

475 W

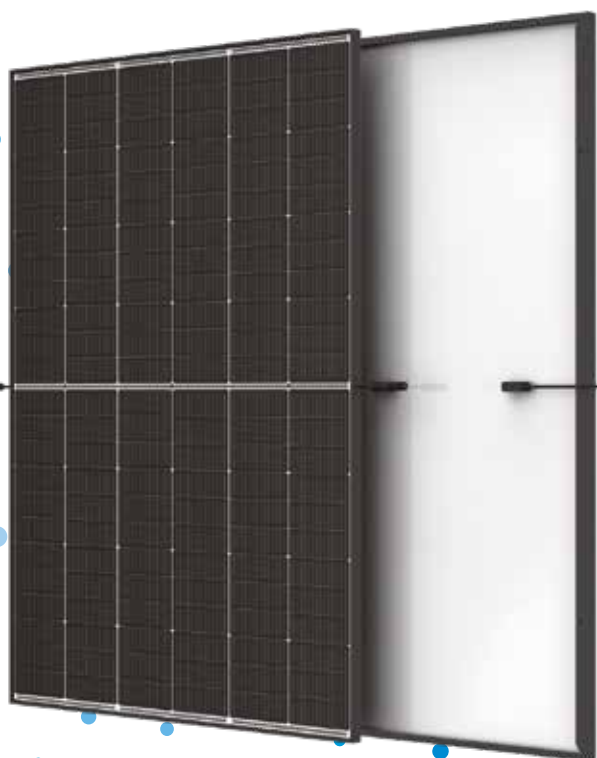
MAXIMUM POWER OUTPUT

0/+5 W

POSITIVE POWER TOLERANCE

23.8 %

MAXIMUM EFFICIENCY



Small in size, bigger on power

- Generates up to 475 W, 23.8 % module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping, lower series resistance, improved current collection and enhanced reliability
- Reduces installation cost with higher power bin and efficiency



Dual-glass Design, High Reliability

- Excellent fire rating and resistance to harsh environmental conditions
- 5,400 Pa snow load and 4,000 Pa wind load (test loads)



Maximize Energy Harvest

- Up to 25 years product warranty and 30 years power warranty
- 1 % first-year degradation and 0.4 % annual degradation enabled by N-type technology



Universal solution for residential and C&I rooftops

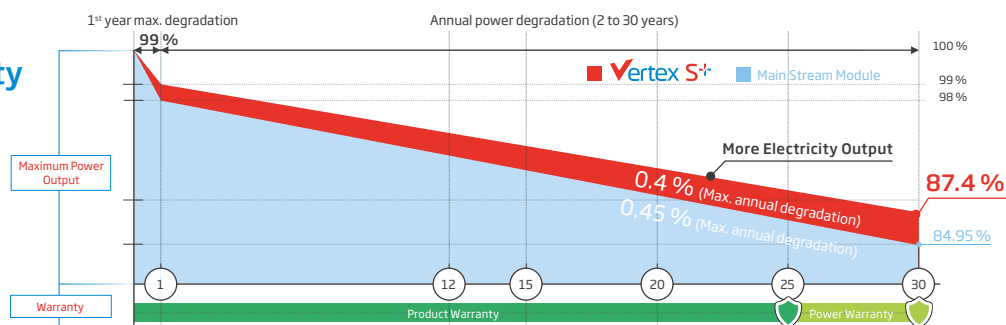
- Designed for compatibility with existing mainstream inverters, optimizers and mounting systems
- Perfect size and low weight for easy handling. Optimized transportation cost
- Flexible installation solutions for system deployment

Extended Vertex S⁺ Warranty

1 %
1st year max. degradation

0.4 %
Max. annual degradation from year 2 to 30

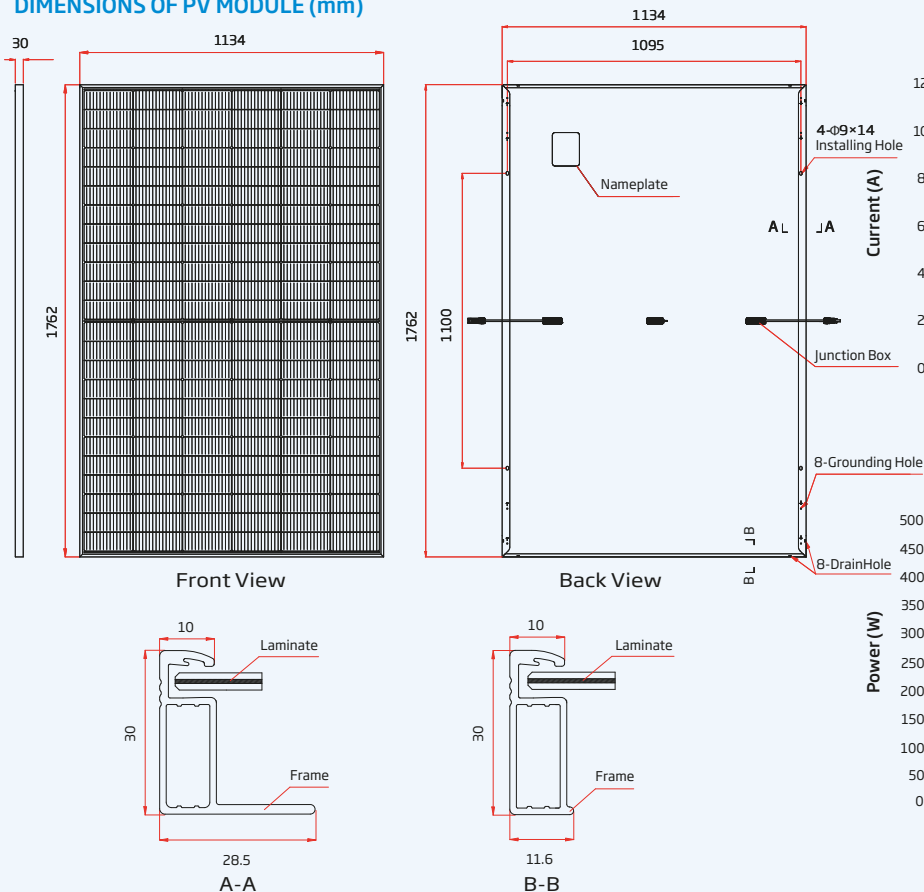
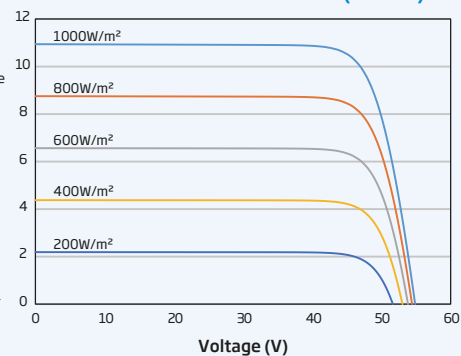
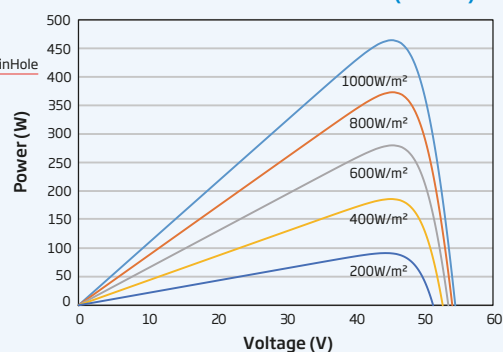
25 Years
Product Workmanship Warranty



Comprehensive Products and System Certificates



IEC61215/IEC61730/IEC61701/IEC62716
 ISO 9001: Quality Management System
 ISO 14001: Environmental Management System
 ISO14064: Greenhouse Gases Emissions Verification
 ISO45001: Occupational Health and Safety Management System
 ISO14067: Product Carbon Footprint Limited Assurance
 ISO14025: Environmental Product Declaration

DIMENSIONS OF PV MODULE (mm)

I-V CURVES OF PV MODULE (465 W)

P-V CURVES OF PV MODULE (465 W)

ELECTRICAL DATA (STC)

	TSM-450 NEG9R.28	TSM-455 NEG9R.28	TSM-460 NEG9R.28	TSM-465 NEG9R.28	TSM-470 NEG9R.28	TSM-475 NEG9R.28
Peak Power Watts- P_{MAX} (Wp)*	450	455	460	465	470	475
Power Selection (W)**	0/+5					
Maximum Power Voltage- V_{MPP} (V)	44.6	45.0	45.4	45.8	46.1	46.4
Maximum Power Current- I_{MPP} (A)	10.09	10.11	10.14	10.16	10.20	10.24
Open Circuit Voltage- V_{OC} (V)	52.9	53.4	53.8	54.2	54.6	55.0
Short Circuit Current- I_{SC} (A)	10.74	10.77	10.81	10.85	10.89	10.93
Module Efficiency η_m (%)	22.5	22.8	23.0	23.3	23.5	23.8

STC: Irradiance 1000 W/m², Cell Temperature 25 °C, Air Mass AM 1.5. *Measuring tolerance: $\pm 3\%$. **Power Selection up to: $\pm 3\%$

ELECTRICAL DATA (NOCT)

	TSM-450 NEG9R.28	TSM-455 NEG9R.28	TSM-460 NEG9R.28	TSM-465 NEG9R.28	TSM-470 NEG9R.28	TSM-475 NEG9R.28
Maximum Power- P_{MAX} (Wp)	344	348	352	355	358	362
Maximum Power Voltage- V_{MPP} (V)	42.0	42.3	42.7	42.8	43.1	43.4
Maximum Power Current- I_{MPP} (A)	8.19	8.22	8.25	8.28	8.31	8.35
Open Circuit Voltage- V_{OC} (V)	50.2	50.6	51.0	51.4	51.8	52.1
Short Circuit Current- I_{SC} (A)	8.66	8.68	8.71	8.74	8.76	8.79

NOCT: Irradiance at 800 W/m², Ambient Temperature 20 °C, Wind Speed 1 m/s.

