 40 x 4**	40 x 40 x 4 mm from stock Customer‘s required length possible	6,0 m	mill finish
9671-40 x 40 x 5		**Aluminium angle profile 40 x 40 x 5**	40 x 40 x 5 mm from stock Customer‘s required length possible	6,0 m	mill finish
9671-15441		**Aluminium Z profile**	Aluminium Z profile 40 x 40 x 40 x 3 mm Other dimensions, e.g. 40 x 60 x 40 x 3 mm, readily available on request	6,0 m	mill finish
9671-1-1431-A		**Aluminium Z profile** with drilled groove	Aluminium Z profile 40 x 40 x 40 x 3 mm Other dimensions, e.g. 40 x 60 x 40 x 3 mm, readily available on request	6,0 m	mill finish

1.4 - MOUNTING ACCESSORIES FOR TOP FIXINGS

Item No.	Illustration	Item	Notes	Units
9431-120901		**T slot nut** Aluminium Ball made of A2 Pivotable	**M8** For mounting rails: WASI 1, WASI 2, WASI 2-26, WASI 5, WASI 15, WASI 16, WASI 31, WASI 31-60, LIGHT 1, WASI 1 UL & WASI 15 UL	100 200 500
557-2-8 **557-4-8**		**Square nut** in A2 and A4 to DIN 557	**M8** For mounting rails: WASI 3, LIGHT 3, WASI 3 UL	200
934-2-8 **934-4-8**		**Hexagon nut** in A2 and A4 to DIN 934	**M8** For mounting rails: WASI 3, LIGHT 3, WASI 3 UL	200
603-2-8 x 25 **603-4-8 x 25**		**Cup square bolt** in A2 and A4 to DIN 603	**M8** For mounting rails: WASI 1, WASI 2, WASI 2-26, WASI 5, WASI 15, WASI 16, WASI 31, WASI 31-60, LIGHT 1, WASI 1 UL & WASI 15 UL	100
9664-Cap 40		**End cap**	For all 40 x 40 mounting rails	100

YOU REQUIRE OTHER STANDARD PARTS?

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WASI NORM SOLAR SPEZIAL MARITIM

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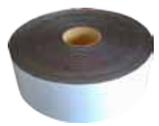
EXCELLENCE IN STAINLESS STEEL

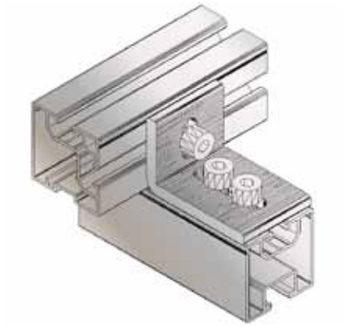
1 RAIL SYSTEM I MOUNTING RAILS
FASTENING ELEMENTS AND SPECIAL PROFILES

1.5 - MOUNTING ACCESSORIES FOR BOTTOM FIXINGS

Item No.	Illustration	Item	Notes	Units
933-2-10 x 25 **933-4-10 x 25**		**Hexagon bolt with thread up to the head** in A2 and A4 to DIN 933	**M10** For mounting rails: WASI 1, WASI 2, WASI 2-26, WASI 3, WASI 5, LIGHT 1, LIGHT 3, WASI 1 UL & WASI 3 UL	100
9664-2-10 x 25		**Hammer head bolt** A2 to WASI standard	**M10** For mounting rails: WASI 1, WASI 2, WASI 2-26, WASI 3, WASI 5, LIGHT 1, LIGHT 3, WASI 1 UL & WASI 3 UL	100
9345-2-10 **9345-4-10**		**Hexagon nut with flange and locking toothing** In A2 and A4	**M10** Nut to suit DIN 933-2-10 x 25 or 933-4-10 x 25 as well as 9664-2-10 x 25 or 10 x 30	100
985-2-10 **985-4-10**		**Lock nut, low version** in A2 and A4 to DIN 985	**M10** Nut to suit DIN 933-2-10 x 25 or 933-4-10 x 25 as well as 9664-2-10 x 25 or 10 x 30	100
9021-2-10 **9021-4-10**		**Washer with large external diameter** in A2 and A4 to DIN 9021	**M10** Nut to suit DIN 985-2-10 & 985-4-10	100
125-2-10,5 **125-4-10,5**		**Washer** in A2 and A4 to DIN 125	**M10** Nut to suit DIN 985-2-10 & 985-4-10	500
9664-WASI 31 -90 x 3-50		**EPDM sealing tape** Width: 90 mm Thickness 3 mm	Sealing tape is fixed between WASI 31 or WASI 31-60 and the trapezoidal corrugated metal. One side adhesive	50 m
9191-2-6,0 x 25		**Facade bolt**	For metal roof design with building approval E16 mm	500
9191-2-6,0 x 25R		**Thin sheet metal facade screw** **A2 / bi-metal, BZ 6.0 x 25 EPDM E16**	specially coated facade screw with building approval (Z-14.1-4 and Z-14.1-537) no pre-drilling, virtually no slivers, half the mounting time E 16 mm	100

1.6.1 - CRUCIFORM JOINT ANGLE

Item No.	Illustration	Item	Notes	Accessories / units
9701-WASI 14		**Cruciform joint connector angle**	Mounting of 9664-WASI 15 or WASI 16 onto WASI 1, WASI 2, WASI 2-26, WASI 3, WASI 5, WASI 15, WASI 31, WASI 31-60, LIGHT 1, LIGHT 3, WASI 1 UL, WASI 3 UL & WASI 15 UL	3x T slot nuts 3x Bolt DIN 912-2-8 x 16 Units = 100

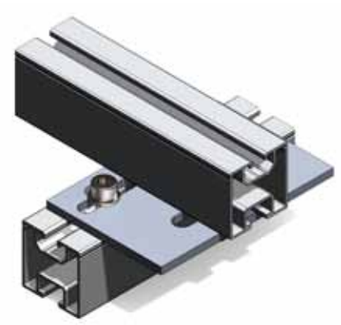


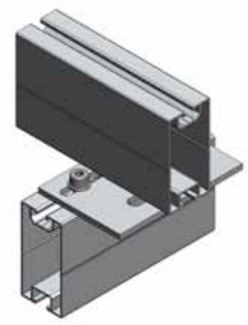
1.6.2 - MOUNTING ACCESSORIES

Item No.	Illustration	Item	Notes	Units
9431-120901		**T slot nut** Aluminium Ball made of A2 Pivotable	**M8** For mounting rails: WASI 1, WASI 2, WASI 2-26, WASI 5, WASI 15, WASI 16, WASI 31, WASI 31-60, LIGHT 1, WASI 1 UL & WASI 15 UL	100 200 500
557-2-8 **557-4-8**		**Square nut** in A2 and A4 to DIN 557	**M8** For mounting rails: WASI 3, LIGHT 3, WASI 3 UL	200
934-2-8 **934-4-8**		**Hexagon nut** In A2 and A4 to DIN 934	**M8** For mounting rails: WASI 3, LIGHT 3, WASI 3 UL	200
912-2-8 x 16 **912-4-8 x 16**		**Hexagon socket Allen screw** In A2 and A4 to DIN 912	**M8** For fixing the cruciform joint angle to the rails	200

1.6.3 - CRUCIFORM CONNECTOR PLATE

Item No.	Illustration	Item	Notes	Accessories / units
9701-WASI 23W		**Cruciform Joint Connector Plate**	Mounting of WASI 1, WASI 2, WASI 2-26, WASI 3, WASI 5, LIGHT 1, LIGHT 3, WASI 1 UL, WASI 3 UL to one of the same	2x T slot nuts 2x bolts DIN 912-2-8 x 16 1x bolt DIN 933-2-10 x 25 or hammer head bolt 1x locking nut* Units = 100



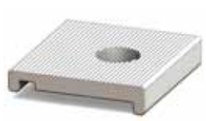
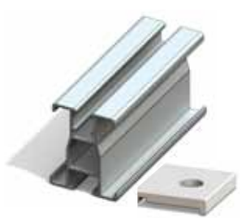


1.6.4 - MOUNTING ACCESSORIES

As accessories for cruciform joint angle, but additionally:

Item No.	Illustration	Item	Notes	Units
933-2-10 x 25 **933-4-10 x 25**		**Hexagon bolt with thread up to the head** in A2 and A4 to DIN 933	**M10** For mounting rails: WASI 1, WASI 2, WASI 2-26, WASI 3, WASI 5, LIGHT 1, LIGHT 3, WASI 1 UL & WASI 3 UL	100
9664-2-10 x 25		**Hammer head bolt** A2 to WASI house standard	**M10** For mounting rails: WASI 1, WASI 2, WASI 2-26, WASI 3, WASI 5, LIGHT 1, LIGHT 3, WASI 1 UL & WASI 3 UL	100
9345-2-10* **9345-4-10***		**Hexagon nut with flange and locking toothing** In A2 and A4 similar to DIN 6923	**M10** Nut to suit DIN 933-2-10 x 25 or 933-4-10 x 25 as well as 9664-2-10 x 25	100

* or stop nut with washers

1.6.5 - CRUCIFORM JOINT RAILS & MOUNTING PLATES				
Item No.	**Illustration**	**Item**	**Notes**	**Accessories / units**
9785-WASI 26-8 9785-WASI 26		**Mounting plates** M8 or M10 Aluminium	Mounting of WASI 2-26, LIGHT 1 & LIGHT 3 onto WASI 1, WASI 2, WASI 2-26, WASI 3, WASI 5, WASI 15, WASI 31, WASI 31-60, LIGHT 1, LIGHT 3, WASI 1 UL, WASI 3 UL & WASI 15 UL	1x T slot nut 1x bolt DIN 912-2-8 x 16 or 1x bolt DIN 603-2-8 x 25 1x locking nut* Units = 100
  				

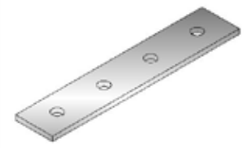
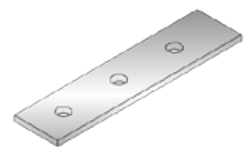
1.6.6 - MOUNTING ACCESSORIES				
Item No.	**Illustration**	**Item**	**Notes**	**Units**
9431-120901*		**T slot nut** Aluminium Ball made of A2 Pivotable	**M8** For mounting rails: WASI 1, WASI 2, WASI 2-26, WASI 5, WASI 15, WASI 16, WASI 31, WASI 31-60, LIGHT 1, WASI 1 UL & WASI 15 UL	100 200 500
912-2-8 x 16 **912-4-8 x 16**		**Hexagon socket Allen screw** In A2 and A4 to DIN 912	**M8** For fixing the cruciform joint angle to the rails	200
		or		
603-2-8 x 25 **603-4-8 x 25**		**Cup square bolt** in A2 and A4 to DIN 603	**M8** For mounting rails: WASI 1, WASI 2, WASI 2-26, WASI 5, WASI 15, WASI 16, WASI 31, WASI 31-60, LIGHT 1, WASI 1 UL & WASI 15 UL	100
9345-2-10** **9345-4-10****		**Hexagon nut with flange and locking toothing** In A2 and A4 similar to DIN 6923	**M10** Nut to suit DIN 933-2-10 x 25 or 933-4-10 x 25 as well as 9664-2-10 x 25	100

* or square/hexagon nut for all square nut channel rails ** or stop nut with washers

1.7.1 - U PROFILE CONNECTORS				
Item No.	**Illustration**	**Item**	**Notes**	**Units**
9751-WASI 12		**Profile connector** 200 mm	For mounting rails 9664-WASI 1/3/15 as well as UL versions. In addition you require 2 self tapping screws DIN 7504-2-4.8 x 25K for diagonal connection	100
7504-2-4,8 x 25 K		**Self tapping screw** A2 or A4	K shape - with hexagon head and flange	500

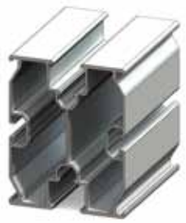
1.7.2 - SLOT-IN CONNECTORS				
Item No.	**Illustration**	**Item**	**Notes**	**Units**
9751-WASI 18		**Slot-in profile connector** 200 mm	For mounting rails 9664-WASI 1/3/15/16 as well as UL versions. WASI 1/3/15 = 1 connector / connection WASI 16 = 2 connectors / connections	50
9751-WASI 18 L		**Slot-in profile connector for LIGHT & WASI 5** 200 mm	For mounting rails type Light & WASI 5 You require 2 pieces / connectors for 9664-Light 1 and 9664-Light 3	50

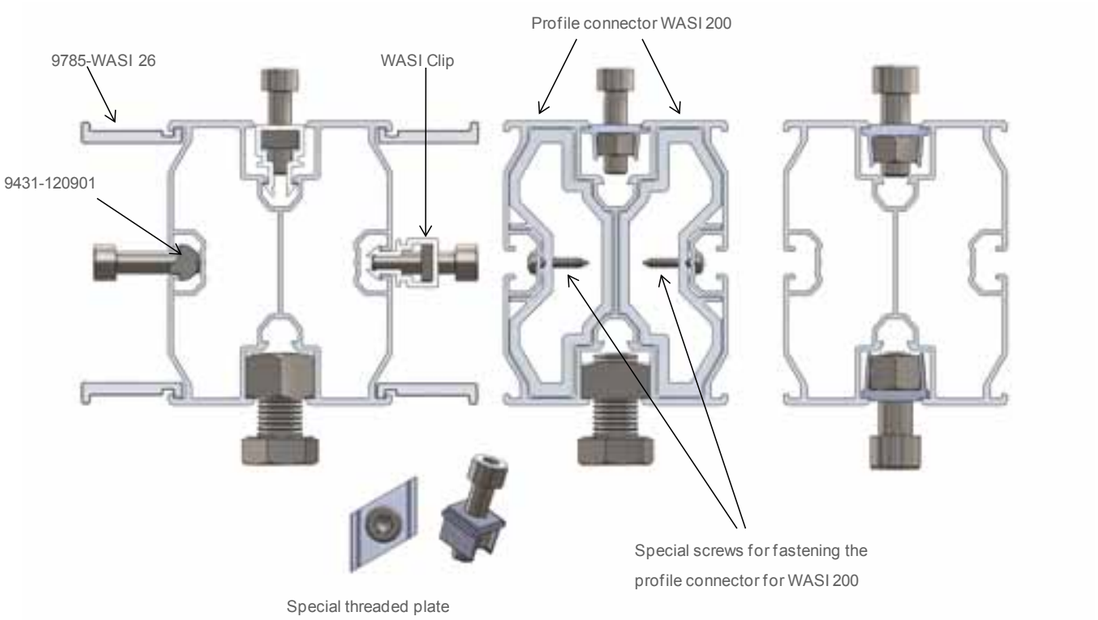
OUR RECOMMENDATION
Spare an expansion gap each 12 meters.

1.7.3 - HOLE PROFILE CONNECTORS				
Item No.	**Illustration**	**Item**	**Notes**	**Units**
9557-2-200 x 40		**4 hole profile connector** 200 x 40 x 5 mm Round hole M10 Stainless A2	In particular for mounting rail WASI 2 (Can also be used for WASI 1 and WASI 3) You require in addition 4 x hexagon bolts DIN 933 M10 x 20 + flange nuts with locking toothing 9345-2-10*	25
9558-2-144 x 40		**3 hole profile connector** 144 x 40 x 5 mm Round hole M10 Stainless steel A2	In particular for mounting rail WASI 2 (Can also be used for WASI 1 and WASI 3) You require in addition 4 x hexagon bolts DIN 933 M10 x 20 + flange nuts with locking toothing 9345-2-10*	25

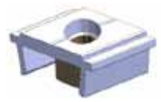
1.7.4 - ACCESSORIES FOR HOLE PROFILE CONNECTORS				
Item No.	**Illustration**	**Item**	**Notes**	**Units**
933-2-10 x 25 **933-4-10 x 25**		**Hexagon bolt with thread up to the head** in A2 and A4 to DIN 933	**M10** For mounting rails: WASI 1, WASI 2, WASI 2-26, WASI 3, WASI 5, LIGHT 1, LIGHT 3, WASI 1 UL & WASI 3 UL	100
9664-2-10 x 25		**Hammer head bolt** A2 to WASI standard	**M10** For mounting rails: WASI 1, WASI 2, WASI 2-26, WASI 3, WASI 5, LIGHT 1, LIGHT 3, WASI 1 UL & WASI 3 UL	100
9345-2-10* **9345-4-10***		**Hexagon nut with flange and locking toothing** In A2 and A4 similar to DIN 6923	**M10** Nut to suit DIN 933-2-10 x 25 or 933-4-10 x 25 as well as 9664-2-10 x 25	100

* or stop nut with washers

2.1 - HEAVY LOAD PROFILE					
Item No.	**Illustration**	**Item**	**Notes**	**Length**	**Version**
9664-WASI 200		**Heavy load profile** 100 x 80 mm	Many different attachment possibilities Span length: > 6 metres	0,7 m 2,7 m 3,5 m 6,0 m	mill finish



2 RAIL SYSTEM I HEAVY LOAD PROFILE
HEAVY LOAD PROFILE

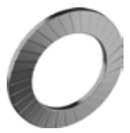
2.2 - MOUNTING ACCESSORIES FOR BOTTOM FIXINGS				
Item No.	**Illustration**	**Item**	**Notes**	**Units**
9672-FS-connector		**Profile connector** for heavy load profile	Slot-in connector for WASI 200	15
933-2-16 x 25 **933-4-16 x 25**		**Hexagon bolt with thread up to the head** In A2 and A4 to DIN 933	**M16** For mounting rails: WASI 200 lower and upper channel	25
934-2-16 **934-4-16**		**Hexagon nut** In A2 and A4 to DIN 934	**M16** For mounting rails: WASI 200 lower and upper channel	50
9672-P-Nut-M8 **9672-P-Nut-M10**		**T slot nut**	**M8 und M10** For mounting rails: WASI 200 lower and upper channel	100
9431-120901		**T slot nut**	**M8** For mounting rails: WASI 200 side channels	100 200 500
603-2-8 x ... **603-4-8 x ...**		**Cup square bolt** In A2 and A4	**M8** For mounting rails: WASI 200 side channels	je nach Größe
912-2-... x ... **912-4-... x ...**		**Hexagon socket Allen screw** In A2 and A4 to DIN 912	**M8 und M10** For T slot nuts M8 or M10	je nach Größe
9345-2-8		**Hexagon nut** **with flange and locking toothing** In A2 and A4	**M8** Nut to suit DIN 603-2-8 x 25	200
9785-WASI 26-8 **9785-WASI 26**		**Mounting plate** M8 or M10 Aluminium	For example for the cruciform joint	100

FURTHER ATTACHMENT POSSIBILITIES AVAILABLE ON REQUEST!

