

Photovoltaic Connection Technology



LAPP GROUP



Welcome

Trust is not given easily - we have earned it!

More than 30 years of continuous and pioneering development work in the area of electronic components – and just as dynamic today as we were on the very first day, we challenge ourselves everyday.

Our success factor? "Knowledge transfer!" With the transfer of new cooling technologies for computers into the photovoltaic sector, we achieved the decisive breakthrough. Today we are an international company with revolutionary product developments, patented worldwide.

Together we are successful

In cooperation with the Lapp Group we develop and sell future-proof, trendsetting product innovations. Together we are continuously expanding our global market position. Our world revolves around the high-quality material aluminium. It is unbeatable as far as reliability, performance and long-term value are concerned. In addition to the aluminium junction boxes we offer jointly with the Lapp Group the entire range of products for connection technology in photovoltaics. From junction boxes for thin film modules and organic photovoltaic panels, high-quality connectors and related accessories, to future-oriented system solutions with integrated „intelligence“. Innovation is what drives us forward and secures our future. You have a challenge – we have the solution.

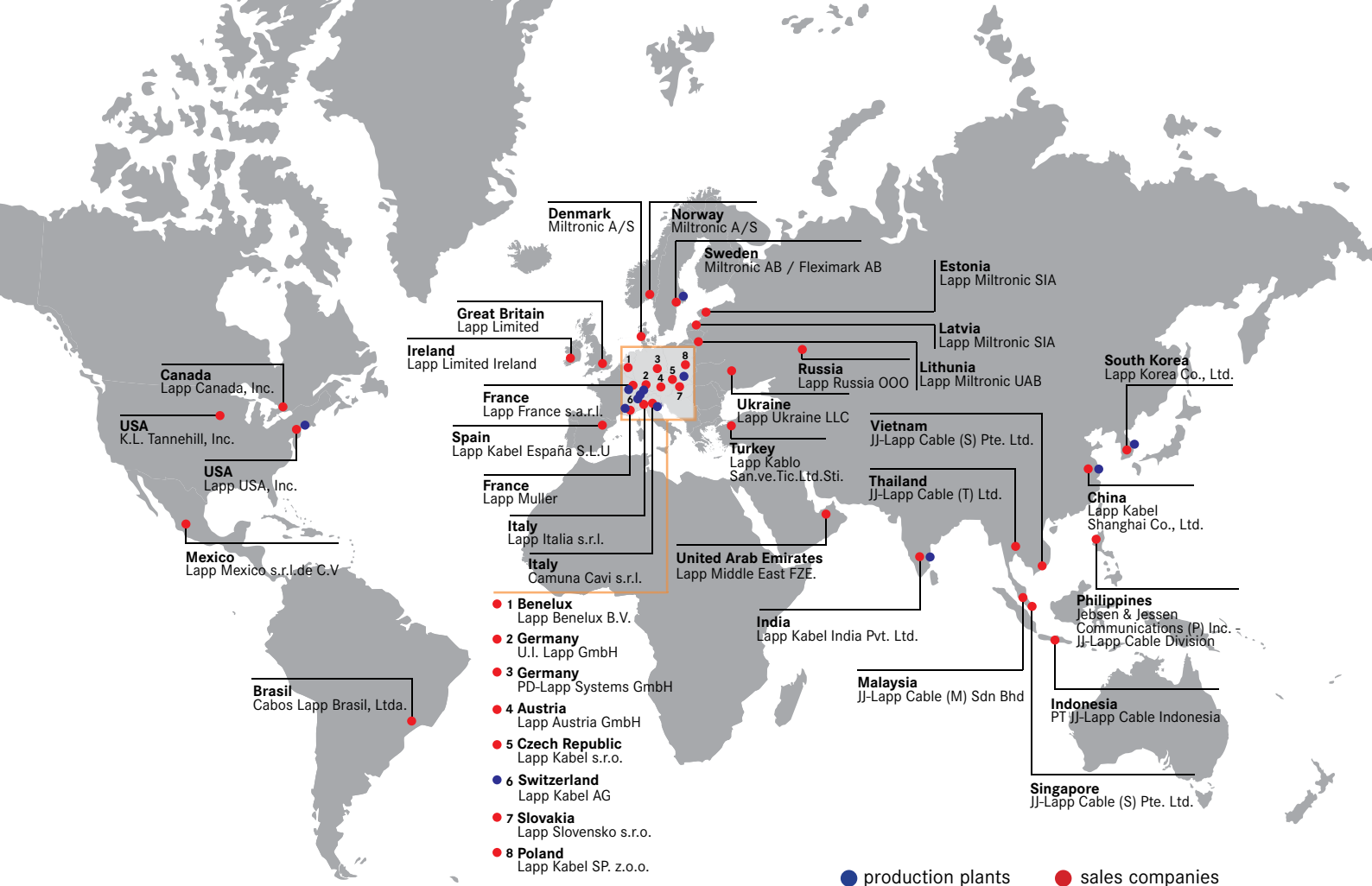
We invite you to get to know our contribution to the success of photovoltaics!