MECHANICAL DATA

Solar Cells	N-type i-TOPCon Monocrystalline
No. of cells	144 cells
Module Dimensions	1762×1134×30 mm
Weight	21.0 kg
Front Glass	1.6 mm, AR Coating Heat Strengthened Glass
Back Glass	1.6 mm, Heat Strengthened Glass
Frame	30 mm Anodized Aluminium Alloy, black
J-Box	IP 68 rated, 3 bypass diodes
Cables	Photovoltaic Technology Cable 4.0 mm ² Landscape: 1100/1100 mm Portrait: 200/320 mm*
Connector	TS4 Plus / TS4 / MC4 EVO2*

*Special order only

TEMPERATURE RATINGS

NOCT (Nominal Operating Cell Temperature)	43 °C (± 2 °C)
Temperature Coefficient of P_{MAX}	-0.29 %/°C
Temperature Coefficient of V_{OC}	-0.24 %/°C
Temperature Coefficient of I_{SC}	0.04 %/°C

MAXIMUM RATINGS

Operational Temperature	-40 to +70 °C
Maximum System Voltage	1500 V DC (IEC)
Max Series Fuse Rating	25 A

PV module 98th percentile operating temperature: 70 °C

WARRANTY

25 year Product Workmanship Warranty
30 year Power Warranty
1 % first year degradation
0.4 % Annual Power Attenuation

(Please refer to product warranty for details)

PACKAGING CONFIGURATION

Modules per box:	36 pieces
Modules per 40' container:	936 pieces

CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

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Version number: TSM_EN_2026_A

PLENTICORE

Hybrid inverter - G3 4.0-20 kW



Data sheet

PLENTICORE G3: The original. New thought!

All-in-one

- Can be used universally as PV, hybrid or battery inverter
- Optionally releaseable Battery input^{1, 2)}
- Optional power upgrade¹⁾
- Compatibility with various high-voltage batteries²⁾
- Backup power capable (backup function) with external switchover device
- 3 MPP trackers for maximum flexibility
- Extended MPP range - perfect for repowering

Easy to install

- Simple device configuration with commissioning wizard via display, smartphone with web browser or KOSTAL Solar App.
- Safe installation thanks to clearly arranged, separate terminal compartment with Push-In terminals and protected power electronics
- DC overvoltage protection type 2 optionally retrofittable
- Always up to date with the latest software thanks to AutoUpdate



Smart performance

- Fast, self-learning shadow management for maximum yields
- Dynamic active power control and 24-hour home-consumption measurement²⁾
- Low conversion losses due to DC coupling and high-voltage battery
- High DC input currents (17A/30A)
- Prepared for additional battery charge via AC energy sources²⁾

Smart connected

- Smart Communication Board: control interfaces integrated as standard
- Display, data logger and system monitoring
- Free KOSTAL Solar Portal and KOSTAL Solar App for monitoring the PV system
- 2 x LAN, WiFi, 4 x digital switching outputs for self-consumption control or event reporting, "SG Ready" compatible, evaluation of external overvoltage protection modules
- Modbus/SunSpec (TCP) for SmartHome integration

PLENTICORE G3: compact and rapidly deployable



¹⁾ Optional battery and power upgrade available for a fee from your wholesaler.

²⁾ Compatible energy meter required (see document Released energy meters in the download area for the product)

PLENTICORE G3: Technical data

	PLENTICORE G3		S			M			L			
Input side (DC)	Basic power	kW	4,0			8,5			15			
	Optional power upgrade level 1 ¹⁾	kW		5,5			10			17,5		
	Optional power upgrade level 2 ¹⁾	kW			7,0			12,5			20	
	Max. PV power (cos φ = 1)	kWp	6	8,25	10,25	12,75	15	18,75	22,5	26,5	30	
	Max. PV power per DC input	kW	8,25	8,25	8,25	10,5	10,5	10,5	18	18	18	
	Nominal DC power	kW	4,08	5,61	7,14	8,67	10,2	12,75	15,3	17,85	20,4	
	Rated input voltage (U _{DC,r})	V	680									
	Start-up input voltage (U _{DCstart})	V	95									
	Max. system voltage (U _{DCmax})	V	1000									
	MPP range at rated output (U _{MPPmin}) ³⁾	V	80	110	140	170	200	250	170	198	227	
	MPP range at rated output (U _{MPPmax}) ³⁾	V	800	800	800	800	800	800	800	800	800	
	Working voltage range (U _{DCworkmin} - U _{DCworkmax}) ⁴⁾	V	75...900									
	Max. input current (I _{DCmax}) DC1/DC2 input	A	17			17			30			
	Max. input current (I _{DCmax}) DC3 input	A	17			30			30			
	Max. PV short-circuit current (I _{SC_PV}) DC1/DC2 input	A	23,8			23,8			42,0			
	Max. PV short-circuit current (I _{SC_PV}) DC3 input	A	23,8			42,0			42,0			
	Number of DC inputs		3									
	Number of combined DC inputs (PV or battery)		1									
	Number of independent MPP trackers		3									
	DC 3 – battery input optional											
	Min. working voltage for battery input (U _{DCworkbatmin})	V	95									
	Max. working voltage for battery input (U _{DCworkbatmax})	V	650									
	Max. charging/discharging current at battery input	A	17/17			30/30			30/30			
	Max. BAT power per DC input	kW	8,25	8,25	8,25	10,5	10,5	10,5	18	18	18	
Output side (AC)	Rated power, cos φ = 1 (P _{AC,r})	kW	4,0	5,5	7,0	8,5	10	12,5	15	17,5	20	
	Apparent output power (S _{AC,Nom} , S _{AC,max})	kVA	4,0/ 4,0	5,5/ 5,5	7,0/ 7,0	8,5/ 8,5	10/ 10	12,5/ 12,5	15/ 15	17,5/ 17,5	20/ 20	
	Min. output voltage (U _{ACmin})	V	320									
	Max. output voltage (U _{ACmax})	V	460									
	Rated AC current (I _{AC,r})	A	5,8	7,9	10,1	12,3	14,4	18	21,7	25,3	28,9	
	Max. output current (I _{ACmax})	A	11,2			20,0			32,0			
	Short-circuit current (peak/RMS)	A	9,1/ 6,4	12,4/ 8,8	15,9/ 11,3	19,2/ 13,6	22,6/ 16,0	28,2/ 20,0	34,1/ 24,1	39,6/ 28,1	45,4/ 32,1	
	Grid connection		3N~, 230/400V, 50Hz									
	Rated frequency (f _r)	Hz	50									
	Min/max grid frequency (f _{min} /f _{max})	Hz	47 / 52,5									
	Setting range of the power factor (cos φ _{AC,r})		0.8 ... 1 (ind./cap.)									
	Power factor for rated power (cos φ _{AC,r})		1									
	Max. THD	%	3									
	Standby	W	3,5									
	Backup operation	Backup power operation		3N~, 230/400V, 51 Hz								
		Nominal apparent power in backup mode ²⁾	kVA	7,0			12,5			20		
Nominal power per phase		kW	2,33			4,16			6,66			
Range cos φ			0...1									
Start-up apparent power in backup for min. 5 sec at U _{AC,r}		kVA	7,7			13,8			22,1			
Max. Current per phase		A	11,2			20			32			
Start time with manual KOSTAL BackUp Switch		s	<5									
Start time with automatic backup box		s	<30									
Operating hours in backup mode		h	5000									

¹⁾ Optional battery and power upgrade available for a fee from your wholesaler.

²⁾ Nominal output power: The actual output power depends on the system and storage size.

³⁾ MPP range at rated output: Outside the MPP range, MPP control takes place below the nominal power. Based on full occupancy of all MPP trackers.

⁴⁾ Working voltage range: No feed-in takes place outside the working voltage range.

PLENTICORE G3			S	M	L
η	Max. efficiency	%	98.03	98,05	98,1
	European efficiency	%	97.14	97.21	97.37
	MPP adjustment efficiency	%			
System data	Topology: Without galvanic isolation – transformerless			yes	
	Protection class according to IEC 60529			IP 65	
	Protective class according to IEC 62103			I	
	Overvoltage category according to IEC 60664-1, input side (PV generator)			II	
	Overvoltage category according to IEC 60664-1, output side (grid connection)			III	
	DC overvoltage protection module type 2 - optionally retrofittable			yes	
	Degree of contamination			4	
	Environmental category (outdoor installation)			yes	
	Environmental category (indoor installation)			yes	
	UV resistance			yes	
	AC cable diameter (min-max)	mm		10...28	
	AC cable cross-section (min-max)	mm ²	2.5 ...10	4...10	6...10
	DC cable cross-section (PV/BAT) (min-max)	mm ²	2.5 ...6 / 4...6	2.5 ...6 / 6	4...6 / 6
	Max. fuse protection on output side according to IEC 60898-1		B16/C16	B25/C25	B32/C32
	Internal operator protection according to EN 62109-2			yes	
	Independent disconnection device according to VDE 0126-1-1			yes	
	Mechanical DC disconnecter according to IEC 60947-3			yes	
	Height/width/depth	mm		561 / 409 / 237	
	Weight	kg	21.8	22.3	24.3
	Cooling principle – regulated fans			yes	
	Max. air throughput	m ³ /h		184	
	Noise emission (typical)	dB(A)		39	
	Ambient temperature	°C		-20...60	
	Max. installation altitude above sea level	m		2000	
	Relative humidity	%		4...100	
	Connection technology, DC side			SUNCLIX plug	
	Connection technology, AC side			Spring-type terminal strip	
	Connection technology, interfaces			Push-In terminal	
Interfaces	Ethernet LAN (RJ45) / WiFi (IEEE 802.11b/g/n 2.4GHz)			2 / yes	
	Connection of energy meter for collecting energy data (Modbus RTU)			yes	
	Connection external switching device (backup)			yes	
	Digital inputs			Ripple control receiver or external battery control, CEI, OVP monitoring	
	Digital outputs			4 (24 V, 100 mA)	
	Webserver (user interface)			yes	
	Warranty (Smart Warranty / Smart Warranty plus ¹⁾)	Years		10 (5 + 5)	
	Directives/Certification ²⁾		CE, GS, CEI 0-21, C10/11, EN 62109-1, EN 62109-2, EN 60529, EN 50438, EN 50549-1, NA/EEA, G98, G99, EHS2018, IEC 61727, IEC 62116, RD 1699, RD 647, RFG, TOR Erzeuger, UNE 206006, UNE 206007-1, VDE 0126-1-1, VDE-AR-N 4105, VDE-AR-N 4110, VJV2018		

Subject to technical changes. Errors excepted. You can find current information at www.kostal-solar-electric.com. Manufacturer: KOSTAL Industrie Elektrik GmbH, Hagen, Germany

¹⁾ Activate your free warranty (Smart Warranty) now in the KOSTAL Solar online shop (shop.kostal-solar-electric.com). For Smart Warranty Plus, you must also register your device in our KOSTAL Solar portal.

