


PHOTOVOLTAIC

Innovations 2014



LAPP GROUP



Solar energy, powered by Lapp









Solar energy is clean energy – and clean energy is the future. As a responsible and environmentally aware company, the Lapp Group has been researching the power of the sun for many years now. Thanks to our constantly increasing specialist expertise in this field, time has seen us advance to one of the leading suppliers and technology partners of the photovoltaic industry. To ensure that we continue “reaching for the sun”, the Lapp Group is working specifically on ever more ingenious technology solutions – for an even more efficient utilisation of solar energy.

Whether it's solar units for family homes or industrial-scale plants – Lapp supplies a whole range of products specifically tailored to photovoltaic systems from cables, connectors and accessories right up to the complete wiring of all plant types. And Lapp is also right by its customers' side in every phase from planning to implementation, providing consultation and assistance – with a keen eye on the market's special requirements.































Through close collaboration with customers, planners and specialised research institutes, a multitude of specialist products such as ÖLFLEX® solar cables, EPIC® solar connector systems and junction boxes as well as special SKINTOP® cable glands have been developed and tested. As a result, we observe the highest of quality standards, making our products one hundred percent reliable. Our products can be used throughout the world and naturally also comply with the RoHS directive. Profit from our know-how.

Legend for icons

INDUSTRIES

	Automation
	e-Mobility
	Food & Beverage
	Mechanical and Plant Engineering
	Oil & Gas
	Rail
	Solar Energy
	Wind Energy

PRODUCT CHARACTERISTICS

	Good chemical resistance		Suitable for outdoor use
	ETIM		Flame-retardant
	Wide clamping range		Halogen-free
	Heat-resistant		Cold-resistant
	Assembly time		Corrosion-resistant
	Oil-resistant		Maximum vibration protection
	Space requirement		Mechanical resistance
	Power chain		Low weight
	Acid-resistant		Optimum strain relief
	Reliability		Robust
	Integrated SKINTOP® cable gland		Temperature-resistant
	Voltage		Torsion-resistant
	Connector with standard housing unit		UV-resistant
	Interference signals		Waterproof
	Variety of approval certifications		Torsion load

Please note: the purpose of the icons is to provide you with a quick overview and a rough indication of the product features to which the corresponding information relates. You can find details of product characteristics in the “technical data” sections on the product pages.



THIS CATALOGUE IS VALID FROM JUNIE 2014.



New

ÖLFLEX® SOLAR XLR 1,5kV

Electron beam cross-linked solar cables for rated voltage 1500 V DC - TÜV type



Info

- TÜV Type PV 1500DC-F (2PFG 1990/05.12) (approval in preparation)

Benefits

- Reduction of flame propagation and of toxic combustion gases in the event of fire
- Robust against mechanical impacts
- Extruded colour stripe serves as reverse polarity protection during installation.
- Exact quantity control during installation by meter marking on the cable sheath

Application range

- For use in photovoltaic-systems with rated voltage 1500 V DC
- For the cabling between the solar modules and as extension cable between the module strings and the DC/AC inverter
- Gable and flat roof photovoltaic systems
- Photovoltaic plants and solar parks
- Flexible or building-integrated PV systems

Product features

- Weather/UV-resistant acc. to HD 605/A1
- Ozone-resistant according to EN 50396
- Halogen-free and flame-retardant
- Good notch and abrasion resistance
- XLR 1,5 kV = X-Linked Radiated 1,5 kV
- Proven electron beam cross-linked quality
- Version without colour stripe for size up to 300 mm² on request

Norm references / Approvals

- TÜV Type PV 1500DC-F (2PFG 1990/05.12) (approval in preparation)

Design

- Fine-wire, tinned-copper conductor
- Core insulation made of electron beam cross-linked copolymer
- Colour of core insulation: white
- Outer sheath made of electron beam cross-linked copolymer
- Outer sheath colour: black respectively black with red or blue stripe

Technical data



Classification

ETIM 5.0 Class-ID: EC001578
ETIM 5.0 Class-Description:
Flexible cable



Conductor stranding

Fine wire according to VDE 0295, class 5/IEC 60228 class 5



Minimum bending radius

Fixed installation: 4 x outer diameter



Nominal voltage

DC U_0 : 1.5 kV
maximum permitted voltage:
DC 1.8 kV (conductor-earth)