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At home in Stuttgart, but known all over the world

The World of Lapp is based in Stuttgart. This is where it all started for our company, which was founded in 1959 as U.I. Lapp KG (now U.I. Lapp GmbH). From its headquarters in Stuttgart we have determinedly evolved to a global player – with currently 15 production plants in Europe, Asia and America, 40 sales companies, more than 100 sales partners and 2,800 employees. The larger Lapp companies such as Russia, India, China, Canada and Mexico have their own warehouses. The others are promptly supplied through our high-performance logistics centres. At our Lapp centres we are also strongly committed to enhancing the knowledge of our employees and customers. After all, knowledge paves our success.

One of our most successful “products” is the proximity to our customers. On one hand, we practice intensive dialogue with designers and planners, manufacturers and users. This enables us to identify new requirements and trends at a much earlier stage, to quickly provide you with suitable solutions. Innovation leadership put into active practice.

On the other hand, proximity to our customers really means something to us: our presence extends all round the globe. As a reliable partner on a local basis we support our customers in exploiting markets by providing them with short delivery times and low logistics costs.

Our current addresses see
www.lappgroup.com/worldwide

Our commitment to solar technology

“Nothing is more environment-friendly than receiving energy directly from the sun. This is our commitment to the solar technology,” says Siegbert Lapp, member of the board of Lapp Holding AG.

As an environmental-orientated company and one of the leading suppliers for the wind and solar industry, the Lapp Group also wants to take part in this trend.

Complete range for photovoltaics

The use of solar energy has been increasing for many years and this trend is continuing. Photovoltaics has a wide range of uses, from major energy plants to small domestic applications.

The fact that we recognised the potential of this market very early on and have built up specialist expertise in this area demonstrates once again the innovative tradition of our company. Our offering ranges from developing tailored products to advising you on planning and conversion matters.

After taking into account the full range of operational requirements, Lapp offers a specifically tailored comprehensive range of cables, connectors and photovoltaic accessories for cabling photovoltaic plants – we are the system of choice!

In collaboration with users, the TÜV (German Association for Technical Inspection) and the North American UL approval organisation, a variety of tests have been carried out on our ÖLFLEX® cables, SOLAR cables, SKINTOP® cable glands and EPIC® SOLAR connectors to guarantee highest quality standards. Our products can be used throughout the world and naturally also comply with the RoHS directive.



A place in the sun

It is a massive area, a thin layer of modules stretching out as far as the eye can see. With a total of 540,000 modules, it will be one of the largest photovoltaic power plants in the world, located in the province of Lopburi in Thailand.

Neutral Energy Development Co. Ltd. (NEC) ordered 1,200 kilometres of cross-linked ÖLFLEX® SOLAR XLR cables for this installation from JJ-Lapp Cable in Singapore, a joint venture company of the Lapp Group.