This does not affect your statutory warranty. You will find more information about the service and warranty conditions in the download area for your product.

²⁾ Directive EN50438, EN50549-1: does not apply to all national annexes, Directive VDE-AR-N 4110: only applies to PLENTICORE L G3

PLENTICORE G3: Overview of all power classes



Purchase the PLENTICORE inverter with a basic power of S, M or L. The basic power can be optionally upgraded in two stages. This gives you maximum flexibility when planning your system - even at a later date without replacing the inverter.

PLENTICORE	S	M	L	
	4.0 - 7.0 kW	8.5 - 12.5 kW	15 - 20 kW	
Basic power [kW]	4.0	8.5	15	
Optional power upgrade [kW] Level 1	5.5	10	17.5	
Optional power upgrade [kW] Level 2	7.0	12.5	20	 

Optional battery and power upgrade available for a fee from your wholesaler.

Services for our products

Activation of the KOSTAL Smart Warranty via shop.kostal-solar-electric.com
You can find all further information at www.kostal-solar-electric.com

KOSTAL HELIVOR HV

Hochvolt-Energiespeicher made by ZYC Energy



Datenblatt

KOSTAL HELIVOR HV : Hochvolt-Energiespeicher mit System

Der Hochvolt-Energiespeicher KOSTAL HELIVOR HV wurde von ZYC Energy Company Limited entwickelt, gefertigt und speziell auf das Zusammenspiel mit KOSTAL Wechselrichtern abgestimmt.

Das durchdachte Design ermöglicht eine schnelle, platzsparende Installation. Eine separate Inbetriebnahme oder Konfiguration entfällt. Das System ist unmittelbar einsatzbereit und bleibt über automatische oder manuelle Software-Updates via Wechselrichter jederzeit aktuell.

Pro Energiespeicher lassen sich bis zu 9 Module in Reihe schalten. Der Parallelbetrieb von bis zu 8 Batteriesystemen eröffnet flexible Einsatzmöglichkeiten mit Kapazitäten von 6,4 kWh bis 230,4 kWh – ideal für private, gewerbliche und industrielle Anwendungen.

Als zentraler Ansprechpartner übernimmt die KOSTAL Solar Electric GmbH den vollständigen Service und Support sowie die Produktgarantie und bietet mit 10 Jahren maximale Investitionssicherheit.

BMS - Einfache Installation

Das BMS (Battery Management System) überwacht und steuert zuverlässig, sorgt für Sicherheit, effizientes Laden und Entladen sowie ein aktives Balancing.

MODULE - Hohe Kapazität

Die leistungsstarken LFP-Module (3,2 kWh / 64 V) sind flexibel erweiterbar, garantieren eine nachhaltige Energieversorgung und lassen sich schnell installieren.

BASE - Kompakte Bauweise

Das Base bildet das stabile Fundament und benötigt nur eine kleine Stellfläche für eine platzsparende Installation auch in kleinen Räumen.

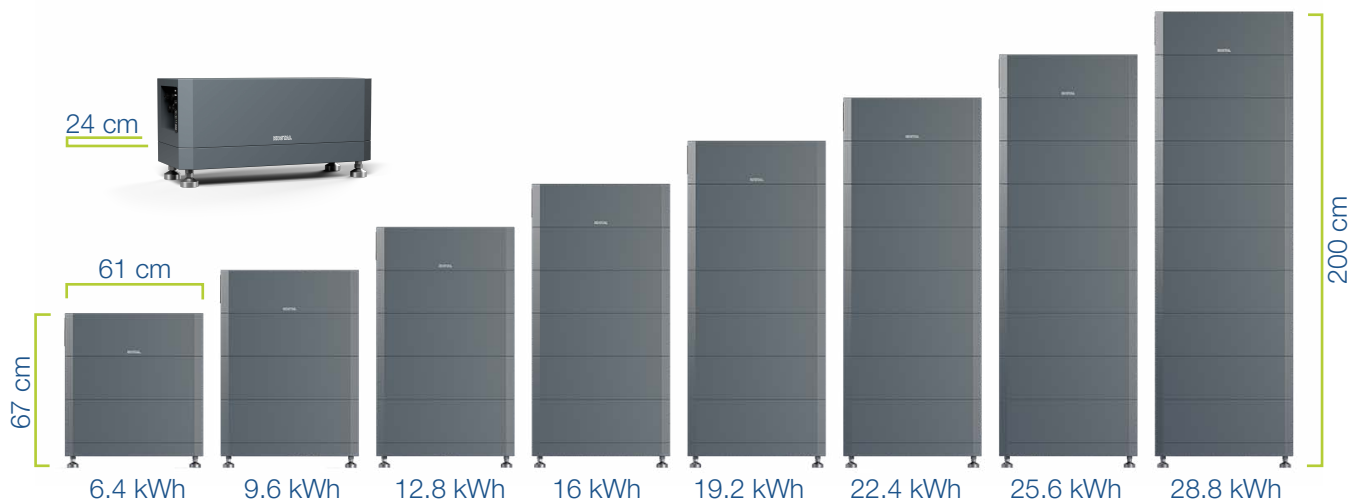


Alle Vorteile auf einen Blick

- Installation per Plug & Play
- Geringes Gewicht und Platzbedarf
- Montage mit schraubenloser Modulverbindung
- Schnell verbunden durch Steckbare Anschlüsse
- Laden / Entladen bei niedrigen Temperaturen bis -10°C (Niedertemperatur-Batterietechnologie)
- Hohe Lade- Entladeleistung beim PLENTICORE G3
- Parallelschaltung von bis zu acht Türmen (6,4 - 230,4 kWh)
- Sichere Litium Eisenphosphat (LFP) Zell Chemie
- IP65 zertifiziert / Ideal für den Innen- und Außenbereich
- 10 Jahre KOSTAL Garantie

Alles im Blick: Das HMI ermöglicht eine einfache Bedienung direkt am Gerät. LEDs u. a. für Ladezustand und Modulstatus.

KOSTAL HELIVOR HV : Schnell installiert und sehr flexibel - bis zu 8 Türme



KOSTAL HELIVOR HV : Technische Daten

KOSTAL HELIVOR HV		6.4	9.6	12.8	16	19.2	22.4	25.6	28.8
Modultyp		Li-Ion LFP, 3,2 kWh, 64 V, 50 Ah, 36,4 kg							
Anzahl der Batteriemodule		2	3	4	5	6	7	8	9
Nutzbare Kapazität 100% DoD	kWh	6,4	9,6	12,8	16,0	19,2	22,4	25,6	28,8
Nutzbare Kapazität 95% DoD	kWh	6,1	9,1	12,2	15,2	18,2	21,3	24,3	27,4
Nennspannung	V	128	192	256	320	384	448	512	576
Spannungsbereich	V	120-146	180-219	240-292	300-365	360-438	420-511	480-584	540-657
Max. Lade-/Entladestrom Batteriesystem	A	50/50							
Max. Strom (Peak für 5 Sekunden)	A	65							
Gewicht	kg	93	129	166	202	238	275	311	348
Höhe	mm	670	860	1050	1240	1430	1620	1810	2000
Breite/Tiefe	mm	610/240							
Zykluswirkungsgrad	%	≥96							
Ladetemperaturbereich	°C	-10...55							
Entladetemperaturbereich	°C	-20...55							
Luftfeuchtigkeit max. (nicht kondensierend)	%	95							
Betriebshöhe max.	m	≤3000							
Gehäuseschutzklasse		IP 65							
Schnittstelle zum Wechselrichter		RS485							
Garantie	Jahre	10							
Parallelschaltung Türme		1-8							
Richtlinien/Zertifizierung		CE / IEC 62619 / UN 38.3 / VDE-AR-E 2510-50							

Serviceleistungen rund um unsere Produkte

Bei allen technischen und Service Anliegen, wenden Sie sich an die KOSTAL Solar Electric GmbH.
Alle weiteren Informationen finden Sie unter www.kostal-solar-electric.com

KOSTAL Energy Meter

Power meter - Series C



Smart
connections.

Data sheet

Technical data KOSTAL Energy Meter - Series C

			KOSTAL Energy Meter - Series C ¹
System data	Compatible with inverter (only one inverter)		PIKO IQ / PLENTICORE plus / PLENTICORE BI
	Compatible with wallbox ENECOT		---
	Rated voltage	V	max. 208/415 V~
	Operating voltage	V	120/240 V~
	Frequency range	Hz	50/60
	Power consumption		<1.3 W / 2.6 VA
	Current inputs - base current (I _b)	A	5
	Current inputs - minimum current (I _{min})	A	0.25
	Current inputs - maximum current (I _{max})	A	65
	Current inputs - starting current (I _{st})	mA	20
	Current inputs - Overload For 10 ms		30 I _{max} (1950 A)
	Current inputs - input impedance	VA	< 3.4
	Current inputs - Peak factor		4 (I _{max} peak 92A)
	Digital output		V _{ON} 2.5 V ac/dc, max 100 mA. V _{OFF} 42 V ac/dc
	Digital input		Contact for voltage measurement: 5 V DC +/- 5%. Contact for current measurement: 5 mA max.
	Overvoltage category		III
	Pollution degree		2
	Directives/Standards		EMV, LVD, EN 62052-11, EN 61010-1
Measurement accuracy ²	Current		From 2 A to 65 A: ± 0,5% rdg / From 0,5 A bis 2 A: ± 1% rdg
	Phase to phase voltage		From U _n min. -20% to U _n max. +15% : ± 0,5% rdg
	Phase to neutral voltage		From U _n min. -20% to U _n max. +15%: ± 0,5% rdg
	Active and apparent power		From 1-65 A (PF=0,5L - 1 - 0,8C): ± 1% rdg From 0,5-1 A (PF=1) ± 1,5% rdg
	Reactive power		Von 1-2 A (sinΦ=0,5L - 0,5C) and from 0,5-1 A (sinΦ=1): ± 2% rdg Von 2-65 A (sinΦ=0,5L- 0,5C) and from 1-65 A (PF=1): ± 2,5% rdg
	Active energy / reactive energy		Class 1 (EN62053-21) / Class 2 (EN62053-23)
	Frequency		From 45 to 65 Hz: ± 0,1% rdg
Mechanical data	Enclosure material		Housing: PBT Transparent cover: polycarbonate
	Mounting		DIN rail (3-TE module)
	Protection class - front / terminals		IP40 / IP20
	Weight	g	270
	Dimensions (H/W/D)	mm	90/53.4/62.4
	Connections	mm ²	Measuring inputs (phase 1/2/3): 2.5-16 Neutral: 0.06-2.5 Inputs, outputs and communication: 0.2-1.5
	Torque	Nm	Measuring inputs (phase 1/2/3): 2.5 Neutral: 0.5 Inputs, outputs and communication: 0.4
Conditions	Operating temperature	°C	-25 ... 55
	Storage temperature	°C	-25 ... 70
	Relative humidity (non-condensing)	%	90
	Max. Altitude during operation above sea level	m	2000