Test voltage

AC 11 kV



Current rating

Im compliance with TÜV requirements spec. 2 PFG 1990/05.12 table 2.1



Temperature range

-40 °C to +120 °C max. conductor temperature based on EN 60216-1
Ambient temperature range according to TÜV 2 PFG 1990/05.12: -40 °C to +90 °C

Article number	Conductor cross-section (mm ²)	Outer diameter (mm)	Copper index (kg/km)	Weight (kg/km)
ÖLFLEX® SOLAR XLR 1,5kV				
Core insulation: white / Outer sheath: black				
1023410	2.5	5.6	24.0	52
1023411	4.0	6.1	38.4	70
1023412	6.0	6.7	57.6	93
1023413	10.0	7.7	96.0	145
1023414	16.0	9.1	153.6	215
Core insulation: white / Outer sheath: black with red stripe				
1023425	2.5	5.6	24.0	52
1023426	4.0	6.1	38.4	70
1023427	6.0	6.7	57.6	93
1023428	10.0	7.7	96.0	145
1023429	16.0	9.1	153.6	215
Core insulation: white / Outer sheath: black with blue stripe				
1023435	2.5	5.6	24.0	52
1023436	4.0	6.1	38.4	70
1023437	6.0	6.7	57.6	93
1023438	10.0	7.7	96.0	145
1023439	16.0	9.1	153.6	215

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: Coil 100 m; Drum (500; 1000) m

Photographs are not to scale and do not represent detailed images of the respective products.

Accessories

- EPIC® SOLAR 4 Plus M
- EPIC® SOLAR 4 Plus F
- UNIVERSAL STRIP stripping and cutting tool
- KS 20 cable shears



New

ÖLFLEX® SOLAR XLR WP

Electron beam cross-linked solar cables with optimized performance in water - TÜV type



Info

- Optimised cable design - constant high volume resistance even after long-term period in water
- TÜV Type PV1-F (2PFG 1169/08.07) (approval in preparation)



Benefits

- The alternative for long-term storage in water, e.g. as it can occur in case after flooding or in buried conduits
- Reduction of flame propagation and of toxic combustion gases in the event of fire
- Robust against mechanical impacts
- Extruded colour stripe serves as reverse polarity protection during installation.
- Exact quantity control during installation by meter marking on the cable sheath

Application range

- For underground installation in conduits, in which water, heat and moisture can accumulate
- For the cabling between the solar modules and as extension cable between the module strings and the DC/AC inverter
- Gable and flat roof photovoltaic systems
- Photovoltaic plants and solar parks
- Flexible or building-integrated PV systems

Product features

- Weather/UV-resistant acc. to HD 605/A1
- Ozone-resistant according to EN 50396
- Halogen-free and flame-retardant
- Good notch and abrasion resistance
- XLR WP = X-Linked Radiated Water-Proof Proven electron beam cross-linked quality

Norm references / Approvals

- TÜV Type PV1-F (2PFG 1169/08.07) (approval in preparation)

Design

- Fine-wire, tinned-copper conductor
- Core insulation made of electron beam cross-linked copolymer
- Colour of core insulation: white
- Outer sheath made of electron beam cross-linked copolymer
- Outer sheath colour: black respectively black with red or blue stripe

Technical data

	Classification ETIM 5.0 Class-ID: EC001578 ETIM 5.0 Class-Description: Flexible cable
	Conductor stranding Fine wire according to VDE 0295, class 5/IEC 60228 class 5
	Minimum bending radius Fixed installation: 4 x outer diameter
	Nominal voltage AC U_o/U : 600/1000 V DC U_o/U : 900/1500 V Max. permissible operating voltage: DC 1,8 kV (Conductor-conductor, non earthed system)
	Test voltage AC 6500 V
	Current rating Im compliance with TÜV requirements spec. 2 PFG 1169/08.2007 table 1
	Temperature range -40 °C to +120 °C max. conductor temperature based on EN 60216-1 Ambient temperature range according to TÜV 2 PFG 1169/08.07: -40 °C to +90 °C

Article number	Conductor cross-section (mm²)	Outer diameter (mm)	Copper index (kg/km)	Weight (kg/km)
ÖLFLEX® SOLAR XLR WP				
Core insulation: white / Outer sheath: black				
1023501	2.5	5.2	24.0	48
1023502	4.0	5.6	38.4	65
1023503	6.0	6.2	57.6	88
1023504	10.0	7.4	96.0	135
1023505	16.0	8.7	153.6	207
Core insulation: white / Outer sheath: black with red stripe				
1023521	2.5	5.2	24.0	48
1023522	4.0	5.6	38.4	65
1023523	6.0	6.2	57.6	88
1023524	10.0	7.4	96.0	135
1023525	16.0	8.7	153.6	207
Core insulation: white / Outer sheath: black with blue stripe				
1023526	2.5	5.2	24.0	48
1023527	4.0	5.6	38.4	65
1023528	6.0	6.2	57.6	88
1023529	10.0	7.4	96.0	135
1023530	16.0	8.7	153.6	207