3.1 - MODULE CLAMPS FOR FRAMED MODULES

Item No.	Illustration	Item	Notes	Length	Version	Units
9742-WASI 4-…		**End clamp** Aluminium	Width: 30 m **Please give module height.**	70 70	mill finish black anodised	50
9745-WASI 13		**Middle clamp** Aluminium	Width: 36 mm **Width between modules:** 20 mm	40 50 70 70	mill finish mill finish mill finish black anodised	100
9745-WASI 13 N		**Middle clamp** ALUMINIUM LIGHT	Length: 70 mm Width: 36 mm	70	mill finish	100

3.2 - MOUNTING ACCESSORIES FOR MODULE MIDDLE CLAMPS

Item No.	Illustration	Item	Notes	Units
9431-120901		**T slot nut** Aluminium Ball made of A2 Pivotable	**M8** For mounting rails: WASI 1, WASI 2, WASI 2-26, WASI 5, WASI 15, WASI 16, WASI 31, WASI 31-60, LIGHT 1, WASI 1 UL & WASI 15 UL	100 200 500
557-2-8 **557-4-8**		**Square nut** in A2 and A4 to DIN 557	**M8** For mounting rails: WASI 3, LIGHT 3, WASI 3 UL	200
934-2-8 **934-4-8**		**Hexagon nut** In A2 and A4 to DIN 934	**M8** For mounting rails: WASI 3, LIGHT 3, WASI 3 UL	200
912-2-8 x 35 **912-4-8 x 35**		**Hexagon socket Allen screw** In A2 and A4 to DIN 912	**M8** For fixing of the clamps	200
9250-2-8,4 **9250-4-8,4**		**‚S' locking washers** In A2 and A4 to WASI house standard 9250	**M8** For securing the screw connection	1000

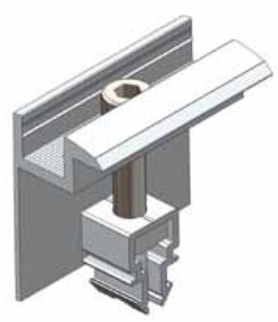
3.3 - SCREWS AND ACCESSORIES FOR MODULE CLAMPS

Item No.	Item	Units
Allen Screws A2 oder A4		
912-2-8 x 30	M8 x 30 mm	200
912-2-8 x 35	M8 x 35 mm	200
912-2-8 x 40	M8 x 40 mm	200
912-2-8 x 45	M8 x 45 mm	100
912-2-8 x 50	M8 x 50 mm	100
912-2-8 x 55	M8 x 55 mm	100
912-2-8 x 60	M8 x 60 mm	100
9250-2-8.4	Locking washer A2 8.4 mm	1000
9431-120901	T slot nut	100, 200, 500
557-2-8	Square nut	200

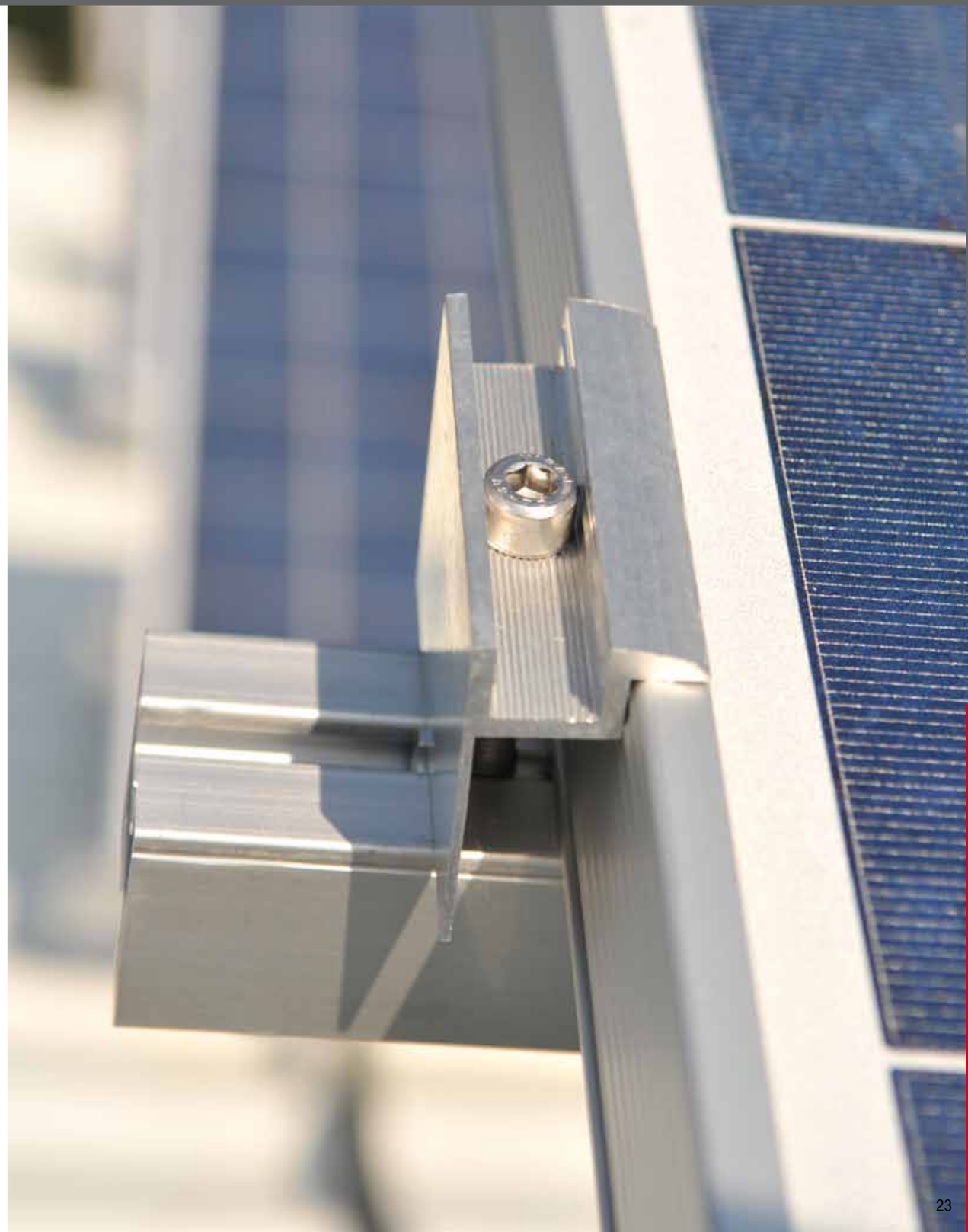
3.4 - USE OF ALLEN SCREWS FOR DIFFERENT MODULE HEIGHTS

Module height	Screw for rail with T slot nut	Locking washer (only with T slot nut channel)	Screw for rail with square nut [1]
30 mm	Allen, M8 x 35	x	Allen, M8 x 35 oder x 40
31 mm	Allen, M8 x 35	x	Allen, M8 x 35 oder x 40
32 mm	Allen, M8 x 35		Allen, M8 x 35 oder x 40
33 mm	Allen, M8 x 35		Allen, M8 x 35 oder x 40
34 mm	Allen, M8 x 35		Allen, M8 x 35 oder x 40
35 mm	Allen, M8 x 40	x	Allen, M8 x 40 oder x 45
36 mm	Allen, M8 x 40	x	Allen, M8 x 40 oder x 45
38 mm	Allen, M8 x 40		Allen, M8 x 40 oder x 45
40 mm	Allen, M8 x 45	x	Allen, M8 x 45 oder x 50
41 mm	Allen, M8 x 45	x	Allen, M8 x 45 oder x 50
42 mm	Allen, M8 x 45		Allen, M8 x 45 oder x 50
43 mm	Allen, M8 x 45		Allen, M8 x 45 oder x 50
44 mm	Allen, M8 x 45		Allen, M8 x 45 oder x 50
45 mm	Allen, M8 x 50	x	Allen, M8 x 50 oder x 55
46 mm	Allen, M8 x 50	x	Allen, M8 x 50 oder x 55
47 mm	Allen, M8 x 50		Allen, M8 x 50 oder x 55
48 mm	Allen, M8 x 50		Allen, M8 x 50 oder x 55
50 mm	Allen, M8 x 55	x	Allen, M8 x 55 oder x 60

[1] With this version both screw lengths given can be used.

3.5 - MODULE CLAMPS FOR FRAMED MODULES					
Item No.	**Illustration**	**Item**	**Notes**	**Version**	**Unit**
9742- WASI Clip E*		**End clamp Alu, incl clip** Considerably higher tensile strength than traditional fastenings due to special aluminium alloy	End clamp ready made with bolt, nut and clip connection Please give the module height when ordering/enquiring! This practical clip connection can be clicked into every upper channel of the WASI profiles. You save time here through reduced fitting time!	mill finish black anodised	50
9745- WASI Clip M*		**Middle clamp Aluminium** Considerably higher tensile strength than traditional fastenings due to special aluminium alloy	End clamp ready made with bolt, nut and clip connection Please give the module height when ordering/enquiring! This practical clip connection can be clicked into every upper channel of the WASI profiles. You save time here through reduced fitting time!	mill finish black anodised	100

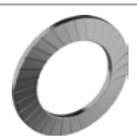
* clip also available singly



3.6 - MODULE CLAMPS FOR GLASS MODULES

Item No.	Illustration	Item	Length	Clamp	Version	Units
9742-Laminate-L **9745-Laminate-L**		**Middle clamp & end clamp for glass modules** Practical clip connection UV resistant EPDM rubber Modular height adjustability FirstSolar approval In addition you require Allen screws DIN 912 A2 8 x 35 and, depending on module height, locking washers 9250-2-8.4 Customer‘s required length possible	**80**	**6-9 mm**	mill finish	30 40
			100	**4,2-7 mm**	mill finish or black	100 220
			100	**6-9 mm**	mill finish or black	100 220
			150	**6-9 mm**	mill finish	100
			200	**6-9 mm**	mill finish	100

3.7 - MOUNTING ACCESSORIES FOR LAMINATE-L CLAMPS

Item No.	Illustration	Item	Notes	Units
9431-120901		**T slot nut** Aluminium Ball made of A2 Pivotable	**M8** For mounting rails: WASI 1, WASI 2, WASI 2-26, WASI 5, WASI 15, WASI 16, WASI 31, WASI 31-60, LIGHT 1, WASI 1 UL & WASI 15 UL	100 200 500
557-2-8 **557-4-8**		**Square nut** in A2 and A4 to DIN 557	**M8** For mounting rails: WASI 3, LIGHT 3, WASI 3 UL	200
934-2-8 **934-4-8**		**Hexagon nut** In A2 and A4 to DIN 934	**M8** For mounting rails: WASI 3, LIGHT 3, WASI 3 UL	200
912-2-8 x 35 **912-4-8 x 35**		**Hexagon socket Allen screw** In A2 and A4 to DIN 912	**M8** For fixing of the clamps	200
9250-2-8,4 **9250-4-8,4**		**‚S‘ locking washers** In A2 and A4 to WASI house standard 9250	**M8** For securing the screw connection	1000

3 MODULAR ASSEMBLY
MODULE CLAMPS FOR GLASS MODULES

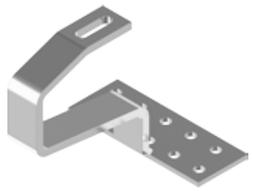
3.8 - MODULE CLAMPS FOR GLASS MODULES

Item No.	Illustration	Item	Notes	Version	Units
9742-Laminate-S **9745-Laminate-S**		**Middle clamp** **End clamp** For glass modules Aluminium Clamping area: 6.8 mm	• Elastic seal insert for optimum and positive fitting clamping • FirstSolar approval In addition you require Allen screws DIN 912 A2 8 x 12	mill finish	200 390
9742-Laminate-JT **9745-Laminate-JT**		**Middle clamp** **End clamp** For glass modules Aluminium Shaped rubber Clamping area: 6.8 mm	• Patented construction with EPDM rubber bed • Practical end stop in order to avoid damage to modules • FirstSolar approval In addition you require an Allen screw DIN 912 A2 8 x 16	mill finish	100 100

3.9. - MOUNTING ACCESSORIES FOR LAMINATE-S AND LAMINATE-JT CLAMPS

Item No.	Illustration	Item	Notes	Units
As Laminate-L accessories on page 24 / For the fixing of the clamps you require:				
912-2-8 x 12 **912-4-8 x 12**		**Hexagon socket Allen screw** In A2 and A4 to DIN 912	**M8 x 12 für Laminate-S** For fixing of the clamps	200
912-2-8 x 16 **912-4-8 x 16**			**M8 x 16 für Laminate-S** For fixing of the clamps	200

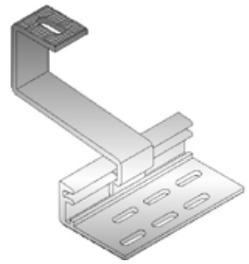
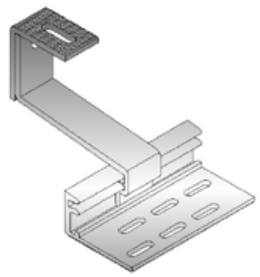
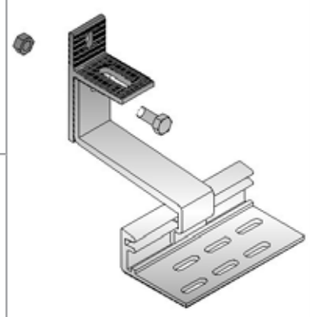
4.1 - ROOF HOOKS

Item No.	Illustration	Item	Notes	Units
9521-2- 150 x 60 W		**Roof hook, standard,** small	Plate 150 x 60 x 4 mm Hook 30 x 5 mm Height 130 mm	20
9521-2- 180 x 80		**Roof hook, standard**	Plate 180 x 80 x 5 mm Hook 35 x 6 mm Height 139 mm	20
9521-2- 180 x 80 W		**Roof hook, standard**	Plate 180 x 80 x 4 mm Hook 40 x 6 mm Height 130 mm	10
9523-2- 157 x 60		**Roof hook, heavy load**	Plate 157 x 60 x 5 mm Hook 35 x 8 mm Height 150 mm	20
9525-2- 140 x 56 K		**Roof hook, adjustable**	Plate 144 x 56 x 5 mm Hook 5 mm made-up Material: 1.4301	20

FROM PAGE 30 ONWARDS YOU CAN FIND ADDITIONAL ENQUIRY FORMS FOR ROOF HOOK SHAPES WITH SPECIAL DIMENSIONS.

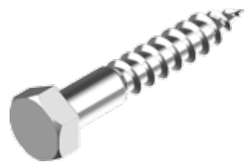
**For fastening the roof hooks to the spar we recommend our special wafer head screw.
(see category for ‚Bolt Accessories'). We will be glad to send to you on request frame calculations of the roof hooks.**

4.2 - ALUMINIUM ROOF HOOKS

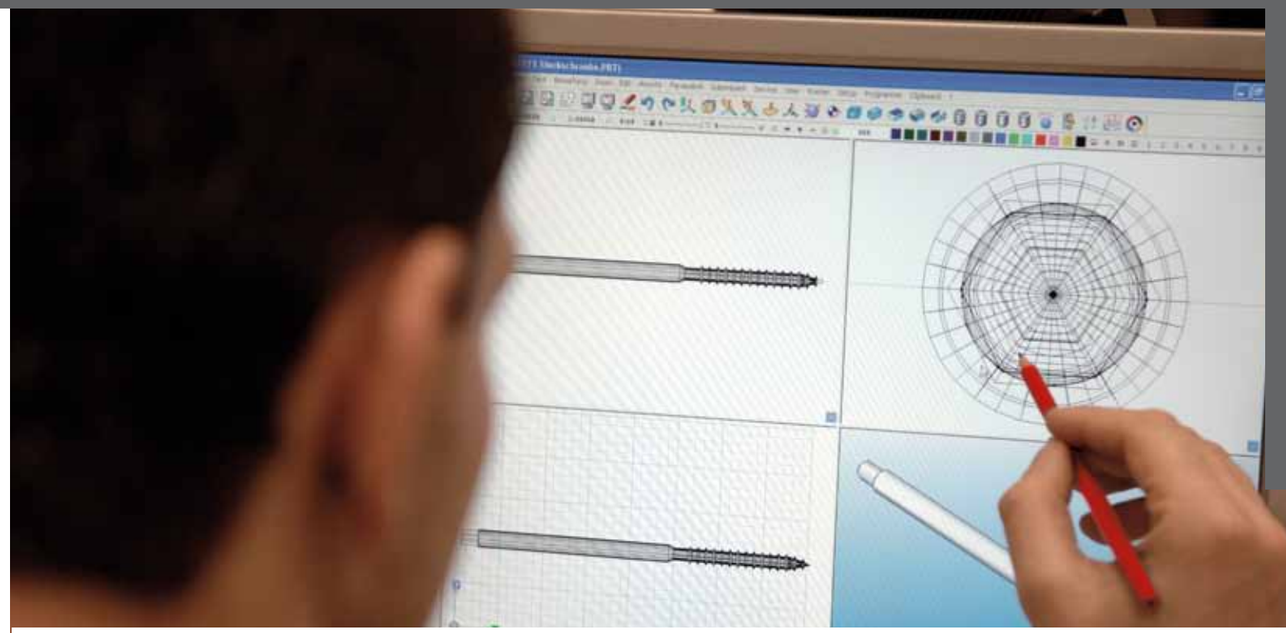
Item No.	Illustration	Item	Notes	Units
Base plate **9721-110004 +** *hook* **9721-110001**		**Roof hook, continuous** Consisting of base plate and hook for clipping in	For 32 mm battens Height of base plate 46 mm	100 100
Base plate **9726-110020 +** *hook* **9721-110001**			For 40 mm battens Height of base plate 54 mm	100 100
Base plate **9721-110004 +** *hook* **9727-100000**		**Roof hook, with height adjust-ment on the hook** Consisting of base plate and made-up hook	For 32 mm battens Height of base plate 46 mm	100 25
Base plate **9726-110020 +** *hook* **9727-100000**			For 40 mm battens Height of base plate 54 mm	100 25
Base plate **9721-110004 +** *hook* **9727-200000**		**Roof hook, side mounting with height adjust-ment** Consisting of base plate and hook made up with T piece	For 32 mm battens Height of base plate 46 mm	100 25
Base plate **9726-110020 +** hook **9727-200000**			For 40 mm battens Height of base plate 54 mm	100 25

FROM PAGE 30 ONWARDS YOU CAN FIND ADDITIONAL ENQUIRY FORMS FOR ROOF HOOK SHAPES WITH SPECIAL DIMENSIONS.

**For fastening the roof hooks to the spar we recommend our special wafer head screw.
(see category for ‚Bolt Accessories'). We will be glad to send to you on request frame calculations of the roof hooks.**

4.3 - SUPPORT PLATES FOR ROOF HOOKS				
Item No.	**Illustration**	**Item**	**Notes**	**Units**
9810-0-8 x 80 **9810-0-8 x 100** **9810-0-8 x 120**		**TWafer head screws with TX Drive** Stainless annealed	Building regulation approved 8 x 80 8 x 100 8 x 120	50
9811-2-8 x 80 **9811-2-8 x 100** **9811-2-8 x 120**		**Wafer head screws with TX Drive** A2	8 x 80 8 x 100 8 x 120	50
571-2-8 x 80 **571-2-8 x 100** **571-2-8 x 120** **571-4-8 x 80** **571-4-8 x 100** **571-4-8 x 120**		**Hexagonal wood screws**	Caution! As is normal practice with wood pre-drilling is necessary!	100 100 50 100 100 50
9731-2 x 130702 **9731-3 x 130703** **9731-5 x 130705**		**Shim** Aluminium	2 mm 3 mm 5 mm	100

ADDITIONAL DIMENSIONS AVAILABLE FROM STOCK
Information via www.wasi.de



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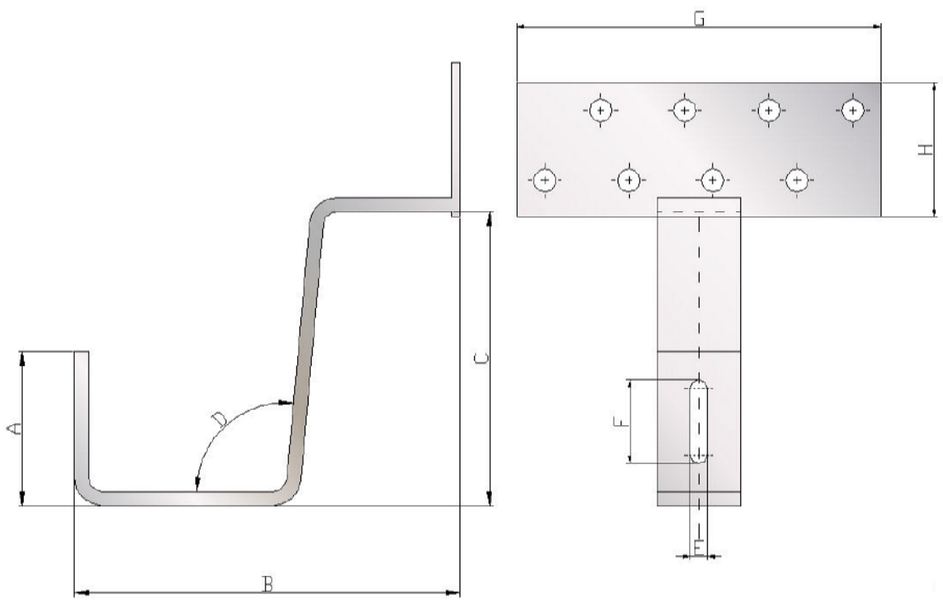
4.4.1 - ORDER SHEET PAN ROOF HOOKS



Please give us details of your required special dimensions:

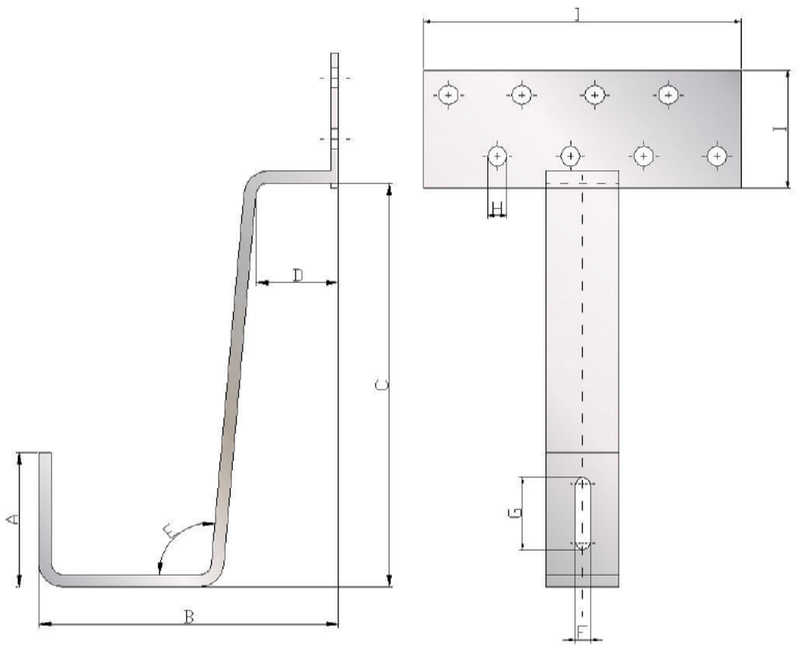
A	B	C	D	E	F	G	H

Quantity of items:

Delivery address:

For our manufacturing we use 1.4301 stainless steel, 5 mm thick, unless anything else is required.