¹ 2-year warranty. This does not affect your statutory warranty.

power in wire and cables



KBE SOLAR DB+



★ H1Z2Z2-K / EN 50618

★ IEC 131 / IEC 62930

★ TÜV 2 PfG 1169/10.19

1.500 V_{DC} / 1.800 V_{DC} max.

UV-Stabilität / UV-stability

erdverlegbar / direct burial

höhere Wasserbeständigkeit/
higher water resistance

Brandklasse D_{ca} nach BauPVO/
flammability class D_{ca} acc. CPR




MADE IN GERMANY

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Tel: +49 (0)30 / 25 208-100 • Fax: +49 (0)30 / 25 208-140 • info@kbe-elektrotechnik.com • www.kbe-elektrotechnik.com



Die KBE Elektrotechnik GmbH ist Hersteller von Kabeln und Leitungen für die Automobil- und Hausgeräteindustrie sowie mit 40 GW installierter Leistung einer der führenden internationalen Anbieter von Solarleitungen.

Bei unserer verbesserten KBE Solar DB+ haben wir berücksichtigt, dass sich die Anforderungen in den letzten Jahren dramatisch erhöht haben. Aus diesem Grund ist die KBE Solar DB+ die erste 3-fach zertifizierte Solarleitung nach der europäischen Solarleitungsnorm EN 50618, sowie nach der internationalen Norm IEC 62930, als auch nach der TÜV Prüfnorm 2 PfG 1169/10.19 durch den TÜV zertifiziert.

Zusätzlich besitzt die KBE Solar DB+ Solarleitung eine ganze Reihe von Vorteilen gegenüber herkömmlichen Solarleitungen:

- TÜV Zertifizierung nach EN 50618 (H1Z2Z2-K)
- TÜV Zertifizierung nach IEC 62930 (62930 IEC 131)
- TÜV Zertifizierung nach 2 PfG 1169/10.19 (PV 1500-K)
- Ausgelegt für 1.500 V_{DC} (max. 1.800 V_{DC})
- fortlaufende Metermarkierung
- Erdverlegbarkeit durch hochwertige Isolationsmaterialien
- Höhere UV-Beständigkeit
- Höhere Wasserbeständigkeit
- Höherer Isolationswiderstand
- Höhere mechanische Stabilität
- Brandklasse D_{ca} nach BauPVO
- optimiert für Floating PV Anlagen (FPV)

Neben wettbewerbsfähigen Konditionen bietet KBE Ihnen:

- „Made in Germany“ mit Fertigung in Berlin
- Lieferung ab Lager, kurze Lieferzeit
- Kostengünstige Direktlieferung ins weltweite Ausland
- Hohe Qualität und lange Lebensdauer (25 Jahre nach EN 50618)
- Hohe Flexibilität und Biegeweichfähigkeit
- Kompatibilität zu allen gängigen Steckern
- Farben: Schwarz, Rot, Blau
- Aufmachung: 100m Ringe, 500m Spulen, 1.000m Spulen

KBE Elektrotechnik GmbH is manufacturer for wires and cables for the automotive and household appliance industry as well as one of the leading international suppliers of solar cables with 40 GW installed capacity.

The advanced KBE Solar DB+ features the latest, significantly increased, technical requirements for solar cables. As a consequence KBE Solar DB+ is the first triple certified solar cable, which is TÜV certified according to the European standard for solar cables EN 50618 and the international standard IEC 62930 as well as the new TÜV test standard 2 PfG 1169/10.19.

KBE Solar DB+ provides a number of additional advantages in comparison to conventional solar cables:

- TÜV certification acc. to EN 50618 (H1Z2Z2-K)
- TÜV certification acc. to IEC 62930 (62930 IEC 131)
- TÜV certification acc. to 2 PfG 1169/10.19 (PV 1500-K)
- Voltage rating 1.500 V_{DC} (max. 1.800 V_{DC})
- Consecutive meter marking
- Direct burial due to high quality insulation materials
- Higher UV-stability
- Higher water resistance
- Higher insulation resistance
- Higher mechanical stability
- flammability class D_{ca} acc. CPR
- optimized for floating PV systems (FPV)

In addition to competitive conditions KBE offers:

- “Made in Germany” with production in Berlin, Germany
- Delivery from stock, short lead time
- Worldwide deliveries at favourable terms
- High quality and long life time (25 years acc. to EN 50618)
- High flexibility and bending capability
- Compatibility to all common connectors
- Colors: black, red, blue
- Packaging: 100m rings, 500m spools, 1.000m spools



KBE Solar DB+ Datenblatt / Technical Data Sheet

Stand: 01.08.2020

		Anforderungsprofil - KBE Solar DB+	Requirement Profile - KBE Solar DB+
	Bezeichnung / Product name	KBE Solar DB+	KBE Solar DB+
	Bauartkurzzeichen/ Leitungscode / Code designation	H1Z2Z2-K / 62930 IEC 131 / PV 1500-K	H1Z2Z2-K / 62930 IEC 131 / PV 1500-K
	Verfügbare Querschnitte / Cross selections available	4,0 mm ² - 10 mm ²	4,0 mm ² - 10 mm ²
	Normen / Approbationen / Standard / Approbations	DIN EN 50618; TÜV Zertifikat-Nr. R60147048; IEC 62930 2 PFG 1169/10.19	DIN EN 50618; TÜV Certificate-No. R60147048; IEC 62930 2 PFG 1169/10.19
		Allgemeine Angaben	General Information
	Leiter / Conductor	E-Cu verzinkt nach IEC 60228 Klasse 5	E-Cu tinned acc. IEC 60228 Class 5
	Isolation / Insulation	Vernetztes Spezial Polyolefin	Crosslinked special Polyolefin
	Mantel / Sheathing	Vernetztes Spezial Polyolefin	Crosslinked special Polyolefin
	Bedruckung / Printing	KBE SOLAR DB+ X,XX mm ² H1Z2Z2-K 62930 IEC 131 PV 1500-K HALOGEN FREE LOW SMOKE R60147048 MADE IN GERMANY CE EAC	KBE SOLAR DB+ X,XX mm ² H1Z2Z2-K 62930 IEC 131 PV 1500-K HALOGEN FREE LOW SMOKE R60147048 MADE IN GERMANY CE EAC
	Abstand der Bedruckung / Continuity of marks	≤ 550 mm	≤ 550 mm
	Mantelfarbe / Sheat colour	rot, blau, schwarz (Verwendung der Farbe mit sehr hoher Lichtechtheit (BWS 8) nach ISO 4892)	red, blue, black (Usage of colour with very high lighth fastness (BWS 8) according to ISO 4892)
	Erwartete Gebrauchsdauer / Expected period of use	25 Jahre	25 years
		Elektrische Anforderungen	Electrical Specifications
	Nennspannung / Rated Voltage U ₀ /U	1,0/1,0 kV _{AC} 1,5/ 1,5 kV _{DC}	1,0/1,0 kV _{AC} 1,5/ 1,5 kV _{DC}
	Höchstzulässige Betriebsspannung / Max. permissible operating voltage	1,2/ 1,2 kV _{AC} 1,8/ 1,8 kV _{DC} (Leiter-Leiter, Leiter-Erde)	1,2/ 1,2 kV _{AC} 1,8/ 1,8 kV _{DC} (conductor-conductor, conductor-ground)
	Strombelastbarkeit / Current carrying capacity	gemäß EN 50618, Tabelle A-3	acc. to EN 50618, table A-3
	Leiterwiderstand / Resistance of the conductor	EN 50395 Abschnitt 5 gemäß EN 50618, Tabelle 2	EN 50395 clause 5 acc. to EN 50618, table 2
	Spannungsprüfung AC / DC an der vollständigen Leitung / Voltage test on the complete cable with AC or DC	EN 50395 Abschnitt 6 (6,5 kV _{AC} oder 15 kV _{DC} ; 5 Minuten)	EN 50395 clause 6 (6,5 kV _{AC} or 15 kV _{DC} ; 5 min)
	Oberflächenwiderstand / Surface resistance	EN 50395 Abschnitt 11	EN 50395 clause 11
	Isolationswiderstand / Insulation resistance	EN 50395 Abschnitt 8.1 durchgeführt bei 20 °C & 90 °C in Wasser Ergebnisse gemäß EN 50618, Tabelle 1 2 PFG 1169/10.19 durchgeführt bei 20 °C & 90 °C in Wasser Ergebnisse gemäß 2 PFG 1169/10.19 mindestens: 1050 MΩ*km @ 20 °C 1,05MΩ*km @ 90 °C	EN 50395 clause 8.1 performed at 20 °C & 90 °C in water results acc. to EN 50618, table 1 2 PFG 1169/10.19 performed at 20 °C & 90 °C in water results acc. to 2 PFG 1169/10.19 at minimum: 1050 MΩ*km @ 20 °C 1,05MΩ*km @ 90 °C
	Durchlaufspannungsprüfung / Spark test	EN 62230, Anhang A	EN 62230, Annex A
	Gleichspannungsbeständigkeit / Long term resistance of insulation to DC	EN 50395 Abschnitt 9 (10 Tage, 85 °C in NaCl 3 %, 1,8 kV _{DC})	EN 50395 clause 9 (10 days, 85 °C in NaCl 3 %, 1,8 kV _{DC})
		Mechanische Anforderungen	Mechanical Specifications
	Eigenschaften vor Alterung / Properties before ageing	EN 60811-1-1; EN 60811-1-2 (Zugfestigkeit Isolierung ≥ 8,0 N/mm ² Zugfestigkeit Mantel ≥ 8,0 N/mm ² Reißdehnung ≥ 125 %)	EN 60811-1-1; EN 60811-1-2 (tensile strenth insulation ≥ 8,0 N/mm ² tensile strenth jacket ≥ 8,0 N/mm ² elongation at break ≥ 125 %)
	Wärmedehnungsprüfung / Hot Set test	EN 60811-2-1 (200 °C; 15 Min. unter Last; 20 N/cm ² Belastung)	EN 60811-2-1 (200 °C; 15 min. under load; 20 N/cm ² stress)
	Biegeradius / Bending radius	≥ 4 x Aussendurchmesser	≥ 4 x outer diameter
	Dynamische Durchdringungsprüfung / Dynamic penetration test	gemäß EN 50618 - Anhang D	acc. to EN 50618 - Annex D
		Thermische Anforderungen	Thermal Specifications
	Umgebungstemperatur im Betrieb / Ambient temperature in operation	-40 °C bis +90 °C	-40 °C to + 90 °C
	Tiefste, zulässige Umgebungstemperatur zur Installation / Min. ambient temperature for installation	-25 °C	-25 °C
	Tiefste, zulässige Umgebungstemperatur / Min. allowable ambient temperature	-40 °C	-40 °C
	Höchste Temperatur am Leiter / Max. temperature at conductor	120 °C, basierend auf der EN 60216-1 (20.000 h; 50 % Restdehnung)	120 °C, based on EN 60216-1 (20.000 h; 50 % residual elongation)
	Kurzschluss temperatur / Short-circuit temperature	+250 °C (am Leiter max. 5 Sek.)	+250 °C (max. 5 sec on conductor)
	Feuchte Wärme-Prüfung / Damp heat test	EN 60068-2-78 (1.000h bei 90 °C und 85 % Luftfeuchte)	EN 60068-2-78 (1.000h at 90 °C and 85 % relative humidity)
	Schrumpungsprüfung / Shrinkage test	EN 60811-503 (120°C, 1h, Schrumpfung <2,0%)	EN 60811-503 (120°C, 1h, shrinkage <2,0%)
	Kältewickelprüfung / Cold bending test	EN 60811-504 (-40 °C, Vorkonditionierung: 16 h)	EN 60811-504 (-40 °C, duration of conditioning: 16 h)
	Kälte dehnungstest / Cold elongation test	DIN EN 60811-505 (-40 ± 2°C, Vorkonditionierung: 16 h)	DIN EN 60811-505 (-40 °C ± 2 °C, duration of conditioning: 16 h)
	Kälteschlagprüfung / Cold impact test	EN 60811-506 und EN 50618, Anhang C (-40 °C; Masse des Fallgewichts 1.000 g)	EN 60811-506 and EN 50618, Annex C (-40 °C; mass of hammer 1.000 g)