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Copper price basis: EUR 150/100kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: Coil 100 m; Drum (500; 1000) m

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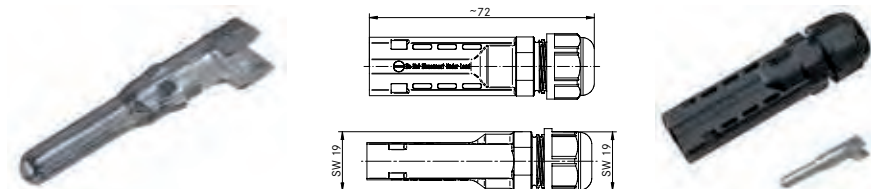
Accessories

- EPIC® SOLAR 4Plus M
- EPIC® SOLAR 4Plus F
- UNIVERSAL STRIP stripping and cutting tool
- KS 20 cable shears



New

EPIC® SOLAR 4Plus M

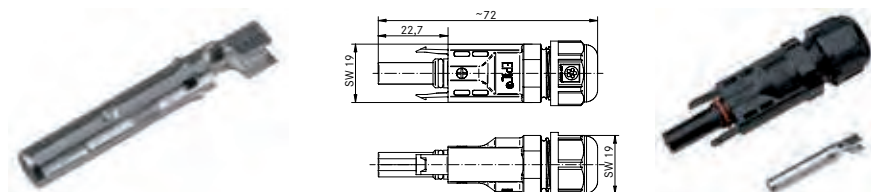


Info

- 4 mm connector system with double hook
- For photovoltaic plants up to 1.5 kV system voltage

New

EPIC® SOLAR 4Plus F



Info

- 4 mm connector system with double hook
- For photovoltaic plants up to 1.5 kV system voltage

Benefits

- Low contact-resistance for efficient power transmission
- Crimp connection for field mounting
- Suitable for various ÖLFLEX® SOLAR cables
- Reliable connection, only possible to unlock with a tool, according NEC standard

Application range

- Photovoltaic plants
- Crystalline and thin-film constructions
- Solartracker

Product features

- 4 mm connector system with double hook
- 10 mm² maximum crimp connection for high currents and long cables
- TÜV Rheinland: in preparation
- UL pending

Suitable cables

- ÖLFLEX® SOLAR XLR-R
- ÖLFLEX® SOLAR XLR WP
- ÖLFLEX® SOLAR XLS-R
- ÖLFLEX® SOLAR XLR 1,5kV

Suitable tools

- EPIC® SOLAR TOOL
- For easier assembly of the plastic parts, use EPIC® SOLAR 4Plus Assembly Tool Set (44428241)
- For assembly of the 10 mm² contacts use crimping tool 11147000, crimping die 44428243 and locator 44428244. Also suitable for 4 mm² and 6 mm².

Suitable connectors

- EPIC® SOLAR 4 THIN
- EPIC® SOLAR 4
- EPIC® SOLAR 4 Splitter
- EPIC® SOLAR 4 Built in socket

Technical data

Rated voltage (V)

1.5 kV

Rated impulse voltage

16 kV

Degree of soiling

3

Contact resistance

< 0.5 mOhm



Protection rating

IP68 (10 h / 1 m)