4.4.2 - ORDER SHEET FLAT-TAIL ROOF HOOKS



Please give us details of your required special dimensions:

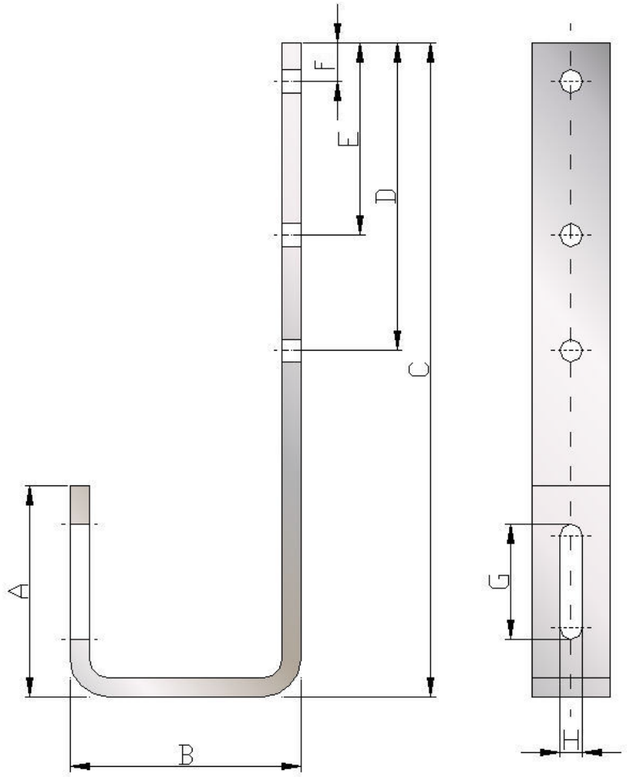
A	B	C	D	E	F	G	H	I	J

Quantity of items:

Delivery address:

For our manufacturing we use 1.4301 stainless steel, 5 mm thick, unless anything else is required.

4.4.3 - ORDER SHEET SLATE ROOF HOOKS



Please give us details of your required special dimensions:

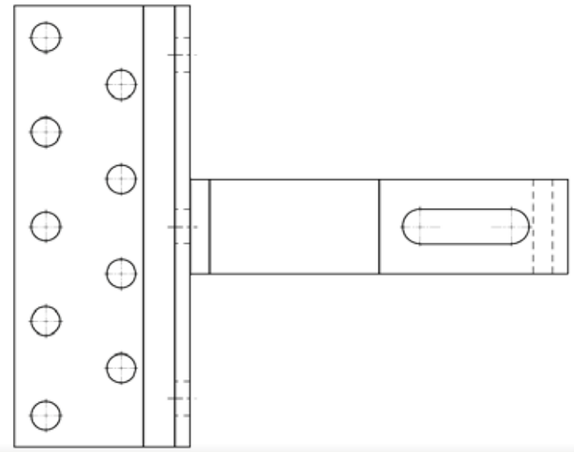
A	B	C	D	E	F	G	H

Quantity of items:

Delivery address:

For our manufacturing we use 1.4301 stainless steel, 5 mm thick, unless anything else is required.

4.4.4 - ORDER SHEET SPECIAL ROOF HOOKS



WASI®
NORM SOLAR SPEZIAL MARITIM

SOLUTIONS THROUGH DIALOGUE!

Have you already created a drawing of your required roof hook and are you still looking for a reliable supplier? We will prepare for you at short notice a quotation for manufacture and storage.

SEND US YOUR ENQUIRY TODAY!

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SOLAR@WASI.DE
WWW.WASI-SOLAR.DE

5.1 - MADE UP HANGER BOLTS FOR WOODEN SUBSTRUCTURES

Item No.	Illustration	Item	Notes	Length	Units
9215-2-.... x		**Hanger bolts,** external hexagon made up (similar to illustration)	Made up with 3 hexagon nuts DIN 934 A2 + 3 washers DIN 125 A2 + EPDM seal WS 9218 All dimensions see above. WS 9211 with this make-up available from stock!	10 x 180 10 x 200 10 x 250 10 x 300 12 x 250 12 x 300 12 x 350	25
9216-2-.... x		**Hanger bolts,** external hexagon made up (similar to illustration)	Made up with 3 locking nuts WS 9345 A2 + EPDM seal WS 9218 All dimensions see above. WS 9211 with this make-up available from stock!	10 x 180 10 x 200 10 x 250 10 x 300 12 x 250 12 x 300 12 x 350	25
9217-2-.... x		**Hanger bolts,** external hexagon made up (similar to illustration)	Made up with 3 locking nuts WS 9345 A2 + EPDM seal WS 9218 + 1 large U washer above the seal Hanger bolt (WS 9211) with external hexagon SW8 M12 x 300 mm	10 x 180 10 x 200 10 x 250 10 x 300 12 x 250 12 x 300 12 x 350	25
9219-2-.... x		**Hanger bolts,** external hexagon made up (similar to illustration)	Made up with 3 locking nuts DIN 934 A2 + 2 washers DIN 125 + 1 washer DIN 9021 A2 + EPDM seal WS 9218 Hanger bolt (WS 9211) with external hexagon SW8 M12 x 300 mm	10 x 180 10 x 200 10 x 250 10 x 300 12 x 250 12 x 300 12 x 350	25

5 SOLAR FIXINGS FOR SHEET METAL AND ETERNIT ROOFS
HANGER BOLTS FOR WOODEN SUBSTRUCTURES

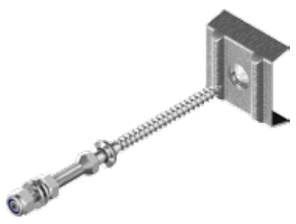
5.2 - DESCRIPTION OF THE HANGER BOLTS FOR WOODEN SUBSTRUCTURES

Length	Item	Description	Thread length	
			metric	Wood
10 x 180	**Hanger bolts A2**	Hanger bolt (WS 9211) with external hexagon SW7 M10 x 180 mm	100	60
10 x 200	**Hanger bolts A2**	Hanger bolt (WS 9211) with external hexagon SW7 M10 x 200 mm	110	70
10 x 250	**Hanger bolts A2**	Hanger bolt (WS 9211) with external hexagon SW7 M10 x 250 mm	130	80
10 x 300	**Hanger bolts A2**	Hanger bolt (WS 9211) with external hexagon SW7 M10 x 250 mm	140	100
12 x 250	**Hanger bolts A2**	Hanger bolt (WS 9211) with external hexagon SW7 M10 x 250 mm	130	100
12 x 300	**Hanger bolts A2**	Hanger bolt (WS 9211) with external hexagon SW8 M12 x 300 mm	140	100
12 x 350	**Hanger bolts A2**	Hanger bolt (WS 9211) with external hexagon SW8 M12 x 300 mm	180	130

5.3 - HANGER BOLTS - COMPONENTS FOR WOODEN SUBSTRUCTURES

Item No.	Illustration	Item	Notes	Units
9211-2-.... x		**Hanger bolts** A2	Hanger bolt (WS 9211) with external hexagon SW7 M10 x 180mm Thread length - see table	50
9218 10 **9218 12**		**EPDM** seal	EPDM - seal ca 60° Shore A for hanger bolts M10 M12	1000
9345-2-10 **9345-4-10** **9345-2-12** **9345-4-12**		**Hexagon nut** with flange and locking toothing	In A2 and A4 to DIN 934	100
934-2-10 **934-4-10** **934-2-12** **934-4-12**		**Hexagon nut**	In A2 and A4 to DIN 125	100
125-2-10,5 **125-4-10,5** **125-2-13** **125-4-13**		**Washer**	In A2 und A4 nach DIN 125	500
9021-2-10,5 **9021-4-10,5** **9021-2-13** **9021-4-13**		**Washer** with large external diameter	In A2 and A4 to DIN 9021	500 200

5.4.1 - APPROVED HANGER BOLTS FOR WOODEN SUBSTRUCTURES

Item No.	Illustration	Item	Notes	Length	Unit
9221-2-…		**Hexagon socket hanger bolts** made up (similar to illustration)	Hanger bolt for wooden substructure, with special coating Made up with nuts, washers and seal Building regulation approval	10 x 134 10 x 150 10 x 170 10 x 180 10 x 200 10 x 250	25 10 25 10 10 10
9221-2-…		**Hexagon socket hanger bolts** made up	Hanger bolt for wooden substructure, with special coating Made up with nuts, washers and cap Building regulation approval	10 x 134 10 x 150 10 x 170 10 x 180 10 x 200 10 x 250	25 10 25 10 10 10

5.4.2 - DESCRIPTION OF THE APPROVED HANGER BOLTS FOR WOODEN SUBSTRUCTURES

Length	Item	Description	Thread length	
			metric	Wood
10 x 134	**9221**	Hanger bolt (WS 9221) for wooden substr. Wood 8 / Metrisch	70	64
10 x 150	**9221**	Hanger bolt (WS 9221) for wooden substr. Wood 8 / Metrisch	50	100
10 x 170	**9221**	Hanger bolt (WS 9221) for wooden substr. Wood 8 / Metrisch	70	100
10 x 180	**9221**	Hanger bolt (WS 9221) for wooden substr. Wood 8 / Metrisch	50	130
10 x 200	**9221**	Hanger bolt (WS 9221) for wooden substr. Wood 8 / Metrisch	50	150
10 x 250	**9221**	Hanger bolt (WS 9221) for wooden substr. Wood 8 / Metrisch	50	200

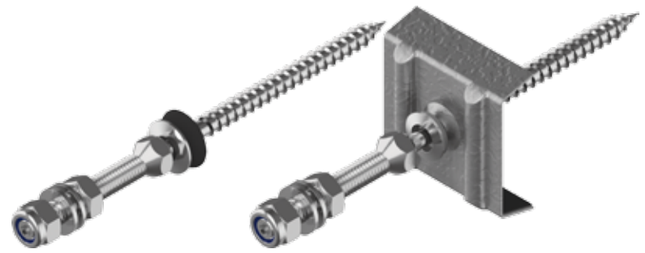
5 SOLAR FIXINGS FOR SHEET METAL AND ETERNIT ROOFS
APPROVED HANGER BOLTS FOR WOODEN SUBSTRUCTURES

5.4.2 - DESCRIPTION OF THE APPROVED HANGER BOLTS FOR WOODEN SUBSTRUCTURES

The approved hangers screws for wood base constructions made of A2 stainless steel with a special coating can be mounted easily and provide the prerequisite for exact adjustment of the solar system.

With its general building approval Z-14.4-555, the solar fastenings guarantee

- Tightness
- Tested load
- Maximum safety during assembly



TECHNICAL INFORMATION

- When pre-drilling wood base constructions, we recommend 6.0 mm (0.7 x D*)
- Drill depth in wood = min. 4 x D* - max. 12 x D*
- (D* = nominal screw diameter)
- Please also note the details in the building approval Z-14.4-555

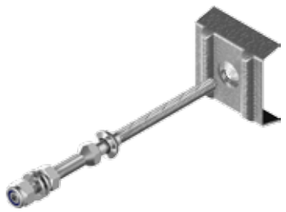
The solar fastenings are anchored in the base construction, to which it transfers pulling and compressive force. Thus, the weight of the solar system, as well as wind and snow loads are not transferred to the thin sheet metal cover. Thus, damage to the roof surface is prevented. The tightness of the connection is optimised with a top flange connection with a calotte and sealing disc or bell type seal. **The water-proofing of the roof remains intact by means of the original facade construction fastening with the solar fasteners.**

The base is a sealing screw 9221-2 for wood base constructions. They are connected by means of a high quality welding process with a threaded pin. Completed with hexagon nut, lock nut, washers, gasket seal and bell type seal, an interlocking connection is achieved.

The tested solar fasteners should be utilised for all roofs with trapezoidal professional sandwich panels and corrugated fibre board roofing.

5 SOLAR FIXINGS FOR SHEET METAL AND ETERNIT ROOFS
APPROVED HANGER BOLTS FOR STEEL SUBSTRUCTURES

5.5.1 - APPROVED HANGER BOLTS FOR STEEL SUBSTRUCTURES

Item No.	Illustration	Item	Notes	Length	Unit
9222-2-…		**Hexagon socket hanger bolts** made up	Hanger bolt for steel substructure, with special coating Made up with nuts, washers and seal Building regulation approval	10 x 130 10 x 150 10 x 170 10 x 175 10 x 195 10 x 200 10 x 210 10 x 250 10 x 270	10 10 10 10 10 10 10 10 25
9222-2-…		**Hexagon socket hanger bolts** made up	Hanger bolt for steel substructure, with special coating Made up with nuts, washers and cap Building regulation approval	10 x130 10 x 150 10 x 170 10 x 175 10 x 195 10 x 200 10 x 210 10 x 250 10 x 270	10 10 10 10 10 10 10 10 25

5.5.2 - DESCRIPTION OF THE HANGER BOLTS FOR STEEL SUBSTRUCTURES

Length	Item	Description	Thread length	
			metric	Wood
10 x 130	**9222**	Hanger bolt (WS 9221) for steel substr. Steel 8 / Metrisch M10	50	80
10 x 150	**9222**	Hanger bolt (WS 9221) for steel substr. Steel 8 / Metrisch M10	50	100
10 x 170	**9222**	Hanger bolt (WS 9221) for steel substr. Steel 8 / Metrisch M10	70	100
10 x 175	**9222**	Hanger bolt (WS 9221) for steel substr. Steel 8 / Metrisch M10	50	125
10 x 195	**9222**	Hanger bolt (WS 9221) for steel substr. Steel 8 / Metrisch M10	70	125
10 x 200	**9222**	Hanger bolt (WS 9221) for steel substr. Steel 8 / Metrisch M10	50	150
10 x 210	**9222**	Hanger bolt (WS 9221) for steel substr. Steel 8 / Metrisch M10	50	160
10 x 250	**9222**	Hanger bolt (WS 9221) for steel substr. Steel 8 / Metrisch M10	50	200
10 x 270	**9222**	Hanger bolt (WS 9221) for steel substr. Steel 8 / Metrisch M10	70	200

5.5.2 - DESCRIPTION OF THE HANGER BOLTS FOR STEEL SUBSTRUCTURES

The approved hanger screws for steel base constructions made of A2 stainless steel with a special coating can be mounted easily and provide the prerequisite for exact adjustment of the solar system.

With its general building approval Z-14.4-555, the solar fastenings guarantee

- Tightness
- tested load
- Maximum safety during assembly

TECHNICAL INFORMATION

Pre-drilling table for base construction

Steel thickness:	Pre-drill -Ø:
1,5 - 5,0 mm	6,8 mm
6,0 mm	7,0 mm
8,0 mm	7,2 mm
> 10,0 mm	7,4 mm

- Recommended screw length (lg): Trapezoidal profile height / sandwich thickness 20 mm

The solar fastenings are anchored in the base construction, to which it transfers pulling and compressive force. Thus, the weight of the solar system, as well as wind and snow loads are not transferred to the thin sheet metal cover. Thus, damage to the roof surface is prevented. The tightness of the connection is optimised with a top flange connection with a calotte and sealing disc or bell type seal. **The water-proofing of the roof remains intact by means of the original facade construction fastening with the solar fasteners.**

The base is a sealing screw 9222-2 for steel base constructions. They are connected by means of a high quality welding process with a threaded pin. Completed with hexagon nut, lock nut, washers, gasket seal and bell type seal, an interlocking connection is achieved.

The tested solar fasteners should be utilised for all roofs with trapezoidal professional sandwich panels and corrugated fibre board roofing.

5.6.1 - ADAPTER PLATES MADE OF A2 FOR HANGER BOLTS

Item No.	Illustration	Item	Notes	Hole sizes	Units
9541-2-82 x 30 x 5		**Stainless steel A2 adapter plate for hanger bolts M 8** Material: 1.4301	Length: 82 mm Width: 30 mm Height: 5 mm	RL: 9 mm LL: 11 x 29,5 mm	100
9542-2-82 x 30 x 5		**Stainless steel A2 adapter plate for hanger bolts M 10** Material: 1.4301	Length: 82 mm Width: 30 mm Height: 5 mm	RL: 11 mm LL: 9 x 29,5 mm	100
9543-2-82 x 30 x 5		**Stainless steel A2 adapter plate for hanger bolts M 10** Material: 1.4301	Length: 82 mm Width: 30 mm Height: 5 mm	RL: 11 mm LL: 11 x 29,5 mm	100
9544-2-80 x 30 x 5		**Stainless steel A2 adapter plate for hanger bolts M 12** Material: 1.4301	Length: 80 mm Width: 30 mm Height: 5 mm	RL: 13 mm LL: 11 x 40 mm	100
9544-2-82 x 30 x 5		**Stainless steel A2 adapter plate for hanger bolts M 12** Material: 1.4301	Length: 82 mm Width: 30 mm Height: 5 mm	RL: 13 mm LL: 11 x 29,5 mm	100
9547-2-110 x 40		**Stainless steel A2 adapter plate for hanger bolts M 10** Material: 1.4301	Length: 110 mm Width: 40 mm Height: 5 mm	RL: 11 mm LL: 9 x 29 mm	100
9549-2-110 x 40		**Stainless steel A2 adapter plate for hanger bolts M 12** Material: 1.4301	Length: 110 mm Width: 40 mm Height: 6 mm	RL: 13 mm LL: 11 x 29 mm	100

5 SOLAR FIXINGS FOR SHEET METAL AND ETERNIT ROOFS
ADAPTER PLATES FOR HANGER BOLTS

5.6.2 - ADAPTER PLATES MADE OF ALUMINIUM FOR HANGER BOLTS

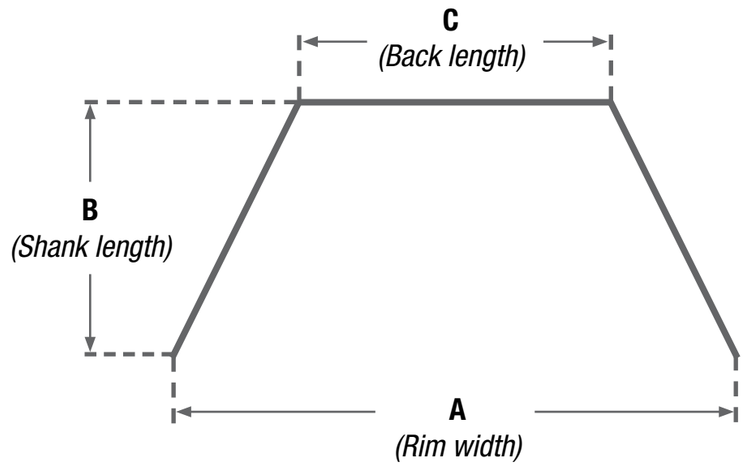
Item No.	Illustration	Item	Notes	Hole sizes	Units
9543-AL-82 x 40 x 6		**Aluminium adapter plate for hanger bolts M 10**	Length: 82 mm Width: 40 mm Height: 6 mm	RL: 11 mm LL: 11 x 29,5 mm	100
9544-AL-82 x 40 x 6		**Aluminium adapter plate for hanger bolts M 12**	Length: 82 mm Width: 40 mm Height: 6 mm	RL: 13 mm LL: 11 x 29,5 mm	100
9548-AL-110 x 40		**Aluminium adapter plate for hanger bolts M 10**	Length: 110 mm Width: 40 mm Height: 6 mm	RL: 11 mm LL: 11 x 29,0 mm	50

5.7 - ACCESSORIES FOR SHEET METAL AND ETERNIT ROOFS

See Z profil (9671-15441 & 9671-1-1431-A) page 9, and trapezoidal corrugated metal rails (9664-WASI31-6-9664-WASI31-60) page 7, under category ‚Mounting rails‘

Item No.	Illustration	Item	Notes	Units
9583-Rebate-Clamp	No picture available	**Roof rebate clamp** **angled M10**	Elongated hole 11 mm up to 3.5 mm rebate	100
9583-KALZIP10		**Kalzip clamp** **angled M10**	Kalzip clamp A2 with elongated hole for connection of rails M10 Made up with bolt/nut/U washer	100
9581-…		**Trapezoidal corrugated metal shoe** **A2**	Shoe for trapezoidal corrugated metal, 4 holes, for direct fastening to the trapezoidal corrugated metal (Corrugated metal shoes are manufactured only at customer‘s request and only to a drawing. The whole assembly should always be checked on site). Either with mounting plate, set screw, or with angle bracket For fastening we recommend our building regulation approved self-tapping screws 6.3 x 25 (Item no. 9191-2-6.3 x 25)	

5.8 - ORDER SHEET TRAPEZOIDAL CORRUGATED METAL SHOE



Please give us details of your required special dimensions (in mm):

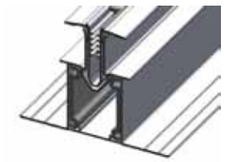
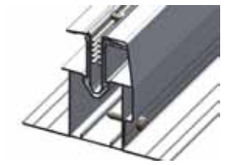
A	B	C

Version

- ☐ **with welded plate**
- ☐ **with set screw M10**
- ☐ **with set screw M12**
- ☐ **with welded angle bracket**
- ☐ _____