KBE Solar DB+ Datenblatt / Technical Data Sheet

Stand: 01.08.2020

		sicherheitsspezifische Anforderungen	specifications regarding safety
BauPVO Dca	Bauproduktenverordnung (BauPVO) / Construction Product Regulation (CPR)	Klasse D _{ca} in Übereinstimmung mit EN 50575:2014	class D _{ca} in accordance with EN 50575:2014
	Beständigkeit gegen Säuren und Laugen / Resistance against acid and alkaline solution	EN 60811-404 7 Tage; 23 °C (N-Oxalsäure; N-Natronlauge)	EN 60811-404 7 days; 23 °C (N-Oxalic-acid; N-Sodium hydroxide solution)
UV	Prüfung der Ozonbeständigkeit der vollständigen Leitung / Ozone resistance on completed cable	EN 50396 Abschnitt 8.1.3, Verfahren B	EN 50396 clause 8.1.3, method B
	Bewitterung/UV-Prüfung am Mantel / Weathering/ UV-resistance on sheath	entspricht EN 50618, Anhang E EN 50289-4-17, Verfahren A (720h; 60 °C ± 3 °C; 50 ± 5 % Luftfeuchte) entspricht 2 PFG 1169/10.19 mit Test von 2.000h und damit deutlich höher als 720h nach EN 50618	meets EN 50618, Annex E EN 50289-4-17, method A (720 h; 60 °C ± 3 °C; 50 ± 5 % relative humidity) meets 2 PFG 1169/10.19 test with 2.000h and exceeds significantly the test of 720h acc. EN 50618
	Prüfung der vertikalen Flammenausbreitung an der vollständigen Leitung / Test for vertical flame propagation on complete cable	EN 60332-1-2	EN 60332-1-2
	Rauchentwicklung an der vollständigen Leitung / Smoke emission of complete cable	EN 61034-2 (Lichtdurchlässigkeit > 70 %)	EN 61034-2 (light transmittance > 70 %)
	Prüfung auf Halogenfreiheit / Bestimmung von Halogenen - Elementarprüfung Assessment of halogens / Determination of halogens - Elemental test	EN 50525-1, Anhang B	EN 50525-1, Annex B
		Zusätzliche interne Tests der KBE	Additional internal tests of KBE
Erdverlegbar / Direct burial	Erdverlegbar / Direct burial	KBE-interne Prüfung gemäß UL 854: - Abschnitt 23: Impact-Resistance Test - Abschnitt 24: Crushing-Resistance Test	KBE internal test acc. To UL 854: -Section 23 Impact-resistance Test -Section 24 Crushing-Resistance Test
	Langzeitisolationswiderstand im Wasser / Long-term insulation resistance in water	KBE Test gemäß UL 44 Abschnitt 5.4 & UL 2556, Abschnitt 6.4: 90 °C ± 5 °C; 2000V (DC) ≥ 3 GΩ×m nach 12 Wochen Testergebnis KBE: > 50 GΩ×m nach 12 Wochen	KBE test acc. to UL 44 Section 5.4 & UL 2556, Section 6.4: 90 °C ± 5 °C; 2000V (DC) ≥ 3 GΩ×m after 12 weeks test result KBE: > 50GΩ×m after 12 weeks
Eingruppierung in Kategorie AD8 / Classification to the category AD8	Eingruppierung in Kategorie AD8 / Classification to the category AD8	in Anlehnung an die EN 50525-21 - Anhang E geprüft: - Spannungsprüfung im Wasser bei 1 kV AC, bei 50 °C über 100 Tage ohne Unterbrechung - Wasseraufnahme des Mantels nach 100 Tage Wasserlage- rung bei 50 °C < 40 % - Isolationswiderstand von mindestens 10 ¹¹ Ω·cm	Tested acc. to EN 50525-21 – Annex E: - Voltage at 1 kV on cable in water at 50 °C during 100 days without any break - Water absorption on sheath after immersion 100 days at 50 °C less than 40 % - Insulation resistance tests with a minimum resistivity of 10 ¹¹ Ω·cm
	Langzeitisolationswiderstand in der Luft / Long-term insulation resistance in air	KBE Test gemäß UL 44, Abschnitt 5.5 & UL 2556, Abschnitt 6.4: 120 °C; 2000V (DC) ≥ 50 GΩ×m nach 12 Wochen	KBE test acc. to UL 44, Section 5.5 & UL 2556, Section 6.4: 120 °C; 2000V (DC) ≥ 50 GΩ×m after 12 weeks
	maximal zulässige Betriebsspannung mit KBE / Max. permissible operating voltage by KBE	2,0/ 2,0 kV _{DC}	2,0/ 2,0 kV _{DC}
	Durchschlagsfestigkeit / Dielectrical strength	12 kV 60 Min. Vergleich zur Anforderung von EN 50618: 6,5 kV; 5 Min.	12 kV 60 min Comparison to Requirement of EN 50618: 6,5 kV; 5 min
	Widerstand gegen Salzwasser / Resistance against salt water	Lagerung bei 23 °C für 7 Tage in gesättigter Salzlösung Änderung der Zugfestigkeit < 5 %	storage at 23 °C for 7 days in saturated salt solution Change of tensile strength < 5 %
Widerstand gegen Ammoniak / Resistance against Ammonia	Widerstand gegen Ammoniak / Resistance against Ammonia	7 Tage bei 23 °C gesättigter Ammoniakatmosphäre (interner Test)	7 days at 23 °C saturated ammonia atmosphere (int. Test)
	Elektrische Kapazität und relative Dielektrizitätskonstante / Electrical capacitance and relative permittivity	KBE Test gemäß UL 44, Abschnitt 5.6 & UL 2556, Abschnitt 6.5: 90 °C ± 5 °C Wassertemperatur; Untertauchen für 14 Tage Relative Permittivität nach 1 Tag Untertauchen ≤ 6 % Kapazität nach 14 Tagen Untertauchen ≤ 10 % Kapazitätsun- terschied von Tag 7 bis Tag 14 ≤ 4 %	KBE test acc. to UL 44, Section 5.6 & UL 2556, Section 6.5: 90 °C ± 5 °C water temperature; immersion for 14 days relative permittivity after 1 day immersion ≤ 6 % capacitance after 14 days immersion ≤ 10 % difference in capacitance from day 7 to day 14 ≤ 4 %
TUV	Richtlinien & Zertifikate / Certificates & Guidelines	EN 50618, IEC 62930, 2 PFG 1169/10.19 TÜV Zertifikat-Nr. R60147048 RoHS 2011/65/EU + 2015/863/EU REACH 1907/2006	EN 50618, IEC 62930, 2 PFG 1169/10.19 TÜV certificate-Nr. R60147048 RoHS 2011/65/EU + 2015/863/EU REACH 1907/2006

Bedruckung / Printing:

KBE SOLAR DB+ X,XX mm² H1Z2Z2-K 62930 IEC 131 PV 1500-K HALOGEN FREE LOW SMOKE MADE IN GERMANY CE EAC

Querschnitt / cross section	Leiteraufbau / conductor design	Widerstand / resistance	min. Wandstärke Isolation / min. insulation thickness	min. Wandstärke Mantel / min. jacket thickness	Außen Ø / outer Ø	Gewicht / weight	Aufma- chung / packaging	KBE-Artikelnnummer / KBE item no		
[mm²]	n x max- Ø [mm]	Rmax. [mΩ/m]	[mm]	[mm]	[mm]	[kg/km]	[Meter]	schwarz / black	rot / red	blau / blue
4,0	56 x 0,310	5,09	0,53	0,58	5,4	55	500 / 1.000	730400015060QUSW	730400015060QURT	730400015060QUBL
4,0	56 x 0,310	5,09	0,53	0,58	5,4	55	100 Ring	820400015060QUSW	820400015060QURT	820400015060QUBL
6,0	80 x 0,310	3,39	0,53	0,58	6,0	75	500 / 1.000	730600015060QUSW	730600015060QURT	730600015060QUBL
6,0	80 x 0,310	3,39	0,53	0,58	6,0	75	100 Ring	820600015060QUSW	820600015060QURT	820600015060QUBL
10,0	80 x 0,410	1,95	0,53	0,58	7,1	115	500	731000015060QUSW	731000015060QURT	731000015060QUBL
10,0	80 x 0,410	1,95	0,53	0,58	7,1	115	100 Ring	821000015060QUSW	821000015060QURT	821000015060QUBL

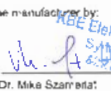
power in wire and cables

KBE Solar DB+ Zertifikate / certificates

Stand: 01.08.2020

Zertifikat		Certificate	
Zertifikat Nr. / Certificate No. R 60147048	Blatt / Sheet 0001	TÜVRheinland	
Ihr Zeichen / Client Reference 1837/19	Unser Zeichen / Our Reference 0010--60193773 002	Anstellungsdatum / Date of Issue 03.03.2020	
Genehmigungsinhaber / License Holder KBE Elektrotechnik GmbH Symeonstr. 8 12279 Berlin Deutschland		Fertigungsstätte / Manufacturing Plant KBE Elektrotechnik GmbH Symeonstr. 8 12279 Berlin Deutschland	
Prüfzeichen / Test Mark 	Geprüft nach / Tested acc. to EN 50618:2014		
Zertifiziertes Produkt (Geräteidentifikation) Certified Product PV Components for BOS - electrical / PV cable		Lizenzentgelte - Einheit License Fee - Unit 13	
Type Designation: KBE Solar DB+ Code designation: H12222-K Cross section: 4,0mm² ; 6,0mm² ; 10,0mm² Rated voltage: AC 0,0/0,1/0,1,0kV DC 1,5kV max. voltage: DC 1,8kV (conductor/conductor and conductor/earth) Ambient temperature range ta: -40°C to +90°C max. temperature at conductor: +120°C @ 20,00h Colour insulation: white Colour sheath: black Material insulation: crosslinked Polyolefine Material sheath: crosslinked Polyolefine Remark: Sheath also in red and blue when requested			
Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich beachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht. This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.		TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg Tel.: +49 221 806-1371 e-mail: cert-validity@tuv.com Fax: +49 221 806-3535 http://www.tuv.com/safety	

Zertifikat		Certificate	
Zertifikat Nr. / Certificate No. R 60147048	Blatt / Sheet 0002	TÜVRheinland	
Ihr Zeichen / Client Reference 1837/19	Unser Zeichen / Our Reference 0010--60193773 003	Anstellungsdatum / Date of Issue 03.03.2020	
Genehmigungsinhaber / License Holder KBE Elektrotechnik GmbH Symeonstr. 8 12279 Berlin Deutschland		Fertigungsstätte / Manufacturing Plant KBE Elektrotechnik GmbH Symeonstr. 8 12279 Berlin Deutschland	
Prüfzeichen / Test Mark 	Geprüft nach / Tested acc. to IEC 62930:2017		
Zertifiziertes Produkt (Geräteidentifikation) Certified Product PV Components for BOS - electrical / PV cable		Lizenzentgelte - Einheit License Fee - Unit 1	
Type Designation: KBE Solar DB+ Code designation: 62930 IEC 131 Cross section: 4,0mm² ; 6,0mm² ; 10,0mm² Rated voltage: AC 0,0/0,1/0,1,0kV DC 1,5kV max. voltage: DC 1,8kV (conductor/conductor and conductor/earth) Ambient temperature range ta: -40°C to +90°C max. temperature at conductor: +120°C @ 20,00h Colour insulation: white Colour sheath: black Material insulation: crosslinked Polyolefine Material sheath: crosslinked Polyolefine Remark: Sheath also in red and blue when requested			
Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich beachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht. This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.		TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg Tel.: +49 221 806-1371 e-mail: cert-validity@tuv.com Fax: +49 221 806-3535 http://www.tuv.com/safety	

Declaration of Performance: DoP 0225		KBE BERLIN										
According to Annex II of regulation (EU) no. 305/2011												
1. Unique identification code of the product type:	H12222-K											
2. Product name	KBE Solar DB+											
3. Usage:	Cables for general applications in construction works subject to reaction to fire											
4. Manufacturer:	KBE Elektrotechnik GmbH Symeonstraße 8 12279 Berlin											
5. System of assessment and verification of constancy of performance:	System 3											
6. Product certification body:	ISSEP - Institut scientifique de service public No. 2659											
7. In case of declaration of performance concerning a construction product covered by a harmonized standard:	The product certification body performed the type testing under system 3 subject to reaction to fire and issued: - Test report no. 0626-1 up to -4/2020 - Test report no. 0527-3 up to -4/2020 - Test report no. 0871-1 up to -2/2020 - Classification report no. 1012/2020											
8. Declared performance:	<table border="1"> <thead> <tr> <th>Essential characteristics</th> <th>performance</th> <th>Harmonized technical standard</th> </tr> </thead> <tbody> <tr> <td>Reaction to fire</td> <td>Dca-s2, d2, a1</td> <td>EN 50575:2014 + A1:2016</td> </tr> <tr> <td>Hazardous substances</td> <td>NPD</td> <td>-</td> </tr> </tbody> </table>			Essential characteristics	performance	Harmonized technical standard	Reaction to fire	Dca-s2, d2, a1	EN 50575:2014 + A1:2016	Hazardous substances	NPD	-
Essential characteristics	performance	Harmonized technical standard										
Reaction to fire	Dca-s2, d2, a1	EN 50575:2014 + A1:2016										
Hazardous substances	NPD	-										
9. The performance of the product identified in points 1 & 2 is in conformity with the declared performance in point 8. This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.												
Signed for and on behalf of the manufacturer by:												
Berlin, 29.05.2020 (Place, Date)  Dr. Mike Szamrat Executive Director R & D KBE / DLB Group												
power in wire and cables Die Leistungsbewertung der Überstromleistung ist als deklarierter Leistungsstrom (I_{pn}) angegeben. Die Leistungsbewertung der Überstromleistung ist als deklarierter Leistungsstrom (I_{pn}) angegeben. Die Leistungsbewertung der Überstromleistung ist als deklarierter Leistungsstrom (I_{pn}) angegeben. 4100 Elektrotechnik GmbH Symeonstr. 8 12279 Berlin, Deutschland Tel.: +49 (0) 30 25208-100 Fax: +49 (0) 30 25208-140 info@kbe-berlin.de												

Zertifikat		Certificate	
Zertifikat Nr. / Certificate No. R 60147048	Blatt / Sheet 0003	TÜVRheinland	
Ihr Zeichen / Client Reference 448/20	Unser Zeichen / Our Reference 0010--60193773 004	Anstellungsdatum / Date of Issue 09.07.2020	
Genehmigungsinhaber / License Holder KBE Elektrotechnik GmbH Symeonstr. 8 12279 Berlin Deutschland		Fertigungsstätte / Manufacturing Plant KBE Elektrotechnik GmbH Symeonstr. 8 12279 Berlin Deutschland	
Prüfzeichen / Test Mark 	Geprüft nach / Tested acc. to 2 PEG 1169/10.19		
Zertifiziertes Produkt (Geräteidentifikation) Certified Product PV Components for BOS - electrical / PV - Cables		Lizenzentgelte - Einheit License Fee - Unit	
as page 0201 - 0202/ Supplement: Product complies also with the above mentioned standard. Additional Code designation: PV 1500-K			
Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich beachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht. This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.		TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg Tel.: +49 221 806-1371 e-mail: cert-validity@tuv.com Fax: +49 221 806-3535 http://www.tuv.com/safety	

power in wire and cables

power in wire and cables



>40 GW weltweit / >40 GW worldwide

Original MC4-Evo 2

Renewable Energy | Solar Photovoltaics

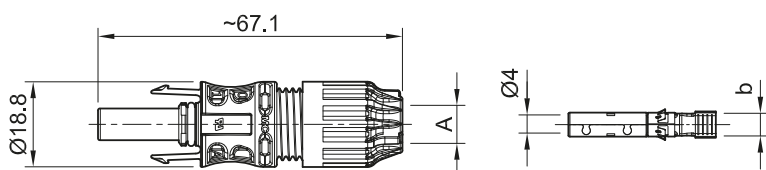
EN



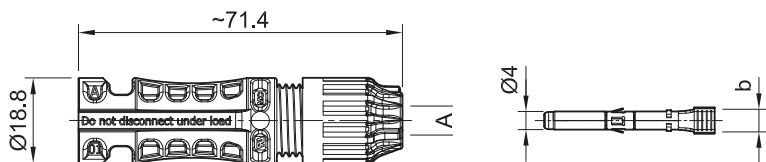
Female and male cable coupler MC4-Evo 2

Female and male cable coupler as individual part (including insulating part)

PV-KBT4-EVO 2A/...



PV-KST4-EVO 2A/...