Protection class

II

Cycle of mechanical operation

100



Temperature range

-40 °C ... +105 °C

Article number	Article designation	Cross-section (mm²)	Cable clamping range (mm)	Rated current (A)	PU
EPIC® SOLAR 4Plus male field-mountable, inclusive contacts					
44428233	EPIC® SOLAR 4Plus M 2.5 mm²	2,5	4.8 - 6.0	22.0	100
44428235	EPIC® SOLAR 4Plus M 4 mm² ... 6 mm²	4 - 6	5.2 - 7.1	30.0	100
44428237	EPIC® SOLAR 4Plus M 10 mm²	10	7.0 - 10.0	35.0	100
EPIC® SOLAR 4Plus male contacts as spare part					
44428217	EPIC® SOLAR 4Plus PIN M 2,5 mm²	2,5			100
44428219	EPIC® SOLAR 4Plus PIN M 4 mm² ... 6 mm²	4 - 6			100
44428239	EPIC® SOLAR 4Plus PIN M 10 mm²	10			100
EPIC® SOLAR 4Plus female field-mountable, inclusive contacts					
44428234	EPIC® SOLAR 4Plus F 2.5 mm²	2,5	4.8 - 6.0	22.0	100
44428236	EPIC® SOLAR 4Plus F 4 mm² ... 6 mm²	4 - 6	5.2 - 6.0	30.0	100
44428238	EPIC® SOLAR 4Plus F 10 mm²	10	7.0 - 10.0	35.0	100
EPIC® SOLAR 4Plus female contacts as spare part					
44428218	EPIC® SOLAR 4Plus PIN F 2,5 mm²	2,5			100
44428220	EPIC® SOLAR 4Plus PIN F 4 mm² ... 6 mm²	4 - 6			100
44428240	EPIC® SOLAR 4Plus PIN F 10 mm²	10			100
EPIC® SOLAR 4Plus assembly tool					
44428241	EPIC® SOLAR 4Plus Assembly Tool Set				1

Photographs are not to scale and do not represent detailed images of the respective products.



Info

- 4 mm connector system with double hook
- Splitter for parallel connection of photovoltaic modules

Technical data

Rated voltage (V)
1000 V AC/DC

Rated impulse voltage
8 kV

Rated current (A)
30 A

Degree of soiling
3

IP Protection rating
IP65/IP67

Protection class
II

Cycle of mechanical operation
100

Temperature range
-40 °C ... +85 °C

Benefits

- Splitter for parallel connection of PV-modules and strings
- Easy plug and play
- Fixing option for a clear installation with a Ø 5 mm mounting hole

Application range

- Photovoltaic plants
- Crystalline and thin-film constructions
- Solartracker

Product features

- Mateable with EPIC® SOLAR 4 THIN, EPIC® SOLAR 4 PLUS, EPIC® SOLAR 4
- Splitter MFF 1x connection male, 2x connection female
- Splitter MFF 1x connection female, 2x connection male

Suitable connectors

- EPIC® SOLAR 4
- EPIC® SOLAR 4 THIN
- EPIC® SOLAR 4Plus
- EPIC® SOLAR 4 Built in socket



Article number	Article designation	PU
EPIC® SOLAR 4 Splitter		
44428226	EPIC® SOLAR 4 Splitter MFF	25
44428227	EPIC® SOLAR 4 Splitter FMM	25

Photographs are not to scale and do not represent detailed images of the respective products.



Info

- 4 mm connector system with double hook
- Built in socket for use in inverters

Technical data

Rated voltage (V)
1000 V AC/DC

Rated impulse voltage
8 kV

Rated current (A)
30 A

Degree of soiling
3

Contact resistance
< 0.5 mOhm

IP Protection rating
IP 67

Protection class
II

Cycle of mechanical operation
100

Temperature range
-40 °C ... +105 °C

Benefits

- Built in fitting for inverters, PV string circuit breakers and fuse boxes

Application range

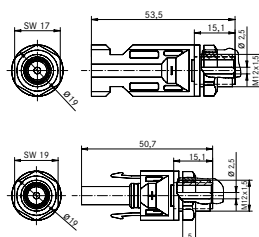
- Photovoltaic plants
- Inverters
- PV string circuit breakers

Product features

- PV panel connector to be screwed directly or with the supplied plastic locknut
- Internal plug connector diameter 2.5 mm, flush connector pin
- Installation hole: drilling diameter 12 mm
- Other types of connection on request

Suitable connectors

- EPIC® SOLAR 4
- EPIC® SOLAR 4 THIN
- EPIC® SOLAR 4Plus
- EPIC® SOLAR 4 Splitter



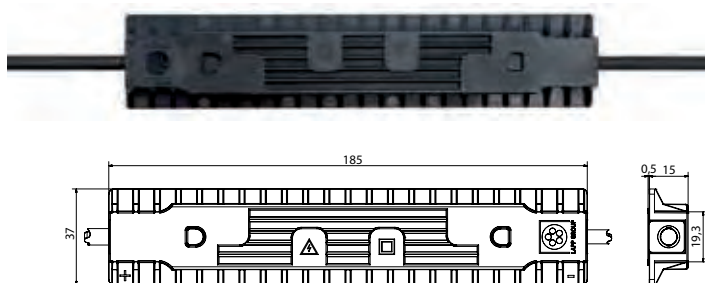
Article number	Article designation	PU
EPIC® SOLAR 4 built in socket with counter nut		
44428222	EPIC® SOLAR 4 AD M Pin 2.5	100
44428223	EPIC® SOLAR 4 AD F Pin 2.5	100

Photographs are not to scale and do not represent detailed images of the respective products.