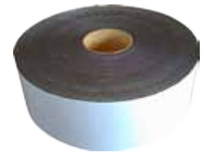
Quantity of items:

Delivery address:

5.9.1 - INSERT PROFILE FOR SHEET METAL, ETERNIT AND KALZIP ROOFS					
Item No.	**Illustration**	**Item**	**Notes**	**Length**	**Version**
9666-EP-GP-6,1		**Mounting rail**	WASI Insert System Basic Profile	6,1 m	mill finish
9666-EP-AP-6,1		**Closure plate**	WASI Insert System Closure Profile	6,1 m	mill finish

5.9.2 - ACCESSORIES FOR INSERT PROFILE FOR SHEET METAL, ETERNIT AND KALZIP ROOFS				
Item No.	**Illustration**	**Item**	**Length**	**Units**
9666-EP-HV-100		**Clamp**	WASI Insert System height adjustment element 100 mm	100
9666-EP-COVER		**End plate**	WASI Insert System side end plate Caution! For fastening the end plates you require an off-the-shelf dowel as well as the self-tapping screw 7504-2-4.8 x 25 K	100

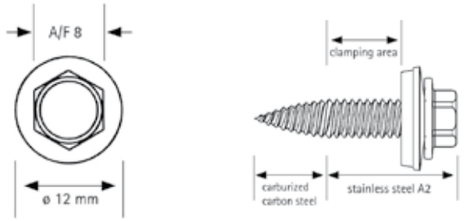
5 SOLAR FIXINGS FOR SHEET METAL AND ETERNIT ROOFS
INSERT PROFILE

5.9.2 - ACCESSORIES FOR INSERT PROFILE FOR SHEET METAL, ETERNIT AND KALZIP ROOFS				
Item No.	**Illustration**	**Item**	**Length**	**Units**
9664-WASI 31 -90 x 3-50		**EPDM sealing tape** Width: 90 mm Thickness 3 mm	Sealing tape is fixed between WASI 31 or WASI 31-60 and the trapezoidal corrugated metal. **One side adhesive**	50 m
9191-2-6,0 x 25		**Facade bolt**	For metal roof design with building approval E16 mm	500
7504-2-4,8 x 25K		**Self tapping screw** A2 oder A4	**K shape** with hexagon head and flange	500

5.10 - THIN SHEET METAL SCREW				
Item No.	**Illustration**	**Item**	**Length**	**Units**
9191-2-6,0 x 25R		**Thin sheet metal facade screw** **A2 / bi-metal, BZ 6.0 x 25 EPDM E16**	specially coated facade screw with building approval (Z-14.1-4 and Z-14.1-537) no pre-drilling, virtually no slivers, half the mounting time E 16 mm	100
9191-2-4,5 x 25R		**This sheet metal drill screw** **A2/ bi-metal, BZ 4.5 x 25 EPDM E14**	specially coated facade screw with building approval (Z-14.1-4 and Z-14.1-537) no pre-drilling, virtually no slivers, half the mounting time E 14 mm	100

5.10 - THIN SHEET METAL SCREW - MAXIMUM STABILITY FOR THIN METAL SHEETS

- Tip and thread made of hardened carbon steel
- Supporting threads and head made of stainless steel A2, rust free
- Break resistant bond by means of a patented welding method
- For connection of steel and aluminium sheet metal profiles and sandwich panels on steel and aluminium base construction



MAXIMUM STABILITY FOR THIN SHEET METAL

- 50% higher retention force
- 50% time savings
- Fewer anchorage points necessary and therefore, faster assembly
- Almost no drill slivers

The facade screws 9191-2-6.0 x 25R and 9191-2-4.5 x 25R require no pre-drilling. The screws break through the material quickly and remove it like a drill. Therefore, the displaced material is deformed downward to a funnel and provides additional support for the screw. This results in a very large retention force.

This capability is made possible through a bi-metal combination. The tip of the screw is made of hardened carbon steel and the actual body of the screw is made of stainless steel A2. During processing, the characteristics of the tool's steel, the high elasticity for the permanent screw connection and the very good corrosion protection can be utilised.

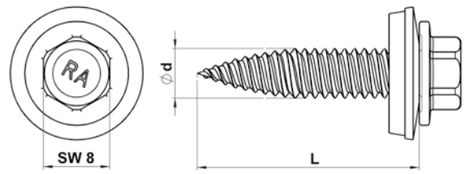
5 SOLAR FASTENERS FOR SHEET METAL AND ETERNIT ROOF
THIN SHEET METAL SCREW

5.10 - THIN SHEET METAL SCREW - A2/ BI-METAL 9191-2-6.0 X 25R

- Special coating
- With building approval
- No pre-drilling, half the mounting time, virtually no slivers

MATERIALS AND DIMENSIONS

- Wrench opening SW 8
- Component 1, sheet metal, steel, from 0.5 – 1.25 mm and aluminium 0.5 – 1.5 mm
- Component 2, sheet metal, steel, from 0.5 – 1.25 mm and aluminium 0.5 – 1.5 mm
- Two-speed full thread

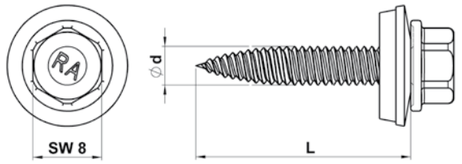


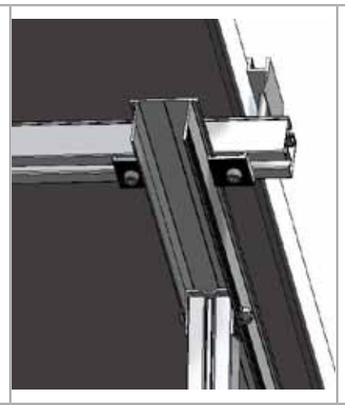
5.10 - THIN SHEET METAL SCREW - A2/ BI-METAL 9191-2-4.5 X 25R

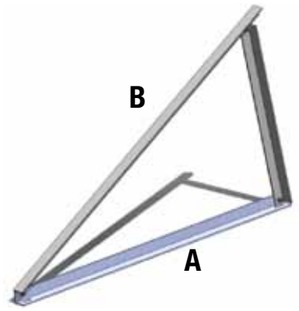
- Special coating
- With building approval
- No pre-drilling, half the mounting time, virtually no slivers

MATERIALS AND DIMENSIONS

- Wrench opening SW 8
- Component 1, sheet metal, steel, from 0.5 – 1.0 mm and aluminium 0.5 – 1.2 mm
- Component 2, sheet metal, steel, from 0.5 – 1.0 mm and aluminium 0.5 – 1.2 mm



6.1 - FLAT ROOF STAND-UP MOUNTING, ADJUSTABLE				
Item No.	**Item**			**Units**
9785-WASI 2040	• Aluminium triangular stand-up mounting for flat roofs • Can be folded up • Adjustable variably from 20° to 40° • Fully assembled, can be supplied from stock • You require per triangle 8 mounting plates 9785-WASI 26 + 4 x 9021-2-8,4. • As a diagonal strut the angle profile 40 x 40 x 3 etc can be used. • Top fixings: DIN 933-2-10x25 + 9345-2-10 + 9785-WASI26 • Bottom fixings: DIN 912-2-8x16 + 9431-120901 + 9785-WASI26 For further information please see our „flat roof mounting“ brochure.			1
9785-WASI 26	Mounting plate for the fastening of the mounting rails on the triangle		M8 M10	100 100

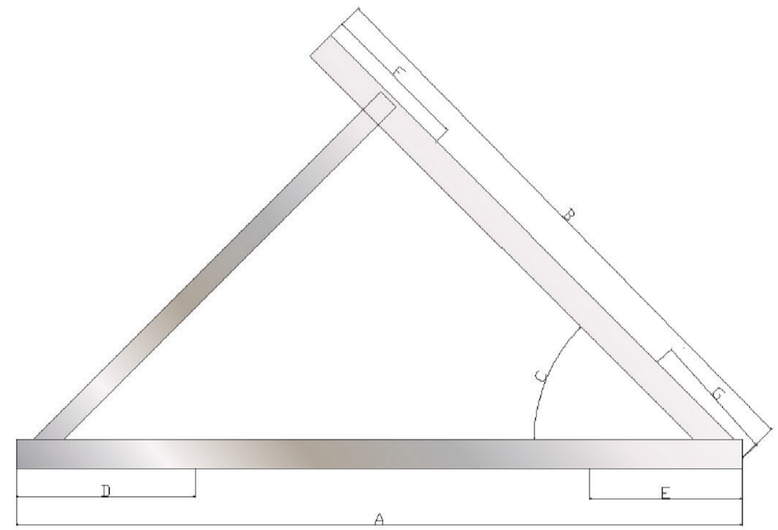
6.2.1 - FLAT ROOF STAND-UP MOUNTING - FIXED				
Item No.	**Item**			
9785-		Fixed triangular stand-up mountings made of angle profiles, e.g. 40 x 40 x 3 or 40 x 40 x 5 Any customer‘s required angle dimensions possible		

6.2.2 - STANDARD STAND-UP MOUNTINGS MADE OF ALUMINIUM L ANGLES 40 X 40 X 3				
Item No.	**A**	**B**	**Angle**	**Material**
...1450155015-3	1450	1550	15°	Aluminium angle 40 x 40 x 3
...1450155020-3	1450	1550	20°	Aluminium angle 40 x 40 x 3
...1450155025-3	1450	1550	25°	Aluminium angle 40 x 40 x 3
...1450155030-3	1450	1550	30°	Aluminium angle 40 x 40 x 3
...1450155035-3	1450	1550	35°	Aluminium angle 40 x 40 x 3
...1450155040-3	1450	1550	40°	Aluminium angle 40 x 40 x 3
...1450155045-3	1450	1550	45°	Aluminium angle 40 x 40 x 3
...1450155050-3	1450	1550	50°	Aluminium angle 40 x 40 x 3
...900100015-3	900	1000	15°	Aluminium angle 40 x 40 x 3
...900100020-3	900	1000	20°	Aluminium angle 40 x 40 x 3
...900100025-3	900	1000	25°	Aluminium angle 40 x 40 x 3
...900100030-3	900	1000	30°	Aluminium angle 40 x 40 x 3
...900100035-3	900	1000	35°	Aluminium angle 40 x 40 x 3
...900100040-3	900	1000	40°	Aluminium angle 40 x 40 x 3
...900100045-3	900	1000	45°	Aluminium angle 40 x 40 x 3
...900100050-3	900	1000	50°	Aluminium angle 40 x 40 x 3

6.2.3 - STANDARD STAND-UP MOUNTINGS MADE OF ALUMINIUM L ANGLES 40 X 40 X 4				
Item No.	**A**	**B**	**Angle**	**Material**
...1450155015-4	1450	1550	15°	Aluminium angle 40 x 40 x 4
...1450155020-4	1450	1550	20°	Aluminium angle 40 x 40 x 4
...1450155025-4	1450	1550	25°	Aluminium angle 40 x 40 x 4
...1450155030-4	1450	1550	30°	Aluminium angle 40 x 40 x 4
...1450155035-4	1450	1550	35°	Aluminium angle 40 x 40 x 4
...1450155040-4	1450	1550	40°	Aluminium angle 40 x 40 x 4
...1450155045-4	1450	1550	45°	Aluminium angle 40 x 40 x 4
...1450155050-4	1450	1550	50°	Aluminium angle 40 x 40 x 4
...900100015-4	900	1000	15°	Aluminium angle 40 x 40 x 4
...900100020-4	900	1000	20°	Aluminium angle 40 x 40 x 4
...900100025-4	900	1000	25°	Aluminium angle 40 x 40 x 4
...900100030-4	900	1000	30°	Aluminium angle 40 x 40 x 4
...900100035-4	900	1000	35°	Aluminium angle 40 x 40 x 4
...900100040-4	900	1000	40°	Aluminium angle 40 x 40 x 4
...900100045-4	900	1000	45°	Aluminium angle 40 x 40 x 4
...900100050-4	900	1000	50°	Aluminium angle 40 x 40 x 4

6.2.4 - STANDARD STAND-UP MOUNTINGS MADE OF ALUMINIUM L ANGLES 40 X 40 X 5				
Item No.	**A**	**B**	**Angle**	**Material**
...1450155015-5	1450	1550	15°	Aluminium angle 40 x 40 x 5
...1450155020-5	1450	1550	20°	Aluminium angle 40 x 40 x 5
...1450155025-5	1450	1550	25°	Aluminium angle 40 x 40 x 5
...1450155030-5	1450	1550	30°	Aluminium angle 40 x 40 x 5
...1450155035-5	1450	1550	35°	Aluminium angle 40 x 40 x 5
...1450155040-5	1450	1550	40°	Aluminium angle 40 x 40 x 5
...1450155045-5	1450	1550	45°	Aluminium angle 40 x 40 x 5
...1450155050-5	1450	1550	50°	Aluminium angle 40 x 40 x 5
...900100015-5	900	1000	15°	Aluminium angle 40 x 40 x 5
...900100020-5	900	1000	20°	Aluminium angle 40 x 40 x 5
...900100025-5	900	1000	25°	Aluminium angle 40 x 40 x 5
...900100030-5	900	1000	30°	Aluminium angle 40 x 40 x 5
...900100035-5	900	1000	35°	Aluminium angle 40 x 40 x 5
...900100040-5	900	1000	40°	Aluminium angle 40 x 40 x 5
...900100045-5	900	1000	45°	Aluminium angle 40 x 40 x 5
...900100050-5	900	1000	50°	Aluminium angle 40 x 40 x 5

6.3 - ORDER SHEET STAND-UP MOUNTINGS



Please give us details of your required special dimensions (in mm):

A	B	C	D	E	F	G
			☐ No hole ☐ 9 mm ☐ 11 mm ☐ _____	☐ No hole ☐ 9 mm ☐ 11 mm ☐ _____	☐ No hole ☐ 9 mm ☐ 11 mm ☐ _____	☐ No hole ☐ 9 mm ☐ 11 mm ☐ _____

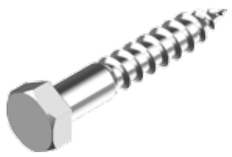
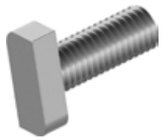
Please put a cross against the required Hole size:

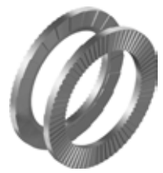
Material:
- ☐ **Aluminium angle profile 40 x 40 x 3**
- ☐ **Aluminium angle profile 40 x 40 x 4**
- ☐ **Aluminium angle profile 40 x 40 x 5**
- ☐ **Miscellaneous** _____

Quantity of items:

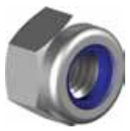
Delivery address:

7 SCREW ACCESSORIES - SOLAR

7 - SCREW ACCESSORIES				
FOR INFO: WASI Solar can supply you with not only innovative solar items but also with all other types of connecting elements. WASI with 26,000 items in its product range is not only a supplier with one of the largest and widest product ranges in the market, but it is also one of the worldwide leaders in the business of stainless connector elements of A1 up to A5 in all classes of strength and rigidity. HERE IS A SMALL SELECTION:				
Item No.	**Illustration**	**Item**	**Notes**	**Units**
9810-0-..... x		Wafer head screws with TX drive, annealed stainless steel Building regulation approved for, among other things, the fastening of roof hooks	8 x 80	50
			8 x 100	50
			8 x 120	50
571-2-..... x		Hexagon - wood screws for, among other things, the fastening of roof hooks	8 x 80 10 x 80 8 x 100 10 x 100 8 x 120 10 x 120 8 x 140 10 x 140 8 x 160 10 x 160 8 x 180 10 x 180 8 x 200 10 x 200	varies depending on size
912-2-..... x ..... **912-4-..... x .....**		Hexagon socket Allen screw in A2 and A4 to DIN 912	For fastening of, among other things, our module clamps	varies depending on size
933-2-..... x ..... **933-4-..... x .....**		Hexagon bolt with thread up to the head in A2 and A4 to DIN 933	Dimension M 10 x 25 for the lower rail channel, item 9664-WASI 1	varies depending on size
9415-2-..... x ..... **9415-4-..... x .....**		Hammer head bolt A2 and A4 for mounting rail type 28/15, to house standard WS 9415 (further rail types on request)	M8 x 20 M10 x 20 M8 x 25 M10 x 25 M8 x 30 M10 x 30 M8 x 35 M10 x 35 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size
9021-2-..... **9021-4-.....**		Washer with large external diameter in A2 and A4 to DIN 9021	for internal (mm) external (mm) M8 8.4 24.0 M8 8.4 24.0 M8 8.4 24.0 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size

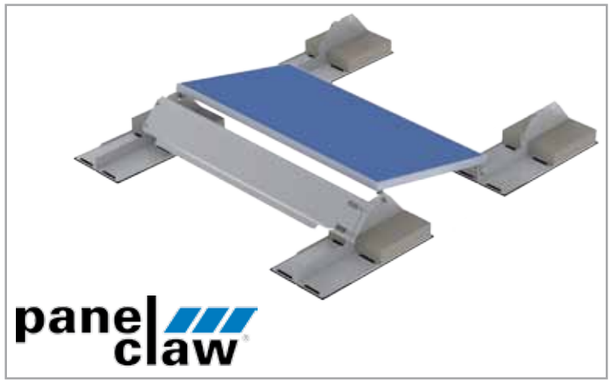
7 - SCREW ACCESSORIES				
Item No.	**Illustration**	**Item**	**Notes**	**Units**
125-2-..... **125-4-.....**		Washer in A2 and A4 to DIN 125	for internal (mm) external (mm) M8 8,4 16,0 M10 10,5 20,0 M12 13,0 24,0 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size
9250-2-.....		‚S' locking washers for, among other things, our module clamps	for internal (mm) external (mm) M8 8,4 13,0 M10 10,5 16,0 M12 13,0 18,0 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size
25201-4-.....x.....		Self locking bolt retaining washer in A4 to DIN 25201	for internal (mm) external (mm) M8 8,7 13,5 M10 10,7 16,0 M12 13,0 19,5 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size
9480-2-.....x.....		Flat round head safety bolt in A2 similar to ISO7380 (with TX drive and safety pin) BITS (WS 9488) and L key (WS 9489) from stock	M8 x 20 M8 x 30 M8 x 40 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size
603-2-.....x..... **603-4-.....x.....**		Cup square bolt in A2 and A4 to DIN 603	M10 x 20 M10 x 25 M10 x 25 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size

7 SCREW ACCESSORIES - SOLAR

7 - SCREW ACCESSOIRES				
Item No.	**Illustration**	**Item**	**Notes**	**Units**
557-2-..... **557-4-.....**		Square nut in A2 and A4 to DIN 557	M8 M10 M12 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size
934-2-..... **934-4-.....**		Hexagon nut in A2 and A4 to DIN 934	M8 M10 M12 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size
985-2-..... **985-4-.....**		Stop nut, low shape, in A2 and A4 to DIN 985	M8 M10 M12 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size
9345-2-..... **9345-4-.....**		Hexagon nut similar to DIN 6923 with flange and locking toothing in A2 and A4	M8 M10 M12 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size
9290-2-..... x ..... **9290-4-..... x .....**		Threaded socket with continuous internal thread, round type in A2 and A4 to WASI HOUSE STANDARD WS 9290	M8 M10 M12 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size
9300-2-..... x ..... **9300-4-..... x .....**		Threaded socket with continuous internal thread, hexagon type in A2 and A4 to WASI HOUSE STANDARD WS 9300	M8 M10 M12 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size

7 - SCREW ACCESSOIRES				
Item No.	**Illustration**	**Item**	**Notes**	**Units**
127-2-..... **127-4-.....**		Spring ring A2 and A4 to DIN 127	M8 M10 M12 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size
9305-2-.....		Pull-off nut to WASI HOUSE STANDARD WS 9305	M8 M10 M12 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size
9265-2-.....		Thrust washer, M shape (medium) to WASI HOUSE STANDARD 9265, for high strength connections with normal bolt head	M8 M10 M12 Additional dimensions available from stock !! **See www.wasi.de**	varies depending on size
9360-2-...		Joint anchor VA mortar cartridge VA-P	For the fastening of hanger bolts in concrete	varies depending on size
9495-ZN-...		Safety stars for TX drive	Material: zinc die cast For the TX sizes 10-40	varies depending on size
9490-2-6,25		Ball for driving in	Stainless steel balls 304 6.25 mm grade 40 For securing of Allen screws SW6	varies depending on size

8.1 - POLAR BEAR FR - LOW LIFE-CYCLE COSTS WITH VARIABLE BALLAST



- Non-penetrating with flexible ballast
- 3 Components: Claw, Wind Deflector, Support
- Factory pre-assembly: integrated roof protection pad, PEM studs
- Rapid installation: 160-180 modules per day (3 person crew)
- Low weight, rail-less design allows unimpeded water flow
- Optimized wind deflection delivers effective natural module cooling
- Single module design and tilt-up access
- Multiple mounting holes for inter-row spacing flexibility and addressing uneven surfaces

8.1.1 - DATA & FACTS – SAFETY

Application	Flat roof (max 5° slope)
Building height	up to 20 meters
Installation speed	160 to 180 modules per day (3 person crew)
Module angle	10 to 13° (depending on module width)
System weight	14-34.2 kg/m² (incl. ballast and modules)
Max. wind speed	193 km/h (over 12 bft)
Module compatibility	95 %
Warranty	10 years

8 FLAT ROOF SYSTEMS WITHOUT ROOF PENETRATION
POLAR BEAR FR

8.1.2 - POLAR BEAR RF MOUNTING INSTRUCTIONS

Step 1:
Mark array perimeter and slide together support halves

Step 2:
Lay out supports and add ballast as detailed in the array plan

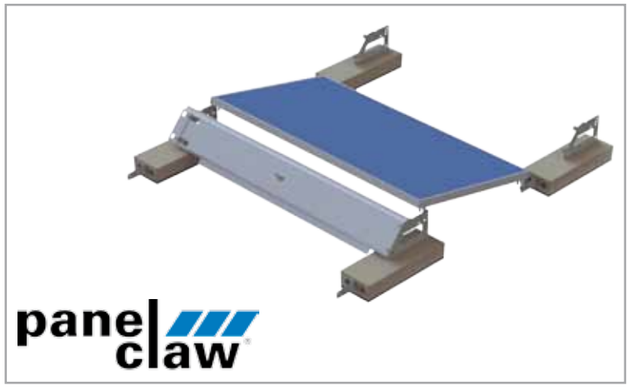
Step 3:
Attach claws (4 per module)

Step 4:
Attach module to support, Module tilt angle depends on module width

Step 5:
Install wind deflectors

Polar Bear's non-penetrating, three component design features system flexibility and factory integration, to meet project requirements and maximize installation speeds.
Polar Bear protects your system and the roof over the array's lifetime. With a ballasted, non-penetrating design, slotted wind deflectors that prevent the accumulation of thermal forces that can lead to array movement, a non-rail construction that allows for the free flow of water, and an integrated recycled rubber roof protection pad, Polar Bear delivers superior protection.