Sealing caps see catalog tools and accessories, page 21

Tools see catalog tools and accessories, page 4 – 16

www.staubli.com/re-downloads.html → English → Catalog → Tools and accessories



Assembly instructions see MA298

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Internationally certified with IEC, UL, JET, cTÜVus. Approved for DC 1500 V (IEC, JET), DC 1500 V (UL) unrestricted access. MULTILAM Technology, has proven the

quality and durability several 100 million times since 2004. Suited for all climatic environments due to UV resistance, ammonia and high IP degree. Available as a field and

preassembled connector, standard crimping tools can be used. Mating compatibility with MC4 connector family.

Technical data	
Connector system	Ø 4 mm
Ambient temperature range	-40 °C ... +85 °C (IEC/UL)
Transportation/storage temperature range	-30 °C/+60 °C
Transportation/storage relative humidity	< 70 %
Upper limiting temperature	115 °C (IEC)
Degree of protection, mated	IP65/IP68 (1 m, 1 h)
Degree of protection, unmated	IP2X
Overvoltage category	III
Contact resistance of plug connectors	< 0.2 mΩ
Locking system	Locking type
Class (IEC)	II
Contact system	MULTILAM
Type of termination	Crimping
Warning	Do not disconnect under load
Contact material	Copper, tin plated
Insulation material	PA
Flame class	UL94-V0
Ammonia resistance (TÜV Rheinland certified acc. to 2 PFG 1911/03.2011)	Q60139020-0001
TÜV-Rheinland certified according to IEC 62852:2014+Amd.1:2020	R 60127169
UL recognized component in accordance with UL6703	E343181
Maximum altitude above sea level for operation	5000 m
Temperature Level according to IEC TS 63126	Level 2

Female and male cable coupler MC4-Evo 2

Female and male cable coupler as individual part (including insulating part)

Order No.	Type	Socket	Plug	Outer diameter of cable A (mm)	Width of crimp opening b (mm)	IEC 62852			UL 6703			Approvals	
						mm ²	DC V	A	AWG	DC V	A	TÜV Rheinland	UR
32.0310P0001	PV-KBT4-EVO 2A/2.5I	x		4.7-6.4	4	2.5	1500	39				x	x
									14	1500	30		
32.0311P0001	PV-KST4-EVO 2A/2.5I		x	4.7-6.4	4	2.5	1500	39				x	x
									14	1500	30		
32.0312P0001	PV-KBT4-EVO 2A/2.5X	x		5.9-7.3	4	2.5	1500	39				x	x
									14	1500	30		
32.0313P0001	PV-KST4-EVO 2A/2.5X		x	5.9-7.3	4	2.5	1500	39				x	x
									14	1500	30		
32.0314P0001	PV-KBT4-EVO 2A/2.5II	x		6.4-8.4	4	2.5	1500	39				x	x
									14	1500	30		
32.0315P0001	PV-KST4-EVO 2A/2.5II		x	6.4-8.4	4	2.5	1500	39				x	x
									14	1500	30		
32.0316P0001	PV-KBT4-EVO 2A/6I	x		4.7-6.4	5.8	4	1500	45				x	x
						6	1500	53					
									12	1500	35		
									10	1500	50		
32.0317P0001	PV-KST4-EVO 2A/6I		x	4.7-6.4	5.8	4	1500	45				x	x
						6	1500	53					
									12	1500	35		
									10	1500	50		
32.0318P0001	PV-KBT4-EVO 2A/6X	x		5.9-7.3	5.8	4	1500	45				x	x
						6	1500	53					
									12	1500	35		
									10	1500	50		
32.0319P0001	PV-KST4-EVO 2A/6X		x	5.9-7.3	5.8	4	1500	45				x	x
						6	1500	53					
									12	1500	35		
									10	1500	50		

Note:

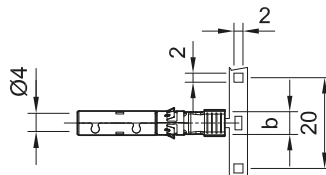
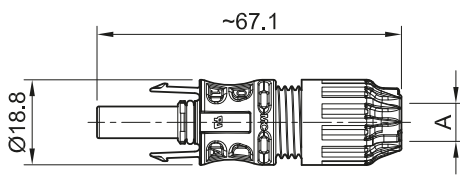
For detailed information concerning the suitable cable gland range, please consult MA298.

Order No.	Type	Socket	Plug	Outer diameter of cable	Width of crimp opening	IEC 62852			UL 6703			Approvals	
				A (mm)	b (mm)	mm ²	DC V	A	AWG	DC V	A	TÜV Rheinland	UR
32.0320P0001	PV-KBT4-EVO 2A/6II	x		6.4-8.4	5.8	4	1500	45				x	x
						6	1500	53					
									12	1500	35		
									10	1500	50		
32.0321P0001	PV-KST4-EVO 2A/6II		x	6.4-8.4	5.8	4	1500	45				x	x
						6	1500	53					
									12	1500	35		
									10	1500	50		
32.0322P0001	PV-KBT4-EVO 2A/10X	x		5.9-7.3	6.5	10	1500	69				x	x
									8	1500	70		
32.0323P0001	PV-KST4-EVO 2A/10X		x	5.9-7.3	6.5	10	1500	69				x	x
									8	1500	70		
32.0324P0001	PV-KBT4-EVO 2A/10II	x		6.4-8.4	6.5	10	1500	69				x	x
									8	1500	70		
32.0325P0001	PV-KST4-EVO 2A/10II		x	6.4-8.4	6.5	10	1500	69				x	x
									8	1500	70		

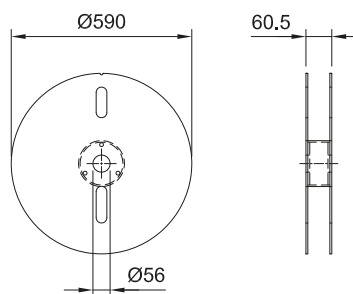
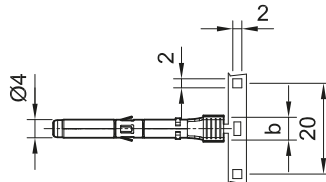
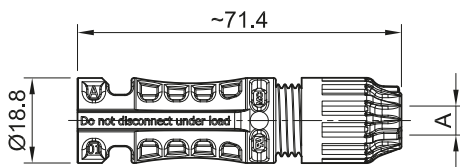
Female and male cable coupler MC4-Evo 2

Contacts on carrier band (including insulating part)

PV-KBT4-EVO 2A/...



PV-KST4-EVO 2A/...



Sealing caps see catalog tools and accessories, page 21

Tools see catalog tools and accessories, page 4 – 16

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Assembly instructions see MA298

www.staubli.com/re-downloads.html → English → Assembly info → MA298

Internationally certified with IEC, UL, JET, cTÜVus. Approved for DC 1500 V (IEC, JET), DC 1500 V (UL) unrestricted access. MULTILAM Technology has proven the qual-

ity and durability several 100 million times since 2004. Suited for all climatic environments due to UV resistance, ammonia and high IP degree. Available as a field and pre-

assembled connector; standard crimping tools can be used. Mating compatibility with MC4 connector family.

Technical data	
Connector system	Ø 4 mm
Ambient temperature range	-40 °C ... +85 °C (IEC) -40 °C ... +90 °C (UL)
Transportation/storage temperature range	-30 °C/+60 °C
Transportation/storage relative humidity	< 70 %
Upper limiting temperature	115 °C
Degree of protection, mated	IP65/IP68 (1 m, 1 h)
Degree of protection, unmated	IP2X
Overvoltage category	III
Contact resistance of plug connectors	< 0.2 mΩ
Locking system	Locking type
Class (IEC)	II
Contact system	MULTILAM
Type of termination	Crimping
Warning	Do not disconnect under load
Contact material	Copper, tin plated
Insulation material	PA
Flame class	UL94-V0
Ammonia resistance (TÜV Rheinland certified acc. to 2 PFG 1911/03.2011)	Q60139020-0001
TÜV-Rheinland certified according to IEC 62852:2014+Amd.1:2020	R 60127169
UL recognized component in accordance with UL6703	E343181
Maximum altitude above sea level for operation	5000 m
Temperature Level according to IEC TS 63126	Level 2

Female and male cable coupler MC4-Evo 2

Contacts on carrier band (including insulating part)

Order No.	Type	Socket	Plug	Outer diameter of cable	Width of crimp opening	IEC 62852			UL 6703			Contacts per reel	Approvals	
						mm ²	DC V	A	AWG	DC V	A		TÜV Rheinland	UR
32.0310P2000	PV-KBT4-EVO 2A/2.5I	x		4.7-6.4	4.0	2.5	1500	39				2000	x	x
									14	1500	30			
32.0311P2000	PV-KST4-EVO 2A/2.5I		x	4.7-6.4	4.0	2.5	1500	39				2000	x	x
									14	1500	30			
32.0312P2000	PV-KBT4-EVO 2A/2.5X	x		5.9-7.3	4.0	2.5	1500	39				2000	x	x
									14	1500	30			
32.0313P2000	PV-KST4-EVO 2A/2.5X		x	5.9-7.3	4.0	2.5	1500	39				2000	x	x
									14	1500	30			
32.0314P2000	PV-KBT4-EVO 2A/2.5II	x		6.4-8.4	4.0	2.5	1500	39				2000	x	x
									14	1500	30			
32.0315P2000	PV-KST4-EVO 2A/2.5II		x	6.4-8.4	4.0	2.5	1500	39				2000	x	x
									14	1500	30			
32.0316P2000	PV-KBT4-EVO 2A/6I	x		4.7-6.4	5.8	4	1500	45				2000	x	x
						6	1500	53						
									12	1500	35			
									10	1500	50			
32.0317P2000	PV-KST4-EVO 2A/6I		x	4.7-6.4	5.8	4	1500	45				2000	x	x
						6	1500	53						
									12	1500	35			
									10	1500	50			
32.0318P2000	PV-KBT4-EVO 2A/6X	x		5.9-7.3	5.8	4	1500	45				2000	x	x
						6	1500	53						
									12	1500	35			
									10	1500	50			
32.0319P2000	PV-KST4-EVO 2A/6X		x	5.9-7.3	5.8	4	1500	45				2000	x	x
						6	1500	53						
									12	1500	35			
									10	1500	50			

Note:

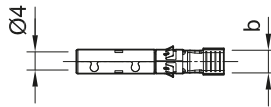
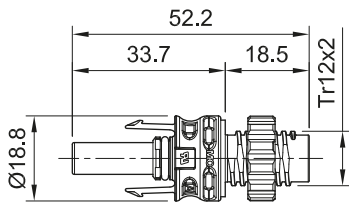
For more detailed information concerning the suitable cable gland range, please consult MA298.