New

EPIC® SOLAR MAP Easy



Info

- Compact, automatic mount junction box for crystalline photovoltaic modules with three cell strings
- New connection technology CLINCHING, joins different parts without the use of heat, while remaining corrosion free.

Benefits

- New connection technology, CLINCHING, allows two parts to be quickly and easily joined together, with no heat required
- EPIC® SOLAR MAP Easy is $\frac{1}{3}$ the size of comparable market junction boxes, saving costs, weight and packaging
- Due to the small volume of the junction box, no membrane for pressure compensation is necessary, thus increasing the watertightness
- Compact EPIC® SOLAR MAP Easy can be built very close to the edge of the module and allows the connections of the ribbons from the side without 90 ° kinking (change of direction)
- Simple automatic or manual assembly, done quickly in a few steps.

Application range

- Crystalline PV-Modules
- Solartracker

Product features

- EPIC® SOLAR MAP Easy including 1 m ÖLFLEX® SOLAR XLR-R 4 mm² and PV-connector EPIC® SOLAR 4Plus
- New diodes with a very large chip for best heat removal
- Serial number on each box for unique identification and traceability
- Durable and solid strain relief by means of stainless steel retaining clip
- TÜV Rheinland: in preparation

Technical data

Rated voltage (V)

1000 V DC

Rated current (A)

12 A

Degree of soiling

3



Protection rating

IP 65 / IP 67

Protection class

II



Temperature range

-40 °C ... +105 °C

Article number	Article	PU
EPIC® SOLAR MAP Easy		
44428242	EPIC® SOLAR MAP Easy 3/12 ES4Plus 1 m	1

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The following applies for the use of our products

The conformity of our products to the relevant European directives and compliance with the provisions contained therein shall be indicated by the CE marking.

The safety of our products is closely associated with how they are used. A knowledge of and adherence to the respective international/national standards of use (e.g. DIN VDE 0100; 0298)

are mandatory. There are particular risks if installed improperly. This applies to all our products/items:

Processing is only to be done by an authorised electrician! Otherwise, there is the risk of an electric shock or a fire ignited by electric current!

Safety

Without exception, our products are tested for application safety in accordance with defined standards and our own regulations, which complement the standards. Relevant legal requirements and safety regulations are also observed. Provided due care and attention is paid, the possibility of product-specific danger to the user may thus reasonably be excluded. Where products are used carelessly or incorrectly, however, considerable

danger to persons and the environment may arise. For this reason, our cables must only be processed and/or used responsibly by trained electricians or specialists. This catalogue contains general information for the application of each product. Independent of such information, the application standards DIN VDE 0298 and DIN VDE 0891 for cables will apply. Excerpts from these standards, as well as complementary selection

and application tables, design and installation guidelines, are contained in the tables in the appendix to the current main catalogue. Our machines and installation tools are – where necessary – designed in accordance with the machine guidelines and display the CE identification mark. It must be noted, however, that our machines and installation tools must only be used by trained specialist personnel and for the purpose for which they

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ÖLFLEX®

AVS Stuttgart

UNITRONIC®

ETHERLINE®

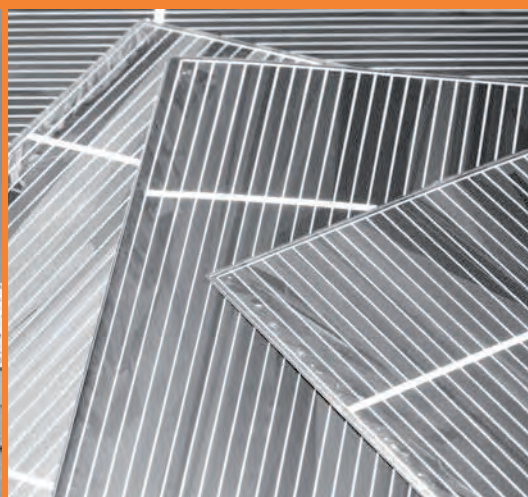
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EPIC®

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