8.2. - GRIZZLY BEAR FR - LOWEST LIFE-CYCLE COSTS OF ANY PRODUCT IN ITS CLASS



- Non-penetrating with fixed ballast
- 3 Components: Claw, Wind Deflector, Support
- Factory pre-assembly: integrated ballast, roof protection pad, PEM studs, wire management chases
- Rapid installation: 190-210 modules per day (3 person crew)
- Low weight, rail-less design allows unimpeded water flow
- Optimized wind deflection delivers effective natural module cooling
- Single module design and tilt-up access
- Multiple mounting holes for inter-row spacing flexibility and addressing uneven surfaces

8.2.1 - DATA & FACTS – SAFETY

Application	Flat roof (max 5° slope)
Building height	up to 20 meters
Installation speed	190 to 210 modules per day (3 person crew)
Module angle	10 to 13° (depending on module width)
System weight	19,5 kg/m² (incl. ballast and modules)
Max. wind speed	161 km/h (over 12 bft)
Module compatibility	95 %
Warranty	10 years

8 FLAT ROOF SYSTEMS WITHOUT ROOF PENETRATION
GRIZZLY BEAR FR

8.2.2 - GRIZZLY BEAR FR MOUNTING INSTRICTIONS

Step 1:
Mark array perimeter

Step 2:
Lay out supports

Step 3:
Attach claws (4 per module)

Step 4:
Attach module to support

Step 5:
Install wind deflectors

Grizzly Bear's non-penetrating, three component design features significant factory integration that maximizes installation speeds while minimizing construction risk.
Grizzly Bear protects your system and the roof over the array's lifetime. With a ballasted, non-penetrating design, slotted wind deflectors that prevent the accumulation of thermal forces that can lead to array movement, a non-rail construction that allows for the free flow of water, and an integrated recycled rubber roof protection pad, Grizzly Bear delivers superior protection.

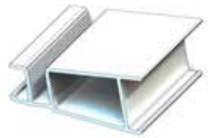
8.3. - NORTH MOUNT I THE VERSATILE MOUNTING SYSTEM FOR THIN FILM MODULES

The North Mount System is suitable for frameless solar modules from GS-Solar and First Solar. The simple and versatile mounting system for thin film modules is supplied as a preassembled support structure with integrated screw channels. In addition, stencils help to ensure a custom-fit installation.
The aerodynamic photovoltaic flat-roof system for foil and gravel roofs allows for a wide variety of roof connections. The support structure can be stabilised with filling stones, making it unnecessary to penetrate the roof cladding. In addition, the track system ensures an optimal load distribution on the flat roof.
The North Mount System is projected on the basis of the respective data of the individual roof. WASI Solar supports you in the planning, projection and implementation of your flat-roof project and guarantees the best possible workmanship.

- Suitable for frameless thin film modules from GS-Solar and First Solar
- Short installation times due to pre-assembled construction (integrated screw channels, stencil technology,...)
- Suitable for foil and gravel roofs
- Installation of a wide range of module sizes possible
- Wide variety of roof connections possible – filling stones, gravel or SOL-F anchor
- Only little additional ballast required to stabilise structure

8.3.1 - NORTH MOUNT I DATA & FACTS – SAFETY	
Materials	Aluminium, stainless steel (screw elements), PU matting
Roof loading	Minimum roof loading due to low total weight with a maximum exploitation of the roof surface (just 17.5 kg/m² at full capacity incl. modules)
Module orientation	10 ° incline – east-west orientation
Roof connection	SOL-F anchor, concrete blocks or gravel
Statics	Specific statics

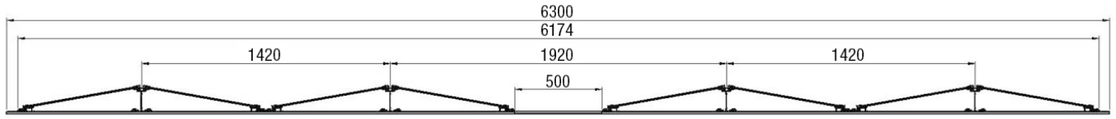
8 FLAT ROOF SYSTEMS WITHOUT ROOF PENETRATION
NORTH MOUNT I SUPPORT STRUCTURE FOR FRAMELESS MODULES

8.3.2 - NORTH MOUNT I MOUNTING ACCESSORIES					
Item No.	**Illustration**	**Item**	**Notes**	**Length**	**Version**
9674-WASI 300-6,4		**Mounting rail,** flat	aluminium flat profile	6,4 m	mill finish
9674-WASI 301-6,4		**Mounting rail,** high	aluminium high profile	6,4 m	mill finish
9674-WASI 302-6		**Bottom cable channel**	Bottom cable channel, aluminium	6,0 m	mill finish
9674-WASI 303-6		**Cable channel cover**	Cable channel cover, aluminium	6,0 m	mill finish

The North Mount System can be adapted to many different needs

The solution for maximum performance:
Maximum occupancy of the flat roof at a surface load of only 17.5 kg/m²

The individual solution:
Every roof obstruction can be left out and individual service corridors or maintenance paths built in.



8.4 - ORDER SHEET FOR FLAT ROOF SYSTEMS WITHOUT ROOF PENETRATION

Customer

Name: _____ Tel: _____

Company: _____ Mobile: _____

Street: _____ Fax: _____

P.code / Place: _____ E-Mail _____

Internet _____

Building project

Name of the building project: _____

Street/No.: _____ Age of building: _____ years

P.code / Place: _____ Height of building: _____ metres above sea level

Surroundings of the location

☐ Town ☐ Open land without obstructions

☐ Suburb ☐ Open land with scattered obstructions

☐ Area close to coast

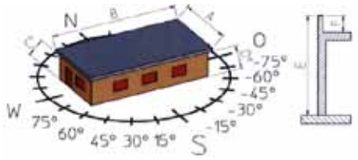
Is a positioning place for a crane available? ☐ Yes ☐ No

Is a forklift for offloading available? ☐ Yes ☐ No

PLEASE FAX THE FULLY COMPLETED DETAILS TO + 49 (0) 202 26 32 377
OR SEND THE DETAILS BY E-MAIL TO SOLAR@WASI.DE

8 FLAT ROOF SYSTEMS WITHOUT ROOF PENETRATION
ORDER SHEET FLAT ROOF SYSTEMS WITHOUT ROOF PENETRATION

Roof / Size of the roof surface which can be occupied



A = Width of the roof _____ m

B = Length of the roof _____ m

C = Roof angle North-South _____ °

D = Roof angle East-West _____ °

E = Building height _____ m

F = Height of the attic _____ m

Angle from the South _____ °

Shaded area of the roof surface _____ %

Area which can be occupied _____ qm

☐ Roof angle over 5 degrees (separate approval required)

Special roof situation, chimneys, roof windows, extensions etc, please mark these on the sketch on the next double page.

Roof / Type of roof

Free roof load available _____ kg/m²

Building year of the roof _____

Renovation in year _____

Name of the roofing company _____

Adress _____

_____

Telephone _____

E-Mail _____

Membrane roof

☐ PVC

☐ EPDM

☐ other _____

☐ Manufacturer _____

Is there a guarantee on the roof?

☐ Yes, until _____ ☐ No

Type of fastening

☐ Fully stuck

☐ sealed

Membrane roof

☐ Only bitumen

☐ Additional gravel layer

Gravel distrubution _____ cm

Type of the insulation

Manufacturer _____

☐ information (information on the condition of the roof, e.g. bubbles, puddles, tears ...)

_____

8 FLAT ROOF SYSTEMS WITHOUT ROOF PENETRATION
ORDER SHEET FLAT ROOF SYSTEMS WITHOUT ROOF SKIN PENETRATION

8.4 - ORDER SHEET FOR FLAT ROOF SYSTEMS WITHOUT ROOF SKIN PENETRATION

Modul

Module type _____

Module weight _____

Module output _____

Module size _____

Number _____

Planned system

- ☐ Polar Bear
- ☐ Grizzly Bear
- ☐ North Mount

Checklist - Please send with other details!

- ☐ Drawing of the roof as AutoCAD or PDF file
  (please mark chimneys, roof windows, lightning conductors, roof extensions etc)
- ☐ Photos of the roof, location and surroundings (from all directions)
- ☐ Data sheet for roof membranes and insulation
- ☐ Further information _____

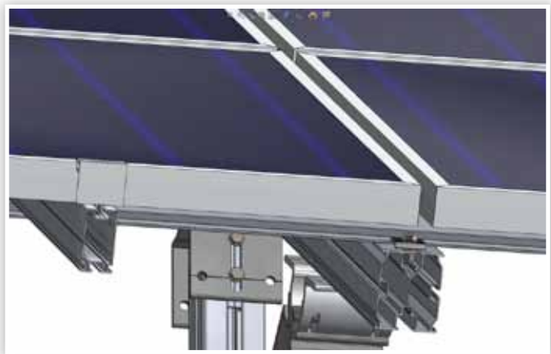
_____
Place, date

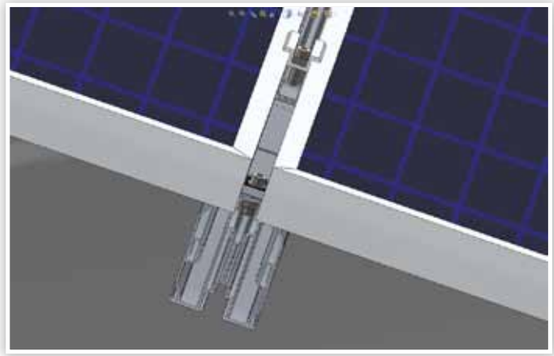
_____ _____
Name (block capitals) and signature of contact person name (block capitals) and signature of customer

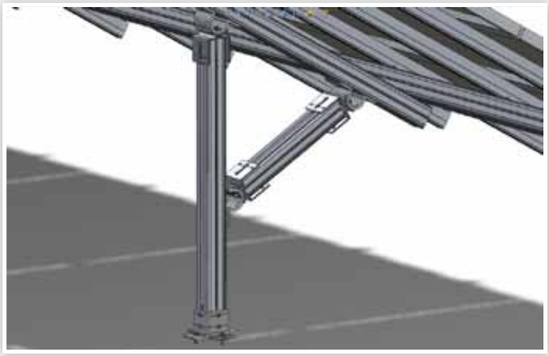
**PLEASE FAX THE FULLY COMPLETED DETAILS TO + 49 (0) 202 26 32 377
OR SEND THE DETAILS BY E-MAIL TO SOLAR@WASI.DE**

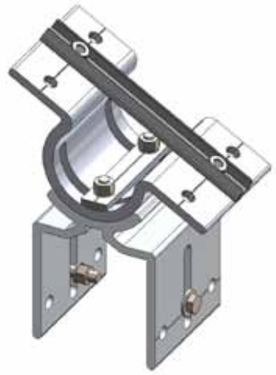
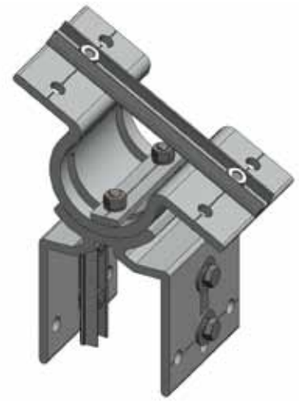
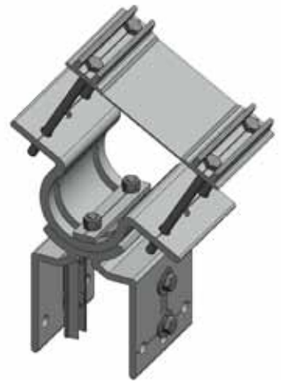
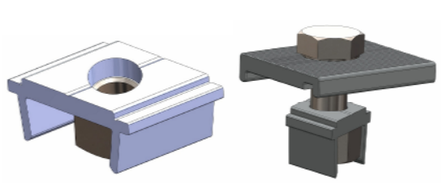
Sketch

9.1 - OPEN SPACE EQUIPMENT / HEAVY LOAD PROFILE					
Item No.	**Illustration**	**Item**	**Notes**	**Length**	**Version**
9664-WASI 200		**Heavy load profile** **100 x 80 mm**	Many different attachment possibilities span length: > 6 metres	0,7 m 2,7 m 3,5 m 6,0 m	mill finish
9672-PRX 100-20		**mounting rail 20 ° Profile**	Connection on top 554 M8 / Clip	7,2	mill finish
9672-SIGMA 100		**Sigma pole ground connection**	SIGMA poles 100 FVS according to drawing 103 of TLSP99	3,0 2,5 1,9	steel galvanised







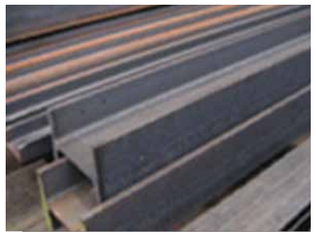
9.1 - OPEN SPACE EQUIPMENT / HEAVY LOAD PROFILE	
We will be pleased to offer on request special stand-up mountings for open space equipment.	
	
	
	 Pre-made up building elements available from stock.

9.2 - OPEN SPACE EQUIPMENT / FLOOR MOUNTINGS

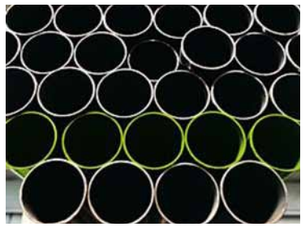
We will be pleased to offer on request special stand-up mountings for open space equipment

Krinner Ground Screws

Sigma pole



T Carriers



Hollow Profiles

9.3 - QUESTIONNAIRE FOR PRODUCING AN ESTIMATED COST

PV-OPEN SPACE EQUIPMENT –
QUESTIONNAIRE FOR PRODUCING AN ESTIMATED COST

In order to produce a first estimated cost for the mounting frame of a PV open space unit, the following details are required as mandatory:

- **LOCATION OF THE BUILDING PROJECT, PLACE AND COUNTRY**
  If possible with details of snow and wind affected areas
- **PV MODULE USED**
  Please send the module data sheet without fail
- **TYPE OF FOUNDATION**
  e.g. pile driven posts, revolving foundations (Ground screws), concrete foundations, others?
- **MODULE POSITION**
  Modules mounted upright or horizontally?
  How many modules are to be mounted on top of each other?
  Details on the linking of the modules

On the basis of these details a theoretical ‚table size' is calculated, which serves as the calculation basis for the cost of the framework (details of the costs then in EUR/Wp). The result of the estimated cost is a ‚budget price', which is based on the optimum mounting conditions being present at the building location.

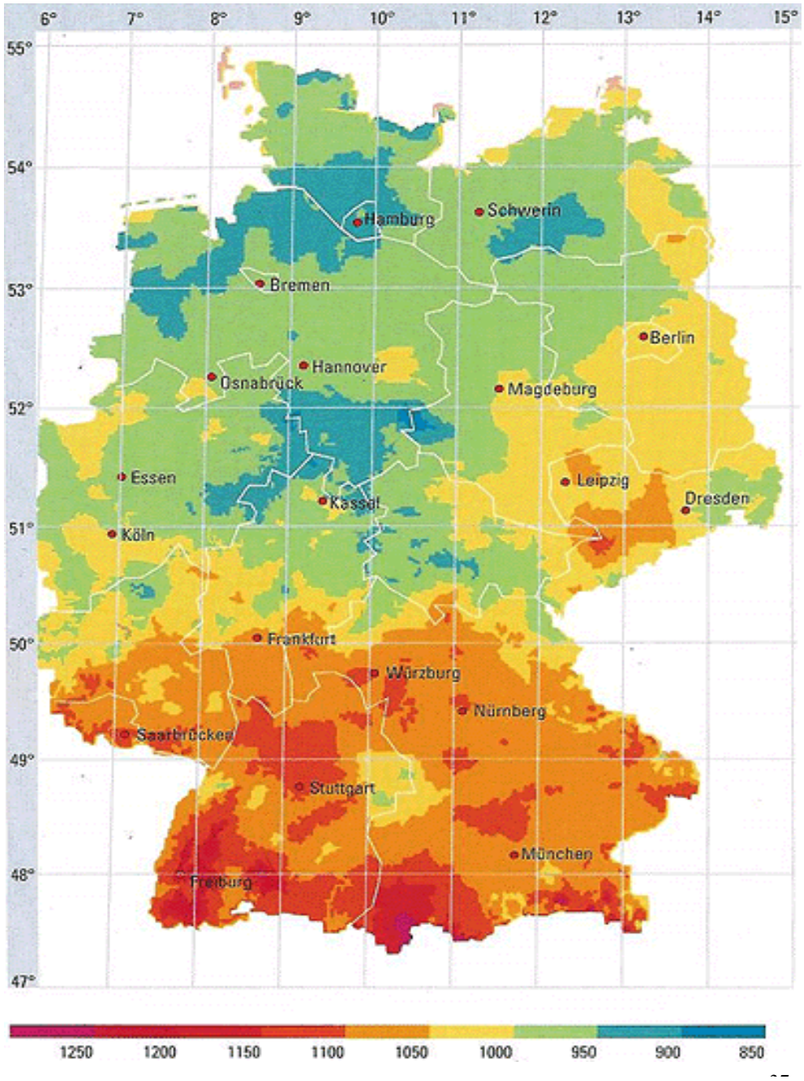
For the production of a complete quotation the following documents for the site are required:

- **SITE PLANS WITH THE ‚MODULE TABLES' ALREADY DRAWN IN**
- **GROUND SURVEY**

On the basis of this documentation the estimated cost is put into concrete terms and adapted to the actual mounting conditions prevailing at the building site. In addition to this the design is checked for stability in connection with the actual conditions on site.

There will therefore be some change between the estimated cost and the budget price.