The ÖLFLEX® SOLAR XLR is one of the highlights of the extensive Lapp Group photovoltaic programme. It has been approved according to the TÜV design standard (Technical Inspection Association) and boasts a particularly high thermal resistance (-40 to +120°C).

This guarantees a long life, even under the most extreme climate conditions. The cables are used in the Lopburi installation for

the cabling of the thin-layer modules, as well as for connecting the individual rows of modules and linking up to the inverter.

When it is finished, the installation is set to generate 55 megawatts of power, enough to supply 70,000 households with electricity.

One of the world's largest photovoltaic power plants is being installed in the Lopburi province, Thailand. – The connections are made using ÖLFLEX® SOLAR by Lapp



FPE AL003



Info

- Optimally cooled diodes
- Crystalline modules

■ Benefits

- Junction boxes for ambient resistant cabling and connecting of photovoltaic systems
- Aluminium acts as heat sink and allows the cooling of the diodes. This increases the lifetime of the diodes
- The aluminium junction box reduces the risk of diode failures and thereby the risk of efficiency losses, hot spots and fire hazards
- The durability of the aluminium junction box allows a very long lifetime
- The PTFE membrane prevents humidity from entering the box and avoids long-term contact corrosion

■ Application range

- The junction box is sealed to the backside of the solar module. The ribbons are connected to the junction box via a terminal block
- The connection is secured through the pre-assembled EPIC® SOLAR 4 THIN connectors

■ Product features

- Robust junction boxes for connecting solar modules
- Version with 3 diodes for three-string modules
- Version with 4 diodes for four-string modules
- Dimensions (WxHxD) 150x25x131
- Housing made of aluminium, inner box made of PPE+PS
- Standard cable length: 1 m (other lengths on request)
- Standards: DIN V VDE V 0126-5, IEC 61730, IEC 61215 and UL 1703

■ Technical data

Rated voltage

1000 V DC – IEC
600 V DC – UL

Rated current

3 diodes: 12,5 A
4 diodes: 11,0 A

Contacts

Copper alloy

Connection method

Terminal clamps for ribbons up to 6 mm



Degree of protection

IP67

Protection class

II



Range of operating temperature

-40 °C up to +105 °C

| Part number | Article description | No of ribbons | No of diodes | Rated current (IEC 61215) | Test current (IEC 61215) |
|--------------|---------------------|---------------|--------------|---------------------------|--------------------------|
| AL003 | | | | | |
| 0339011300 | FPE AL003/3 | 4 | 3 | 12,5 A | 15,6 A |
| 0339021300 | FPE AL003/3 UL | 4 | 3 | 12,5 A | 15,6 A |
| 0349011300 | FPE AL003/4 | 5 | 4 | 11 A | 13,75 A |
| 0349021300 | FPE AL003/4 UL | 5 | 4 | 11 A | 13,75 A |

FPE AL005



Info

- Optimally cooled diodes
- Fully automated assembly
- Crystalline modules



■ Benefits

- Junction boxes for ambient resistant cabling and connecting of photovoltaic systems
- Aluminium acts as heat sink and allows the cooling of the diodes. This increases the lifetime of the diodes
- The aluminium junction box reduces the risk of diode failures and thereby the risk of efficiency losses, hot spots and fire hazards
- The durability of the aluminium junction box allows a very long lifetime
- The PTFE membrane prevents humidity from entering the box and avoids long-term contact corrosion
- The junction box is delivered with a closed lid and does not require the lid to be removed during assembly
- Easy-Fit allows for fast and fully automated assembling
- Traceability of every junction box through barcodes

■ Application range

- The junction box is sealed to the backside of the solar module. The ribbons are connected to the junction box via a positioning block
- The connection is secured through the pre-assembled EPIC® SOLAR 4 THIN connectors