Order No.	Type	Socket	Plug	Outer diameter of cable	Width of crimp opening	IEC 62852			UL 6703			Contacts per reel	Approvals	
				A (mm)	b (mm)	mm ²	DC V	A	AWG	DC V	A		TÜV Rheinland	UR
32.0320P2000	PV-KBT4-EVO 2A/6II	x		6.4-8.4	5.8	4	1500	45				2000	x	x
						6	1500	53						
									12	1500	35			
									10	1500	50			
32.0321P2000	PV-KST4-EVO 2A/6II		x	6.4-8.4	5.8	4	1500	45				2000	x	x
						6	1500	53						
									12	1500	35			
									10	1500	50			
32.0322P1500	PV-KBT4-EVO 2A/10X	x		5.9-7.3	6.5	10	1500	69				1500	x	x
									8	1500	70			
32.0323P1500	PV-KST4-EVO 2A/10X		x	5.9-7.3	6.5	10	1500	69				1500	x	x
									8	1500	70			
32.0324P1500	PV-KBT4-EVO 2A/10II	x		6.4-8.4	6.5	10	1500	69				1500	x	x
									8	1500	70			
32.0325P1500	PV-KST4-EVO 2A/10II		x	6.4-8.4	6.5	10	1500	69				1500	x	x
									8	1500	70			

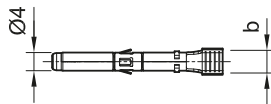
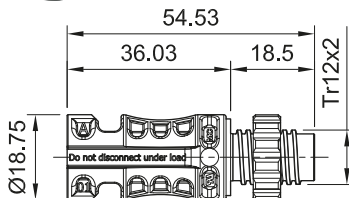
Female and male panel receptacle MC4-Evo 2

Female and male panel receptacles as individual part (including insulating part)

PV-ADB4-EVO 2A/...



PV-ADS4-EVO 2A/...



Sealing caps see catalog tools and accessories, page 21

Tools see catalog tools and accessories, page 4 – 16

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Assembly instructions see MA713

www.staubli.com/re-downloads.html → English → Assembly info → MA713

MC4-Evo 2 panel-receptacle connectors are the interface between the inverter or the distributor housing and string. Assembly directly via the threads or in the perforated plate with the plastic nut (contained in

scope of delivery). Thanks to the D-shape thread the connection is secured against twisting. For 1500 DC V (IEC), 1500 DC V (UL) approved without constraints. Degree of protection IP65/IP68 (1 m, 1 h) guarantees

highest connection safety. Fast and clean connection. Plug compatible with the original MC4 plug connector family. With preassembled flat seal.

Technical data

Connector system	Ø 4 mm
Ambient temperature range	-40 °C...+85 °C (IEC) -40 °C...+90 °C (UL)
Upper limiting temperature	115 °C
Degree of protection, mated	IP65/IP68 (1 m, 1 h)
Degree of protection, unmated	IP2X
Overvoltage category	III
Locking system	Locking type
Contact system	MULTILAM
Type of termination	Crimping
Contact material	Copper, tin plated
Insulation material	PA
Flame class	UL94-V0
TÜV Rheinland certified according to IEC 62852:2014+Amd.1:2020	R 60127171
UL recognized component in accordance with UL6703	E343181
Maximum altitude above sea level for operation	5000 m
Temperature level according to IEC TS 63126	Level 2

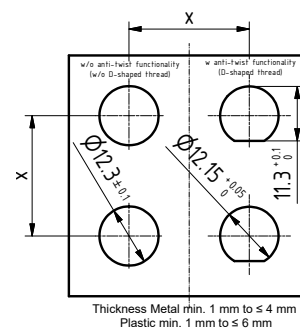
Order No.	Type	Socket	Plug	Width of crimp opening	IEC 62852			UL 6703			Approvals	
				b (mm)	mm²	DC V	A	AWG	DC V	A	TÜV Rheinland	UR
32.0344P0001	PV-ADB4-EVO 2A/2.5	x		4.0	2.5	1500	32				x	x
								14	1500	30		
32.0345P0001	PV-ADS4-EVO 2A/2.5		x	4.0	2.5	1500	32				x	x
								14	1500	30		
32.0346P0001	PV-ADB4-EVO 2A/6	x		5.8	4	1500	42				x	x
					6	1500	47					
								12	1500	35		
								10	1500	50		
32.0347P0001	PV-ADS4-EVO 2A/6		x	5.8	4	1500	42				x	x
					6	1500	47					
								12	1500	35		
								10	1500	50		
32.0352P0001	PV-ADB4-EVO 2A/10	x		6.5	10	1500	62				x	x
								8	1500	70		
32.0353P0001	PV-ADS4-EVO 2A/10		x	6.5	10	1500	62				x	x
								8	1500	70		

Note:

For more detailed information concerning the suitable cable gland range, please consult MA713

Note

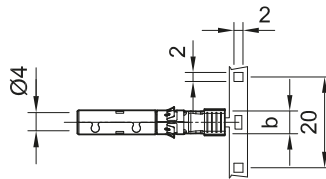
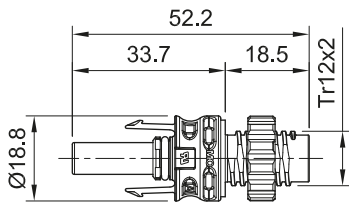
When using panel receptacles in housings (e.g. inverter maker) confirm that the minimum plastic wall thickness shall be between 1 mm and 6 mm; on metal housings, wall thickness shall be between 1 mm and 4 mm. In case of wall thickness undercut or exceedance, the panel receptacle usage in the end-application has to be verified by the installer.



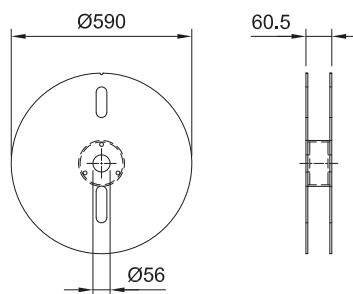
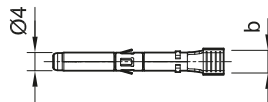
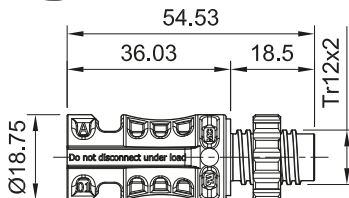
Female and male panel receptacle MC4-Evo 2

Contacts on carrier band (including insulating part)

PV-ADB4-EVO 2A/...



PV-ADS4-EVO 2A/...



Sealing caps see catalog tools and accessories, page 21

Tools see catalog tools and accessories, page 4 – 16

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Assembly instructions see MA713

www.staubli.com/re-downloads.html → English → Assembly info → MA713

MC4-Evo 2 panel-receptacle connectors are the interface between the inverter or the distributor housing and string. Assembly directly via the threads or in the perforated plate with the plastic nut (contained in

scope of delivery). Thanks to the D-shape thread the connection is secured against twisting. For 1500 DC V(IEC), 1500 DC V (UL) approved without constraints. Degree of protection IP65/IP68 (1 m, 1 h) guarantees

highest connection safety. Fast and clean connection. Plug compatible with the original MC4 plug connector family. With preassembled flat seal.

Technical data	
Connector system	Ø 4 mm
Ambient temperature range	-40 °C...+85 °C (IEC) -40 °C...+90 °C (UL)
Upper limiting temperature	115 °C
Degree of protection, mated	IP65/IP68 (1 m, 1 h)
Degree of protection, unmated	IP2X
Overvoltage category	III
Locking system	Locking type
Contact system	MULTILAM
Type of termination	Crimping
Contact material	Copper, tin plated
Insulation material	PA
Flame class	UL94-V0
TÜV Rheinland certified according to IEC 62852:2014+Amd.1:2020	R 60127171
UL recognized component in accordance with UL6703	E343181
Maximum altitude above sea level for operation	5000 m
Temperature level according to IEC TS 63126	Level 2

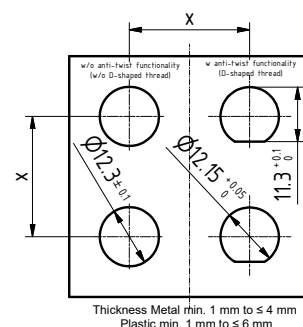
Order No.	Type	Socket	Plug	Width of crimp opening	IEC 62852			UL 6703			Contacts per reel	Approvals	
					mm ²	DC V	A	AWG	DC V	A		TÜV Rheinland	UR
32.0344P2000	PV-ADB4-EVO 2A/2.5	x		4.0	2.5	1500	32				2000	x	x
								14	1500	30			
32.0345P2000	PV-ADS4-EVO 2A/2.5		x	4.0	2.5	1500	32				2000	x	x
								14	1500	30			
32.0346P2000	PV-ADB4-EVO 2A/6	x		5.8	4	1500	42				2000	x	x
					6	1500	47						
								12	1500	35			
								10	1500	50			
32.0347P2000	PV-ADS4-EVO 2A/6		x	5.8	4	1500	42				2000	x	x
					6	1500	47						
								12	1500	35			
								10	1500	50			
32.0352P1500	PV-ADB4-EVO 2A/10	x		6.5	10	1500	62				1500	x	x
								8	1500	70			
32.0353P1500	PV-ADS4-EVO 2A/10		x	6.5	10	1500	62				1500	x	x
								8	1500	70			

Note:

For more detailed information concerning the suitable cable gland range, please consult MA713

Note

When using panel receptacles in housings (e.g. inverter maker) confirm that the minimum plastic wall thickness shall be between 1 mm and 6 mm; on metal housings, wall thickness shall be between 1 mm and 4 mm. In case of wall thickness undercut or exceedance, the panel receptacle usage in the end-application has to be verified by the installer.





● Stäubli Units ○ Representatives/Agents

Global presence of the Stäubli Group

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