10.1 - GLOBAL RADIATION FEDERAL REPUBLIC OF GERMANY

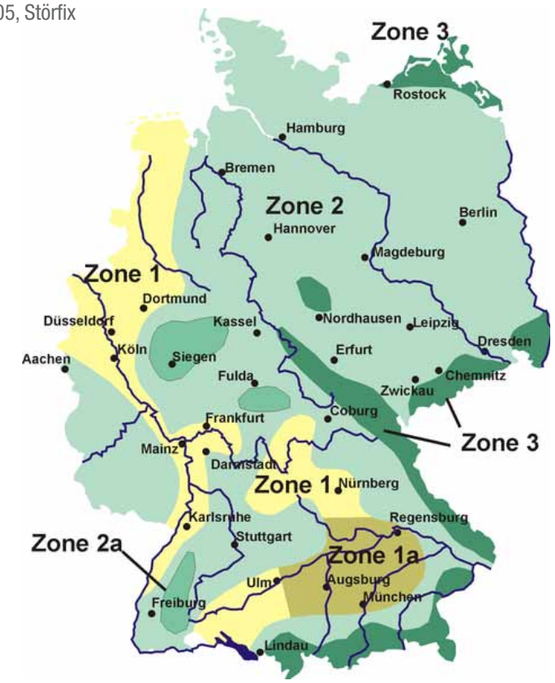


10.2 - WIND ZONES

Quelle: Wikipedia 15. Dez. 2005, Störfix

10.3 - SNOW LOADS

Quelle: Wikipedia 01. Okt. 2005, Störfix



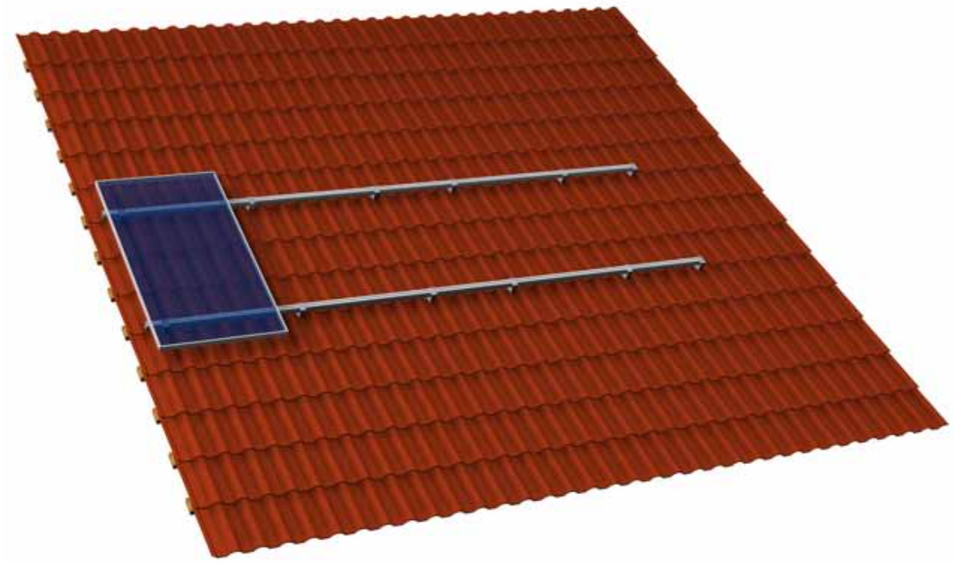
WASI® SOLAR

MOUNTING SYSTEMS FOR SOLAR SYSTEMS

MONTAGE PITCHED ROOF

WE SECURE THE SUN

11.1 - GENERAL INFORMATION



Two things were absolutely decisive for our construction and development of the WASI SOLAR mounting systems: simple installation and durability that guarantees safety. That is what the WASI solar program is based on.

Since individual characteristics are to be taken into consideration for each and every roof, we request that you submit a professional specification form before the installation. You need to take particular note of the static requirements. When mounting the system, it is very important to observe and uphold the corresponding norms and accident prevention regulations.

We would like to point out that this mounting recommendation illustrates the latest in technology and many years of experience as to how our systems can be installed on site.

IMPORTANT NORMS AND REGULATIONS

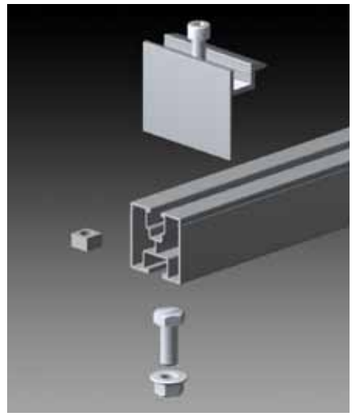
BGV A2	Electrical systems and utilities
BGV C22	Construction works
BGV D35	Ladders and steps
BGV A1	Accident prevention regulations
DIN 1052-2	Timber structures: Mechanical connections
DIN 1055	Load assumption for constructions
DIN 18299	Regulations for construction works of every type
DIN 18451	Scaffold erections

11.2 - SYSTEM OVERVIEW

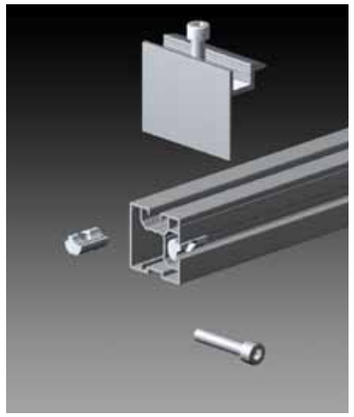
„WASI 1“

„WASI 2“

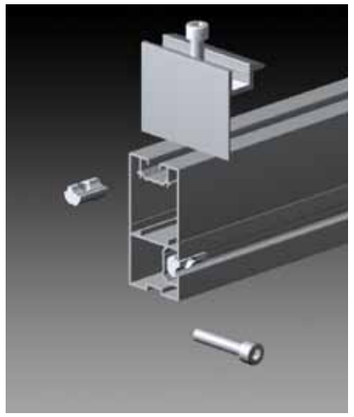
„WASI 3“



„WASI 15“



„WASI 16“



11.3 - POSSIBILITIES FOR ATTACHING SYSTEMS TO A ROOF

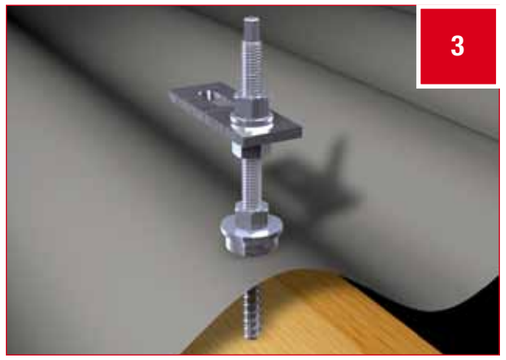
A majority of roof coverings are established with roof tiles or roofing shingles. For these types of roofs, you can use, for example, heavyload roof hooks (PICTURE 1), adjustable roof hooks and standard roof hooks (PICTURE 2).

The assembly is described in the following.

These roof hooks are generally mounted to wooden beams as per current wood norms.

You can use the following screws for this:

- DIN 571 A2 8 x 80/100/120 mm wooden screws
- WS 9810 A2 8 x 80/100/120 mm disk head screws
(WS = WASI in-house standards)

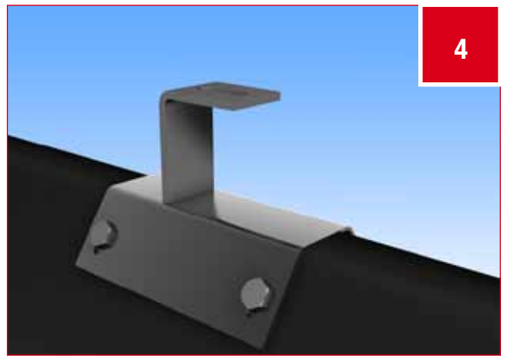


When covering with corrugated sheets (PICTURE 3) or trapezoidal metal sheets, you can use stock screws and special consoles/blocks (PICTURE 4, 5 and 6). You select the corresponding stock screws based on the respective sub-construction (for example, whether it's wood or steel).

We offer the following possibilities here:

11 MOUNTING INSTRUCTIONS - PITCHED ROOF
POSSIBILITIES FOR ATTACHING SYSTEMS TO A ROOF

11.3 - POSSIBILITIES FOR ATTACHING SYSTEMS TO A ROOF



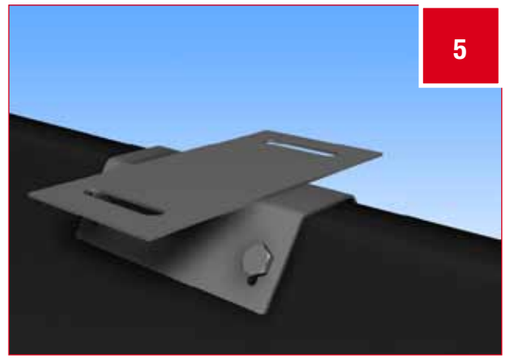
For wooden sub-constructions:

- See delivery programs 9215 + 9216 + 9217 + 9219

For steel sub-constructions:

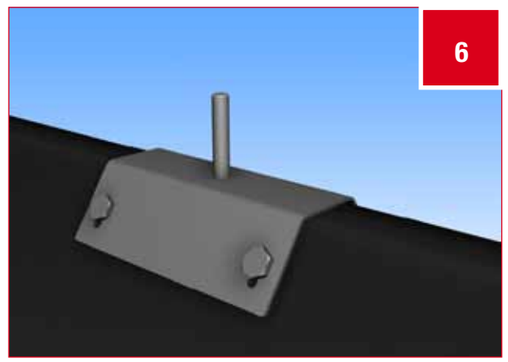
- See delivery program 9222
- Approved solar panel fasteners!

You select the proper console based on the respective roof cover.



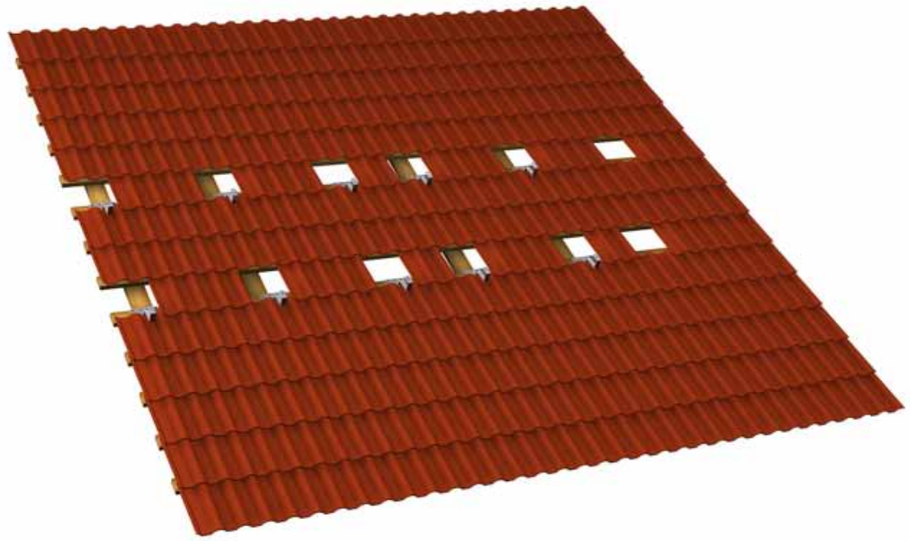
If a roof penetration is not possible, you can conduct a direct attachment to the provided trapezoidal or corrugated sheet covers with a console/block (see below) for a sheet mounting.

.



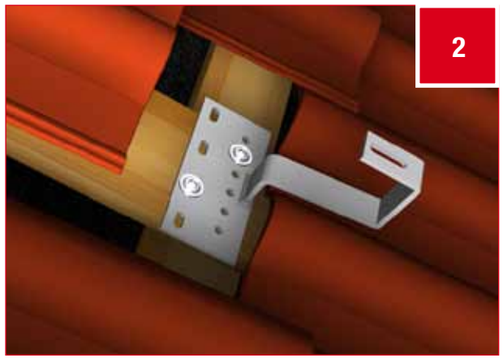
The consoles can be used up to a pitch of 30° depending on the construction type. Before starting, you must observe that the attachment of the sheet to the sub-construction is sufficient and observe the maximum load capacity of the sheet.

11.4 - MOUNTING STEP: PITCHED ROOF FRAMEWORK



Determine the position of the roof hooks according to the plan, which is provided in the project-related assembly draft drawings.

Remove the roofing tiles at the respective positions or, if possible, push them upwards. Position the respective roof hooks; the hook must not push against the roofing tile.

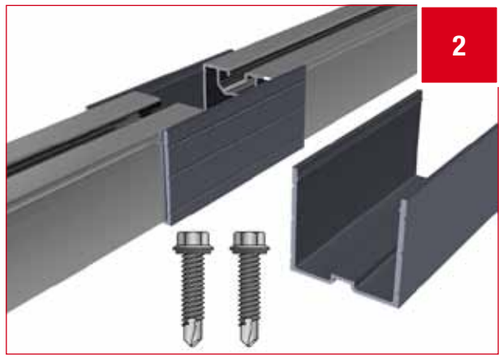


Depending on the roof hook model, you can adjust the roof hooks at the height and in the sides, such that it is located in the wave trough of the roofing tile. Mount each roof hook with two wood screws (for example, wooden screws DIN 571 or disk head screws norm 9810 x 80 mm or M8 x 100 mm) to the rafters.
If necessary, leave out the roofing tile above the roof hooks at the spot where the roof hooks are led through with hand-held cutters. The roof hooks should not push up the roofing tile located above it. In the case of mixed roofing tiles, we recommend that you also leave out the lower tile.

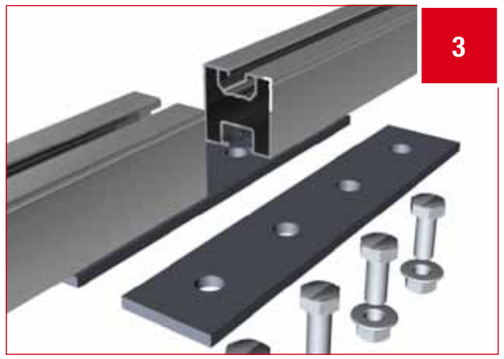
11.4 - MOUNTING STEP: PITCHED ROOF FRAMEWORK

To line up several system units next to each other, you can use various connectors:

PICTURE 1: Half of the connector (WASI 18) is pushed into the mounting rail. Then push the other mounting rail onto the connector. Afterwards, you push together the mounting rails with pressures.

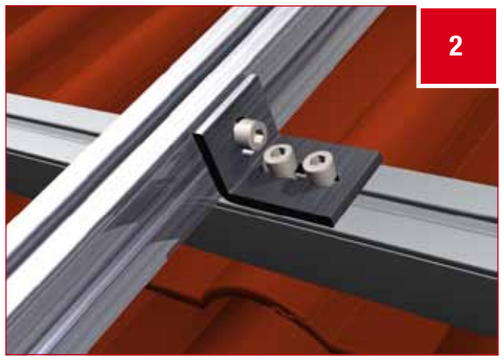


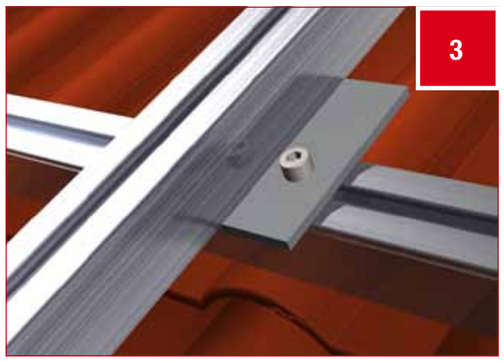
PICTURE 2: Place the connector (WASI 12) above the first mounting rail and click it into the existing groove. Then click in the second mounting rail and press them together. You then screw the connection together with two drilling screws (tightening torque 8-10 Nm).

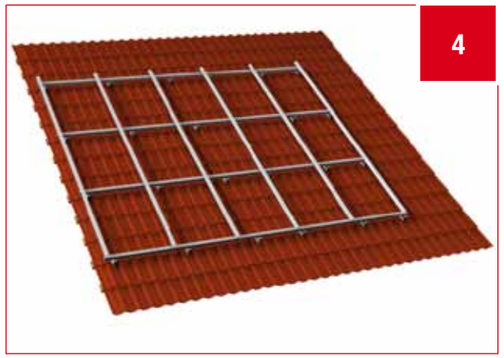


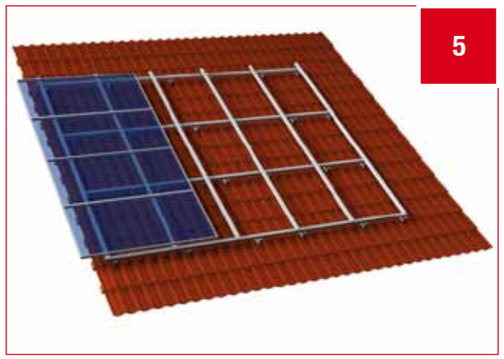
PICTURE 3: Make sure you have four hexagon bolts for the connectors (featuring 4 holes) and then push the first two screw heads into the lower channel of the first mounting rail. Then push the last two screws into the other rails.
You then attach all four screws with (in each case) 4 bolts (tightening torque 10-12 Nm).

11.5 - MOUNTING STEP: IN CROSSBAR COMBINATION









When you attach non-framed PV modules, you may have to conduct an assembly in the cross brace. This is a particularly stabile construction. You must always observe the module manufacturer instructions!

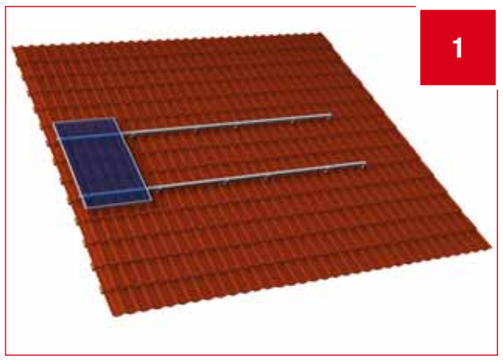
PICTURE 2: Connection of the two rails via a cross brace bracket

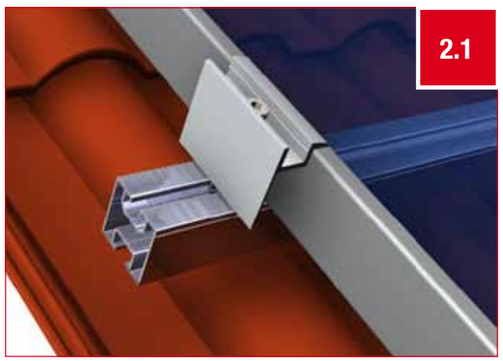
- 912 A2/A4 8 x 16 (3x) cylinder head screw
- 9431 120901 (3x) sliding block
- 9701 WASI 14 bracket cross brace

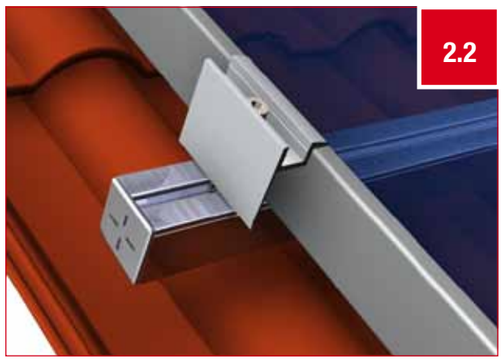
PICTURE 3: Connection of the two rails via a connector plate

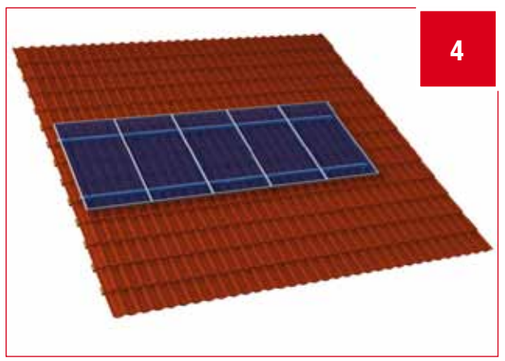
- 912 A2/A4 8 x 16 (2x) cylinder head screw
- 9431 120901 (2x) sliding block
- 9701 WASI 23 linear grille face connector
- 933-2 10 x 25 hexagon bolt
- 9345-2 10 self-locking nut

11.6 - MOUNTING STEP: PITCHED ROOF FRAMEWORK WITH FRAMELESS PV MODULES





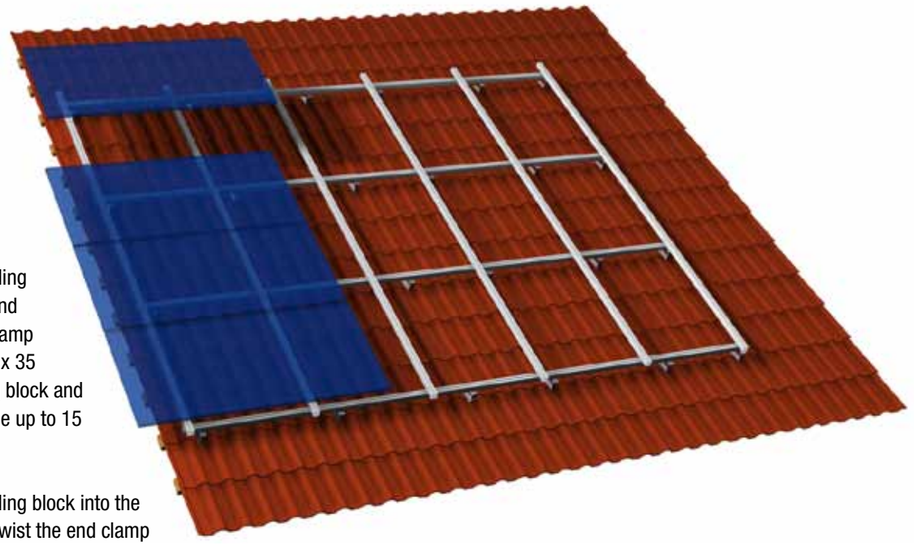




PICTURE 2.1 : Swivel the sliding block into the upper rail and click it in. Twist the end clamp with the respective screw (depending on module height) into the sliding block. Alternatively, you can attach the click-in kit in the upper channel of the rail and tighten it (tightening torque up to a maximum of 18 Nm depending on module manufacturer.) You can add a cover to the rails for personal or appearance reasons (PICTURE 2.2).