■ Product features

- Robust junction boxes for connecting solar modules
- Version with 3 diodes for three-string modules
- Dimensions (WxHxD) 150x26x174
- Housing made of aluminium, inner box made of PC
- Standard cable length: 1 m (other lengths on request)
- Standards: DIN V VDE V 0126-5, IEC 61730, IEC 61215

■ Technical data

- Rated voltage**
1000 V DC – IEC
- Rated current**
16,0 A
- Contacts**
Copper alloy
- Connection method**
Terminal clamps for ribbons up to 9 mm
- Degree of protection**
IP67
- Protection class**
II
- Range of operating temperature**
-40 °C up to +105 °C

| Part number | Article description | No of ribbons | No of diodes | Rated current (IEC 61215) | Test current (IEC 61215) |
|--------------|---------------------|---------------|--------------|---------------------------|--------------------------|
| AL005 | | | | | |
| 0539011300 | FPE AL005 | 4 | 3 | 16 A | 20 A |

FPE AL008



Info

- Optimally cooled diodes
- Crystalline modules

■ Benefits

- Junction boxes for ambient resistant cabling and connecting of photovoltaic systems
- Aluminium acts as heat sink and allows the cooling of the diodes. This increases the lifetime of the diodes
- The aluminium junction box reduces the risk of diode failures and thereby the risk of efficiency losses, hot spots and fire hazards
- The durability of the aluminium junction box allows a very long lifetime
- The PTFE membrane prevents humidity from entering the box and avoids long-term contact corrosion
- Traceability of every junction box through barcodes

■ Application range

- The junction box is sealed to the backside of the solar module. The ribbons are connected to the junction box via a terminal block
- The connection is secured through the pre-assembled EPIC® SOLAR 4 THIN connectors

■ Product features

- Robust junction boxes for connecting solar modules
- Version with 3 diodes for three-string modules
- Version with 4 diodes for four-string modules
- Dimensions FPEAL008 with 3 diodes (WxHxD) 148x25x132
- Dimensions FPEAL008/4 with 4 diodes (WxHxD) 170x25x132
- Housing made of aluminium, inner box made of PPE+PS
- Standard cable length: 1 m (other lengths on request)
- Standards: DIN V VDE V 0126-5, IEC 61730, IEC 61215 and UL 1703

■ Technical data

Rated voltage

1000 V DC – IEC
600 V DC – UL

Rated current

3 diodes: 12,0 A
4 diodes: 10,0 A

Contacts

Copper alloy

Connection method

Terminal clamps for ribbons up to 6 mm



Degree of protection

IP67

Protection class

II



Range of operating temperature

-40 °C up to +105 °C

| Part number | Article description | No of ribbons | No of diodes | Rated current (IEC 61215) | Test current (IEC 61215) |
|--------------|---------------------|---------------|--------------|---------------------------|--------------------------|
| AL008 | | | | | |
| 0837011300 | FPE AL008/3 | 4 | 3 | 8 A | 10 A |
| 0830011300 | FPE AL008/3 | 4 | 3 | 10 A | 12,5 A |
| 0838011300 | FPE AL008/3 | 4 | 3 | 12 A | 15 A |
| 0848011300 | FPE AL008/4 | 5 | 4 | 10 A | 12,5 A |

FPE PL008



Info

- Moulded cable gland
- Crystalline modules



■ Benefits

- Junction boxes for ambient resistant cabling and connecting of photovoltaic systems
- The PTFE membrane prevents humidity from entering the box and avoids long-term contact corrosion
- Traceability of every junction box through barcodes
- Identical design allows for fully compatible assembling process of the plastic junction box and aluminium junction box
- Cable glands moulded to the housing warrant the tightness of the junction box

■ Application range

- The junction box is sealed to the backside of the solar module. The ribbons are connected to the junction box via a terminal block
- The connection is secured through the pre-assembled EPIC® SOLAR 4 THIN connectors

■ Product features

- Robust junction boxes for connecting solar modules
- Version with 3 diodes for three-string modules
- Dimensions (WxHxD) 120x24x109
- Housing made of PPE+PS, PC
- Standard cable length: 1 m (other lengths on request)
- Standards: DIN V VDE V 0126-5, IEC 61730, IEC 61215 and UL 1703
- TÜV and UL in preparation

■ Technical data

Rated voltage

1000 V DC – IEC
600 V DC – UL

Rated current

11,0 A

Contacts

Copper alloy

Connection method

Terminal clamps for ribbons up to 6 mm



Degree of protection

IP67

Protection class

II



Range of operating temperature

-40 °C up to +105 °C

| Part number | Article description | No of ribbons | No of diodes | Rated current (IEC 61215) | Test current (IEC 61215) |
|--------------|---------------------|---------------|--------------|------------------------------|-----------------------------|
| PL008 | | | | | |
| 0837211300 | FPE PL008 | 4 | 3 | 7 A | 8,75 A |
| 0838211300 | FPE PL008 | 4 | 3 | 11 A | 13,75 A |

FPE AL009



Info

- Optimally cooled diodes
- Fully automated assembly
- Thin-film and one-string crystalline modules

■ Benefits

- Junction boxes for ambient resistant cabling and connecting of photovoltaic systems
- Aluminium acts as heat sink and allows cooling of the diodes. This increases the lifetime of the diodes
- For fully automated assembly
- The aluminium junction box reduces the risk of diode failures and thereby the risk of efficiency losses, hot spots and fire hazards
- The durability of the aluminium junction box allows a very long lifetime
- The PTFE membrane prevents humidity from entering the box and avoids long-term contact corrosion
- The junction box is delivered with a closed lid and does not require the lid to be removed during assembly
- Easy-Fit allows fast and fully automated assembling
- Also applicable for BIPV

■ Application range

- The junction box is sealed to the backside of the solar module. The ribbons are connected to the junction box via a positioning block
- The connection is secured through the pre-assembled EPIC® SOLAR 4 THIN connectors

■ Product features

- Robust junction boxes for connecting solar modules
- Version with 1 diode for one-string crystalline modules and thin-film modules
- Dimensions (WxHxD) 85x17x99
- Housing made of aluminium, inner box made of PBT
- Standard cable length: 1 m (other lengths on request)
- Standards: DIN V VDE V 0126-5, IEC 61730, IEC 61215

■ Technical data

Rated voltage

1000 V DC – IEC

Rated current

16,0 A – one-string crystalline modules
10,0 A – thin-film modules

Contacts

Copper alloy

Connection method

Terminal clamps for ribbons up to 9 mm



Degree of protection

IP67

Protection class

II

Range of operating temperature
-40 °C up to +105 °C

| Part number | Article description | No of ribbons | No of diodes | Rated current (IEC 61215) | Test current (IEC 61215) |
|--------------|---------------------|---------------|--------------|---------------------------|--------------------------|
| AL009 | | | | | |
| 0919011300 | FPE AL009 | 2 | 1 | 16 A | 20 A |
| 0916011300 | FPE AL009 TF | 2 | 1 | 10 A | 12,5 A |

EPIC® SOLAR MAP



Info

- Junction box for flexible foil and thin-film modules

■ Benefits

- Junction boxes for ambient resistant cabling and connecting of photovoltaic systems
- Extremely thin designed and small dimensioned junction box
- Suitable for flexible Organic Photovoltaic (OPV) modules and thin-film modules
- Also applicable for Building Integrated Photovoltaics (BIPV)
- Design suitable for automated assembly
- Low resistant welded connection

■ Application range

- The junction box is sealed to the backside of the solar module
- The connection is secured through the pre-assembled EPIC® SOLAR 4 THIN connectors
- Delivered as a set with pre-assembled EPIC® SOLAR 4 THIN connectors