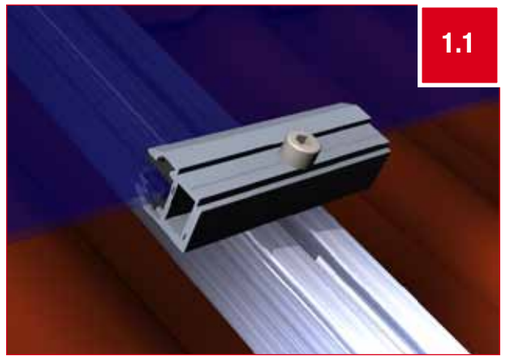
PICTURE 3: Swivel the sliding block into the upper rail and click it in. Twist the middle clamp with the respective screw (depending on module height) into the sliding block. Alternatively, you can attach the click-in kit in the upper channel of the rail and tighten it (tightening torque up to a maximum of 18 Nm depending on module manufacturer.)

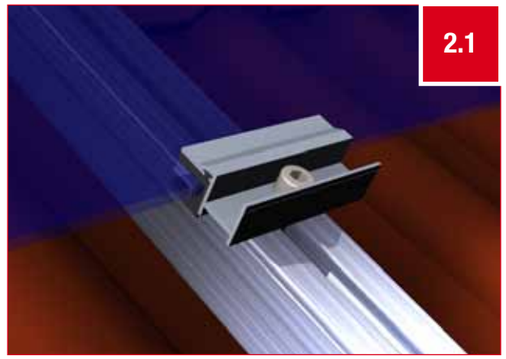
11.6 - MOUNTING STEP: PITCHED ROOF FRAMEWORK WITH FRAMELESS PV MODULES

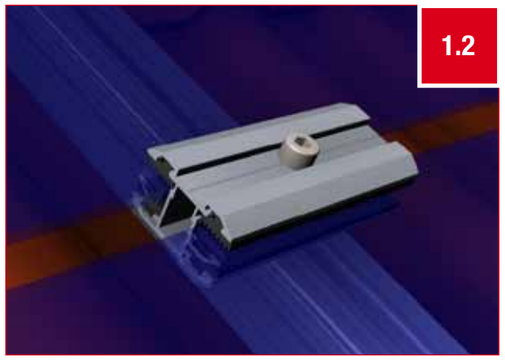


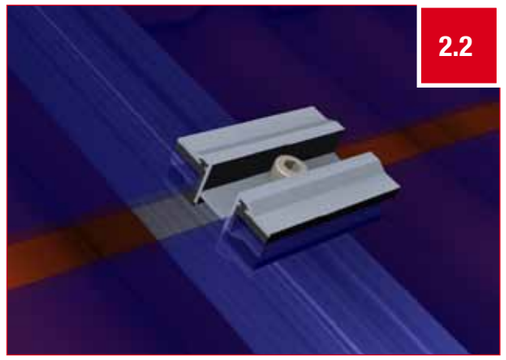
PICTURE 1: Swivel the sliding block into the upper rail and click it in. Twist the end clamp with a DIN 912 A2/A4 M8 x 35 mm screw into the sliding block and tighten it (tightening torque up to 15 Nm.)

PICTURE 2: Swivel the sliding block into the upper rail and click it in. Twist the end clamp with a DIN 912 A2/A4 M8 x 35 mm screw into the sliding block and tighten it (tightening torque up to 15 Nm.)

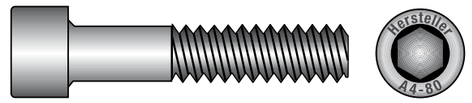








11.7 - SCREWS FOR FRAMED PV MODULES

Item No.	Item	Units
Allen screws A2 oder A4		
912-2-8 x 30	M8 x 30 mm	100
912-2-8 x 35	M8 x 35 mm	100
912-2-8 x 40	M8 x 40 mm	100
912-2-8 x 45	M8 x 45 mm	100
912-2-8 x 50	M8 x 50 mm	100
912-2-8 x 55	M8 x 55 mm	100
912-2-8 x 60	M8 x 55 mm	100
9250-2-8.4	locking washer A2 8,4 mm	100
9431-120901	sliding block	100, 200, 500
557-2-8	square nut	100

APPLICATION OF ALLEN SCREWS FOR VARIOUS MODULE HIGHTS

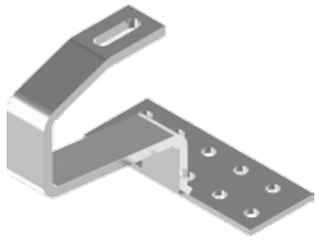
Module hight	Screw for rail with sliding block	Locking washer (only for sliding block channel)	Screw for rail with square nut [1]
30 mm	Allen, M8 x 35	x	Allen, M8 x 35 oder x 40
31 mm	Allen, M8 x 35	x	Allen, M8 x 35 oder x 40
32 mm	Allen, M8 x 35		Allen, M8 x 35 oder x 40
33 mm	Allen, M8 x 35		Allen, M8 x 35 oder x 40
34 mm	Allen, M8 x 35		Allen, M8 x 35 oder x 40
35 mm	Allen, M8 x 40	x	Allen, M8 x 40 oder x 45
36 mm	Allen, M8 x 40	x	Allen, M8 x 40 oder x 45
38 mm	Allen, M8 x 40		Allen, M8 x 40 oder x 45
40 mm	Allen, M8 x 45	x	Allen, M8 x 45 oder x 50
41 mm	Allen, M8 x 45	x	Allen, M8 x 45 oder x 50
42 mm	Allen, M8 x 45		Allen, M8 x 45 oder x 50
43 mm	Allen, M8 x 45		Allen, M8 x 45 oder x 50
44 mm	Allen, M8 x 45		Allen, M8 x 45 oder x 50
45 mm	Allen, M8 x 50	x	Allen, M8 x 50 oder x 55
46 mm	Allen, M8 x 50	x	Allen, M8 x 50 oder x 55
47 mm	Allen, M8 x 50		Allen, M8 x 50 oder x 55
48 mm	Allen, M8 x 50		Allen, M8 x 50 oder x 55
50 mm	Allen, M8 x 55	x	Allen, M8 x 55 oder x 60

[1] For this variant, you can use both of the stated screw lengths.

MOUNTING INSTRUCTIONS - PITCHED ROOF
ARTICLE LIST – ACCESSORIES

Standard roof hooks

heavyload roof hooks



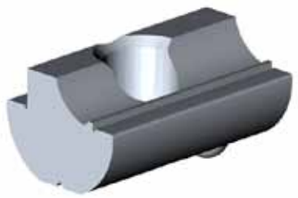
Trapezoidal sheet block

Hanger bolt

Adapter sheet

Mounting bracket

Sliding block



Section connector 9557

11.8 - ARTICLE LIST – ACCESSORIES

Section connector WASI 18

Section connector WASI 12

End clamp

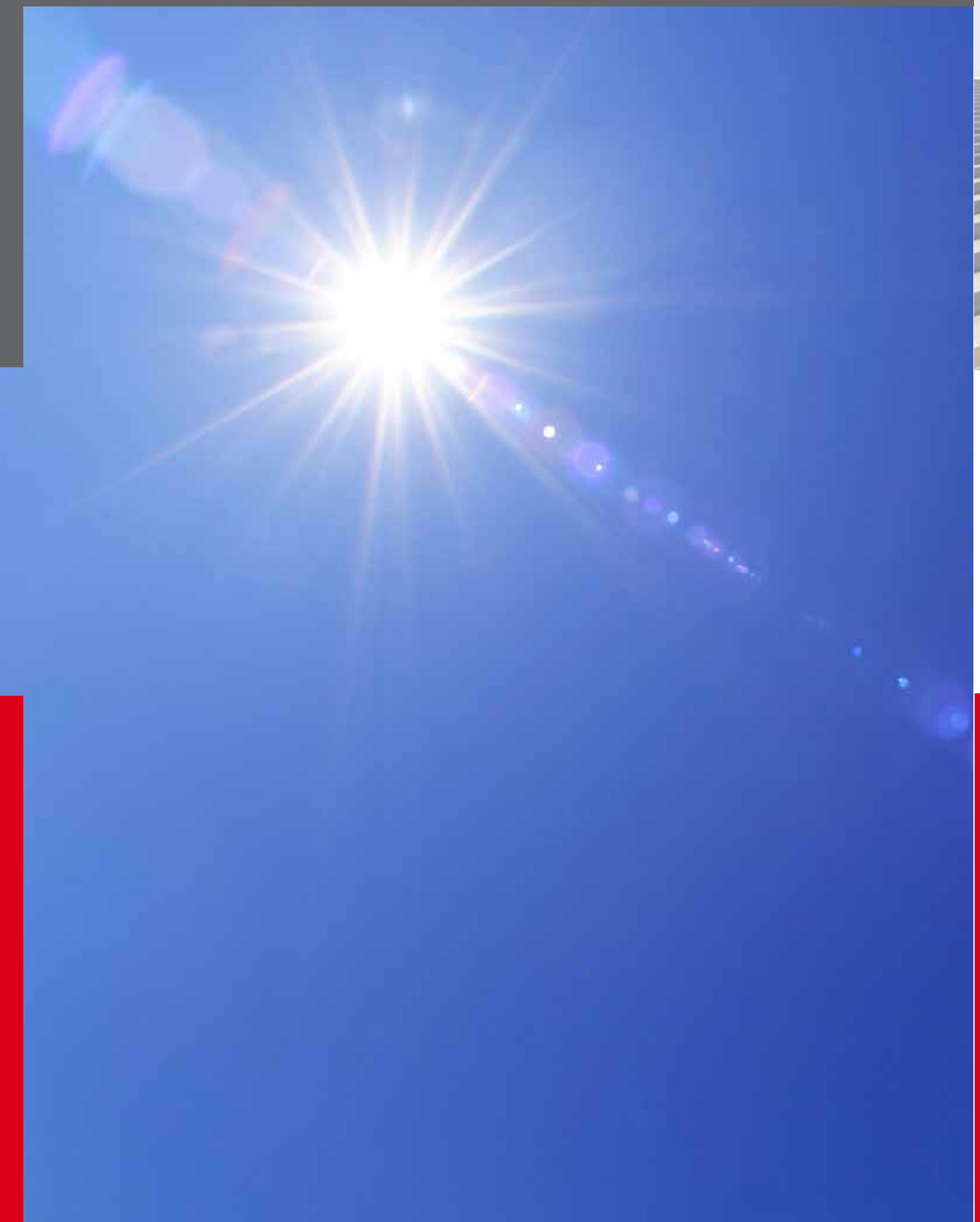
Middle clamp

End clamp for LAMINAT-L glass module

Middle clamp for LAMINAT-L glass module

End clamp for LAMINAT-JT glass module

Middle clamp for LAMINAT-JT glass module



WASI® SOLAR

MOUNTING SYSTEMS FOR SOLAR SYSTEMS

FLAT ROOF MOUNTING

WE SECURE THE SUN

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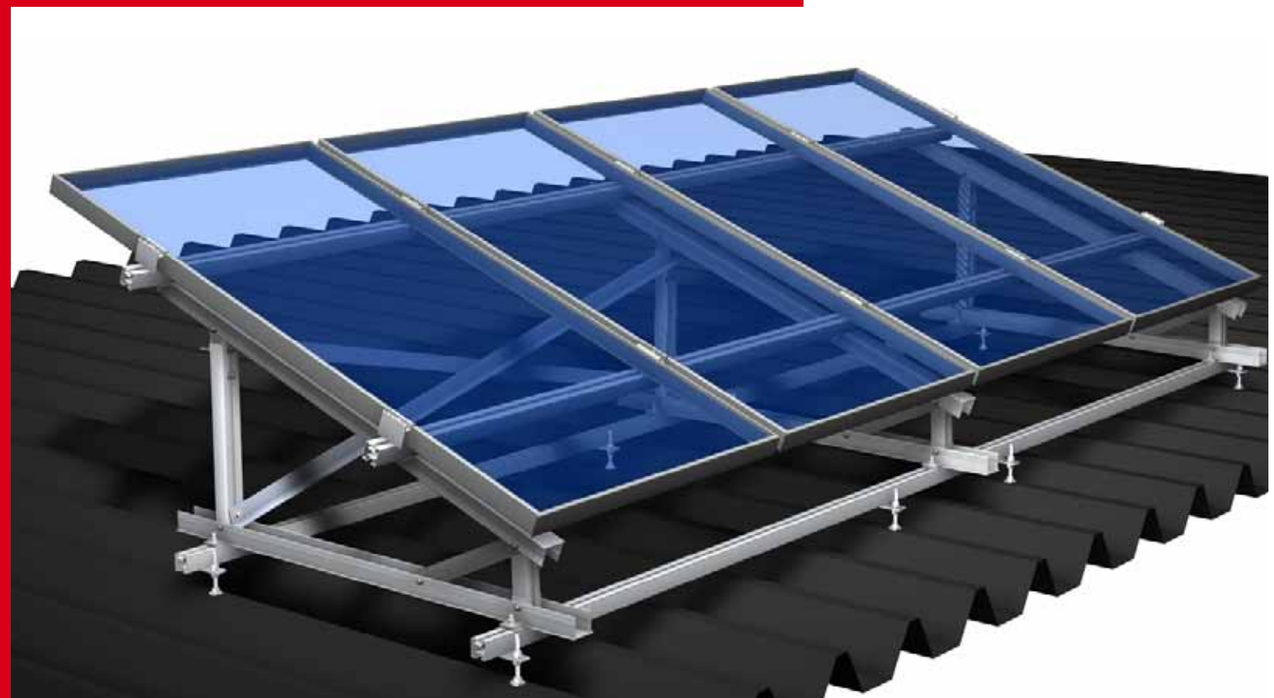
Two things were absolutely decisive for our construction and development of the WASI SOLAR mounting systems: simple installation and durability that guarantees safety. That is what the WASI solar program is based on.

Since individual characteristics are to be taken into consideration for each and every roof, we request that you submit a professional specification form before the installation. You need to take particular note of the static requirements. When mounting the system, it is very important to observe and uphold the corresponding norms and accident prevention regulations.

We would like to point out that this mounting recommendation illustrates the latest in technology and many years of experience as to how our systems can be installed on site.

IMPORTANT NORMS AND REGULATIONS:

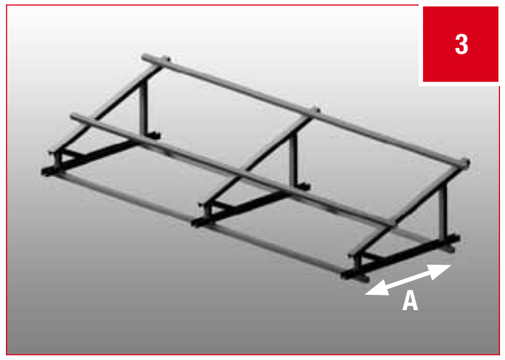
BGV A2	ELECTRICAL SYSTEMS AND UTILITIES
BGV C22	CONSTRUCTION WORKS
BGV D35	LADDERS AND STEPS
BGV A1	ACCIDENT PREVENTION REGULATIONS
DIN 1052-2	TIMBER STRUCTURES: MECHANICAL CONNECTIONS
DIN 1055	LOAD ASSUMPTION FOR CONSTRUCTIONS
DIN 18299	REGULATIONS FOR CONSTRUCTION WORKS OF EVERY TYPE
DIN 18451	SCAFFOLD ERECTIONS



12.2 - POSSIBILITIES FOR ATTACHING SYSTEMS TO A ROOF – PLANNING NOTES

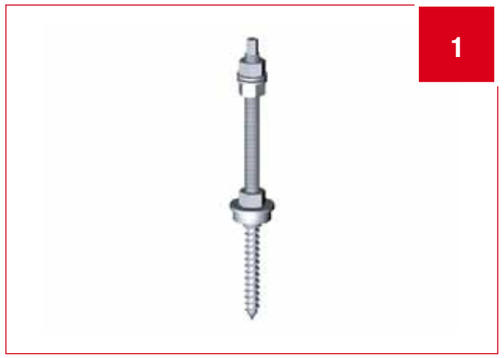
PICTURE 1: 9785- WASI 2040
Hinged, variably adjustable from 20° to 40°.
Delivered as completely assembled ex warehouse. All you need to do is unfold it and screw it in. You will require eight (8) 9785-WASI 26 mounting platelets per elevated mounting. The aluminum angles 40 x 40 x 3, etc., can be used as diagonal struts.

PICTURE 2: 9785- ...
These elevated mountings are manufactured individually according to drawings upon customer request. In this case, the customer can determine and coordinate the dimensions according to drawings, and thus the angle in which they should be delivered. These elevated mountings are completely preassembled and only need to be mounted to the hanger bolts/adapters. These elevated mountings are manufactured from aluminum L-sections (40 x 40 x 3.4 or 5).



PICTURE 3: Spatial intervals
A: The spatial interval between the anchorage points on the sub-construction elevated mountings 9785-WASI 2040: optimally 900 mm.
B: The spatial interval between the elevated mountings is determined via static calculations.

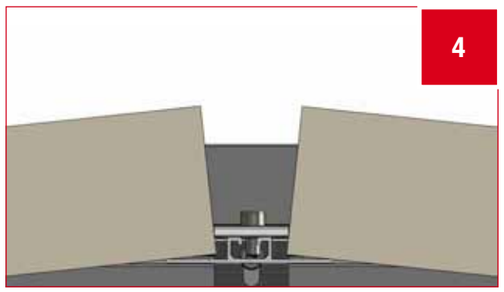
12.2 - POSSIBILITIES FOR ATTACHING SYSTEMS TO A ROOF – PLANNING NOTES



PICTURE 1: Hanger bolts
You can use hanger bolts for coverings with corrugated sheets or trapezoidal sheet metal. This is possible for roofs with a pitch up to 20°.

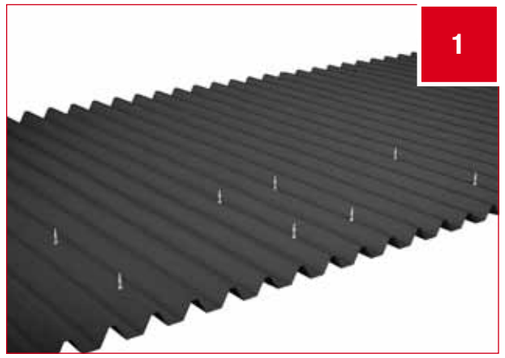
PICTURE 2: For the anchorage points to be arranged in an optimal manner on the rafters under considerationof the statically calculated triangle intervals, you can assemble the elevated mountings directly on the hanger bolts with or without the respective brackets. When applying the hanger bolt(s) without a bracket or adapter, the fastening anchor points in the triangle must be adjusted for this on-site by the customer to the size of the hanger bolts.

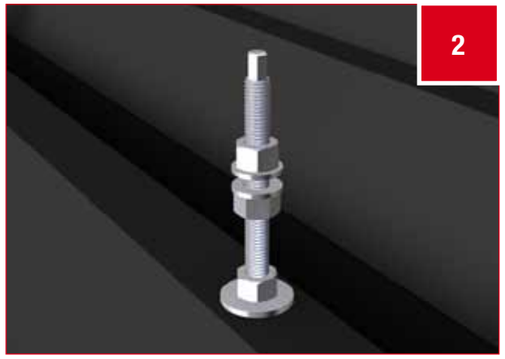
If the anchorage points do not match each other optimally, the elevated mountings must be mounted to system units (sub-construction/railing system).
This mounting step is described in the following pages.



PICTURE 3 & 4: Without roof penetration
If a roof penetration is not possible, the elevated mountings can be attached on or with the aid of weighting. The bearing loads for the roof construction must be inspected in advance, as are the static weight requirement values.

12.3 - MOUNTING STEP: FLAT ROOF FRAMEWORK FOR TRAPEZOIDAL SHEET METAL ROOF





PICTURE 1 & 2: The hanger bolts are initially attached to the roof. The spatial intervals to each other are provided in the project-related mounting draft drawings.
You select the corresponding hanger bolts based on the respective sub-construction (for example, wood or steel).

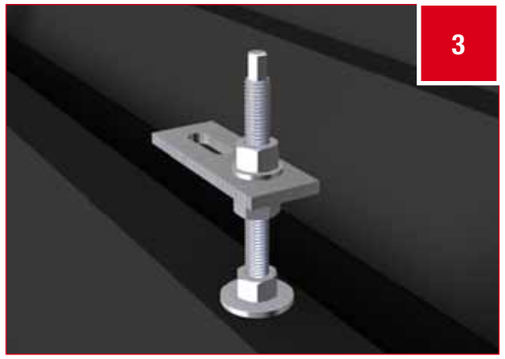
We offer the following possibilities:

For wooden sub-constructions:

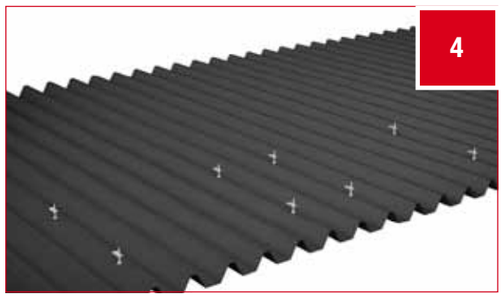
- See delivery program 9215 + 9216 + 9217 + 9219 + 9221

For steel sub-constructions:

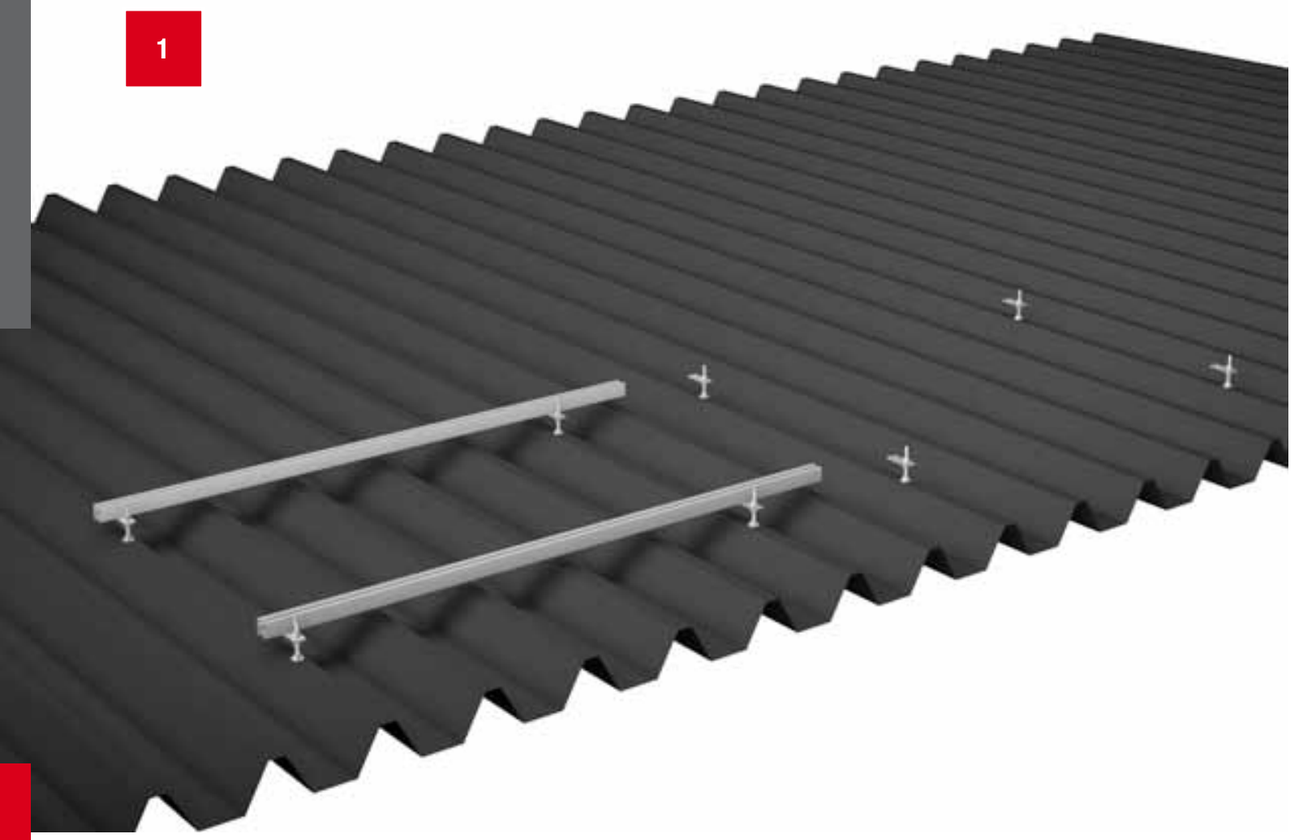
- See delivery program 9222
- Approved solar panel fasteners!

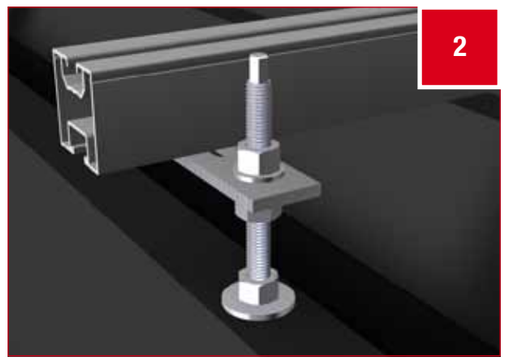


PICTURE 3 & 4: Afterwards, you attach the delivered adapter sheets to the hanger bolts (tightening torques: for M10 > 30-40 Nm, for M12 > 50-60 Nm).



12.3 - MOUNTING STEP: FLAT ROOF FRAMEWORK FOR TRAPEZOIDAL SHEET METAL ROOF

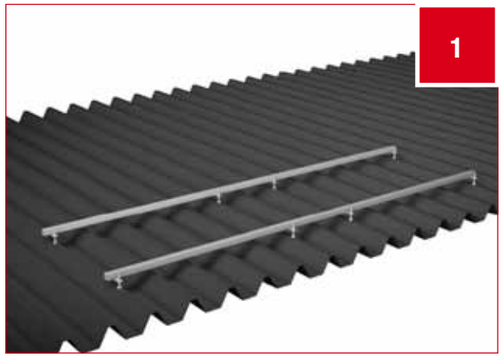




Once you have mounted all of the adapter sheets, the system units are attached to the adapter sheets. For this, thread the hexagon bolts DIN 933 A2/A4 M10 x 25 mm into the respective rails and tightened with the locking edge bolts 9345 A2/A4 M10 to the adapter sheet (tightening torque 9-10 Nm).

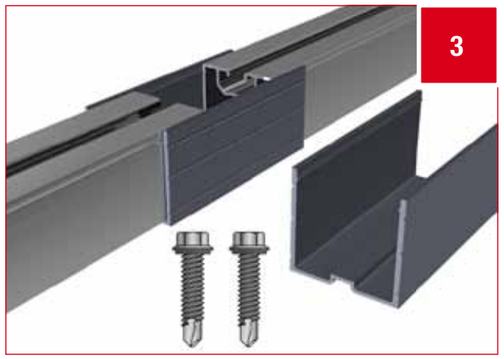
If you would like to make use of WS 9664 A2 M10 x 30 mm hammerhead bolts, you must observe the alignment of the hammerhead bolts in the system unit channel.

12.4 - MOUNTING THE RAIL CONNECTOR

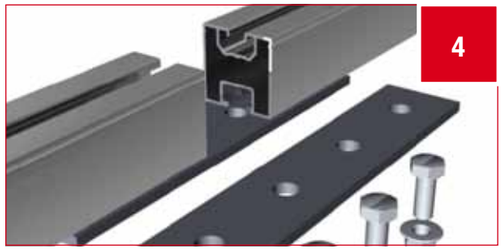


PICTURE 1: To line up several system units in a row, you can make use of various connectors:

PICTURE 2: The connector (WASI 18) is pushed half-way into the mounting rail. Then the other mounting rail is pushed onto the connector. Afterwards, you push together the mounting rails with pressures.

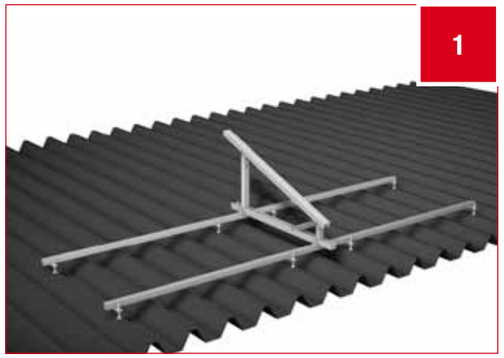


PICTURE 3: Place the connector (WASI 12) above the first mounting rail and click it into the existing groove. Then click in the second mounting rail and press them together. You then screw the connection together with two drilling screws (tightening torque 8-10 Nm).



PICTURE 4: Make sure you have four hexagon bolts for the connectors (featuring 4 holes) and then push the first two screw heads into the lower channel of the first mounting rail. Then push the last two screws into the other rails. You then attach all four screws with (in each case) 4 bolts (tightening torque 10-12 Nm).

12.5 - MOUNTING STEP: FLAT ROOF FRAMEWORKS FOR TRAPEZOIDAL SHEET METAL ROOFS



PICTURE 1 – 4: LOWER attachment
The elevated mountings must now be attached to the system units. Begin by placing a DIN 603 A2/A4 M8 x 25 mm carriage bolt in the upper section of the system unit such that the thread(s) stick out.

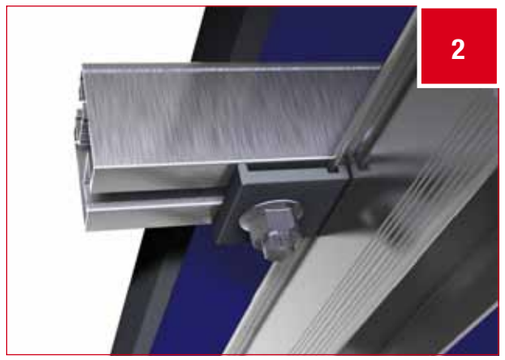
You then loosely lay the 9785-WASI 26 mounting platelets on the threaded necks and pull them tight with a 985 A2/A4 M8 stop nut or 9345 A2/A4 M8 locking nut (tightening torque 14-16 Nm).

PICTURE 5: Or alternatively
Swivel and click the sliding block into the upper rails. Then attach the 9785-WASI 26 mounting platelets to the elevated mountings and to the rails via a DIN 912-2-8 x 16 cylinder head screw.

12 FLAT ROOF MOUNTING INSTRUCTIONS
MOUNTING STEP: FLAT ROOF FRAMEWORKS FOR TRAPEZOIDAL SHEET METAL ROOFS

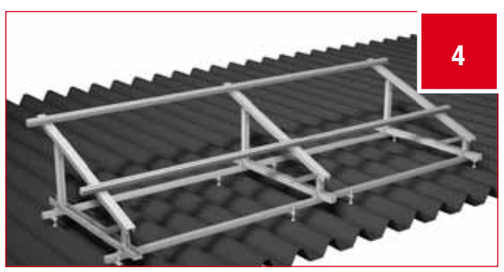
12.5 - MOUNTING STEP: FLAT ROOF FRAMEWORKS FOR TRAPEZOIDAL SHEET METAL ROOFS

PICTURE 1 – 4: UPPER attachment
You now attach the system units for the module to the triangle. You do this by pushing DIN 933 A2/A4 M10 x 25 mm hexagon bolt into the lower section of the system unit such that the threads stick out.
Then you loosely lay the 9785-WASI 26 mounting platelet on the threaded necks and pull it tight with an A2/A4 M10 locking nut (tightening torque 14-16 Nm).

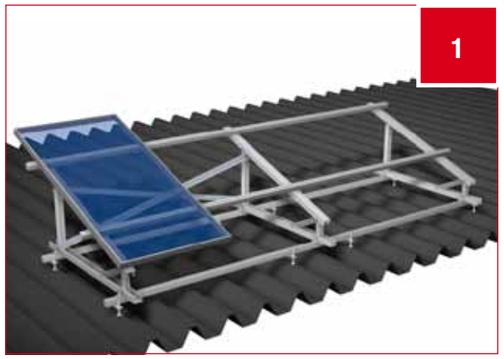


The interval between the module rails for framed modules that are to be mounted upright should be approximately 1/2 of the module height.

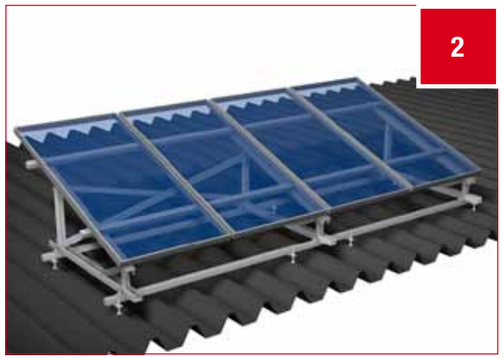
In this case, always observe the module manufacturer instructions!

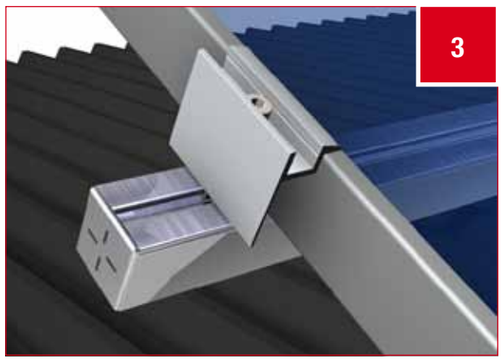


12.5 - MOUNTING STEP: FLAT ROOF FRAMEWORKS FOR TRAPEZOIDAL SHEET METAL ROOFS

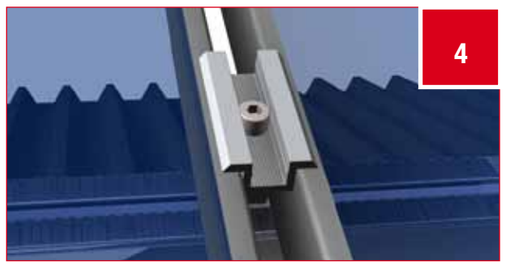


PICTURE 1 & 2: Once all of the module units have been mounted to the brackets, you attach the cross-bracings. You can make use of common L-sections (40 x 40 x 3) for this. You must mount them to every closed row once and at least every 12m. You can screw these sections directly onto the rear brackets with drilling screws or attach them with normal standard screws.



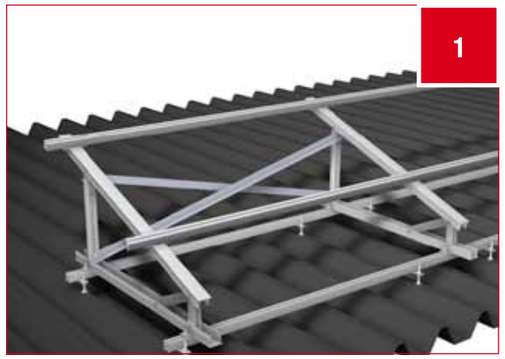


PICTURE 3: To attach the module clamps, swivel the sliding block into the upper rails and click it in. You now turn the end clamp and its respective screw (depending on the module height) into the sliding block. You could alternatively attach the click-in kit in the upper channel of the rails and screw it tight (tightening torque up to a maximum of 18 Nm depending on the module manufacturer). You can add a cover to the rails for personal or appearance reasons.

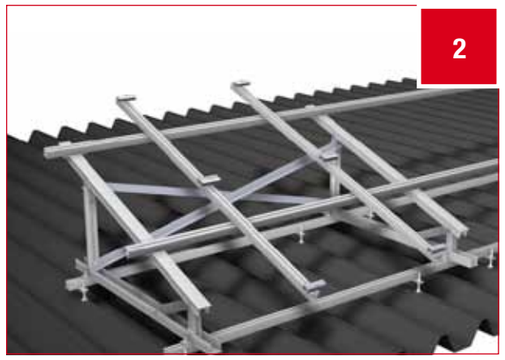


PICTURE 4: Swivel the sliding block into the upper rails and click it in. You twist the middle clamp into the sliding block with the respective screw (depending on the module height). Alternatively, you can attach click-in kit in the upper channel of the rails and screw it tight (tightening torque up to a maximum of 18 Nm depending on module manufacturer.)

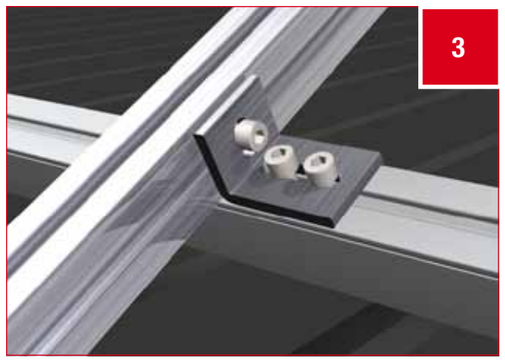
12.6 - MOUNTING STEP: FLAT ROOF FRAMEWORKS WITH FRAMELESS PV MODULES



PICTURE 1: Once all of the module units have been mounted to the brackets, you attach the cross-bracings. You can make use of common L-sections (40 x 40 x 3) for this. You must mount them to every closed row once and at least every 12m. You can screw these sections directly onto the rear brackets with drilling screws or attach them with normal standard screws.

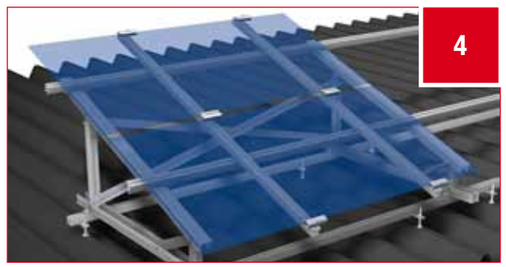


PICTURE 2: When you place the frameless PV modules, it may be mandatory to conduct a mounting in the cross brace. Please make note of the mounting specifications of the module manufacturer.



PICTURE 3: Connect the two rails via a cross brace bracket

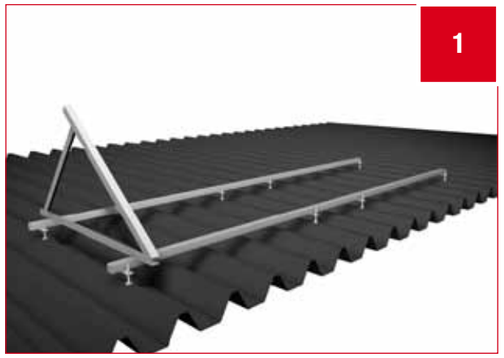
- 912 A2/A4 8 x 16 (3x) cylinder head screw
- 9431 120901 (3x) sliding block
- 9701 WASI 14 bracket cross brace



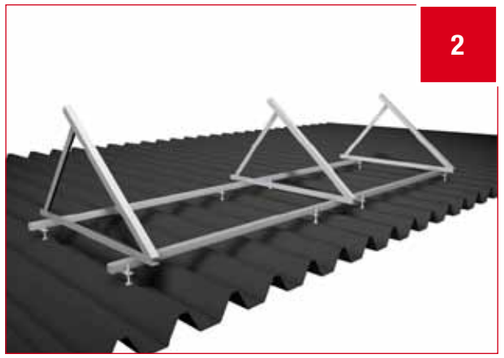
PICTURE 4: Swivel the sliding block into the upper rails and click it in. You now twist the clamp into the sliding block with a DIN 912 A2/A4 M8 x 35 mm screw and screw it tight (tightening torque up to 15 Nm.)

12.7 - MOUNTING STEP: FLAT ROOF FRAMEWORKS WITH RIGID ELEVATED MOUNTINGS

1



2



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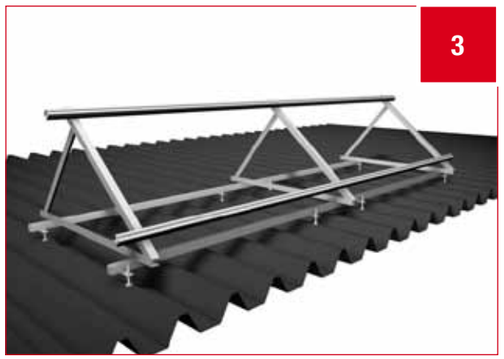


4

PICTURE 1 & 2: Lower attachment: The rigid elevated mountings are attached to the respective sub-construction in a similar manner to the adjustable mountings, but without mounting platelets. You can approach this task in two ways:

Alternative 1: If the WASI 1 mounting section runs along the upper channel for our M8 t-nut M8 under the elevated mountings, then you can insert a DIN 603 M8 x 25 round-head screw with the head in the upper rail channel such that the thread can be seen sticking out upwards. The thread is pushed through a drilled hole in the lower branch of the elevated mounting, then countered and fastened there with a 9345-2-8 locking nut or 985-2-8 stop nut.

Alternative 2: A sliding block is clicked into the upper WASI 1 rail channel and the elevated mounting is attached with a DIN 912 M8 Allen screw (length depends on the strength of the elevated mounting) that is screwed into the sliding block.

PICTURE 3: Upper attachment: You attach the system units in a similar manner to the adjustable elevated mountings, but without using mounting platelets. A DIN 933 A2/A4 10 x 25 hexagon bolt is pushed into the lower channel of the system units such that the thread sticks out downwards. The thread is pushed through the drill hole on the diagonal branch of the elevated mounting, countered and fastened with a 9345-2-10 locking nut or a 985-2-10 stop nut.

12.8 - ARTICLE LIST – ACCESSORIES

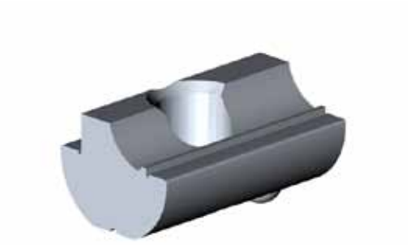
Hanger bolt

Trapezoidal sheet block

Adapter sheet

Mounting bracket

Slinding block



Section connector 9557

Section connector WASI 18

Section connector WASI 12

12.8 - ARTICLE LIST – ACCESSORIES

End clamp

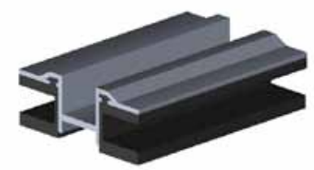
Middle clamp

End clamp for LAMINAT-L glass module

Middle clamp for LAMINAT-L glass module

End clamp for LAMINAT-JT glass module

Middle clamp for LAMINAT-JT glass module



Adjustable mounting rack

Rigid elevated mounting

WASI SOLAR

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