■ Product features

- Dimensions (WxHxD) 27x12x43 (without adhesive pad)
- Standards: DIN V VDE V 0126-5, IEC 61730, IEC 61215

■ Technical data

Rated voltage
700 / 1000 V DC

Rated current
15,0 A

Connection methods
welded, soldered, clamped



Degree of protection
IP68

Protection class
II



Range of operating temperature
-40 °C up to +85 °C

EPIC® SOLAR 4 THIN M pre-assembled



Info

- 4mm connector with double locking hook
- Low resistance cable connection

EPIC® SOLAR 4 THIN F pre-assembled



■ Benefits

- Low resistance cable connection for efficient power transmission
- Very low heat generation through patented, innovative contact system
- High reliability and longevity by welded bonding
- Extra thin 12mm for high density packing

■ Application range

- Pre-assembled cables and connectors for weather proof cabling of photovoltaic systems

■ Product features

- 4mm connector with double locking hook
- Fully automated assembly with 100% production control
- Wide range of wire sizes from 1.5mm² up to 6mm²
- UL pending

■ Technical data

| | |
|--------------------------------------|----------------------|
| Rated voltage | 1000 V AC/DC |
| Rated impulse voltage | 8 kV |
| Pollution degree | 3 |
| Contact resistance | < 0.2 mOhm |
| Degree of protection | IP68 (10h / 1m) |
| Protection class | II |
| Cycle of mechanical operation | 100 |
| Range of temperature | -40 °C up to +105 °C |



| Part number | Article description | Cross-section in mm ² | Rated current in A | Length in m | Copper index kg/km | Pieces / PU |
|--|---|----------------------------------|--------------------|-------------|--------------------|-------------|
| EPIC® SOLAR 4 THIN male with cable ÖLFLEX® SOLAR XLR | | | | | | |
| 44428100 | EPIC® SOLAR 4 THIN M XLR TF 1,5mm ² 1m | 1,5 | 17,0 | 1,0 | 14,4 | 100 |
| 44428101 | EPIC® SOLAR 4 THIN M XLR TF 2,5mm ² 1m | 2,5 | 21,0 | 1,0 | 24,0 | 100 |
| 44428102 | EPIC® SOLAR 4 THIN M XLR TF 4mm ² 1m | 4 | 25,0 | 1,0 | 38,4 | 100 |
| 44428103 | EPIC® SOLAR 4 THIN M XLR 6mm ² 1m | 6 | 30,0 | 1,0 | 57,6 | 100 |
| EPIC® SOLAR 4 THIN male with cable ÖLFLEX® SOLAR XL multi | | | | | | |
| 44428108 | EPIC® SOLAR 4 THIN M XL multi 2,5mm ² 1m | 2,5 | 21,0 | 1,0 | 24,0 | 100 |
| 44428109 | EPIC® SOLAR 4 THIN M XL multi 4mm ² 1m | 4 | 25,0 | 1,0 | 38,4 | 100 |
| 44428110 | EPIC® SOLAR 4 THIN M XL multi 6mm ² 1m | 6 | 30,0 | 1,0 | 57,6 | 100 |
| EPIC® SOLAR 4 THIN female with cable ÖLFLEX® SOLAR XLR | | | | | | |
| 44428104 | EPIC® SOLAR 4 THIN F XLR TF 1,5mm ² 1m | 1,5 | 17,0 | 1,0 | 14,4 | 100 |
| 44428105 | EPIC® SOLAR 4 THIN F XLR TF 2,5mm ² 1m | 2,5 | 21,0 | 1,0 | 24,0 | 100 |
| 44428106 | EPIC® SOLAR 4 THIN F XLR TF 4mm ² 1m | 4 | 25,0 | 1,0 | 38,4 | 100 |
| 44428107 | EPIC® SOLAR 4 THIN F XLR 6mm ² 1m | 6 | 30,0 | 1,0 | 57,6 | 100 |
| EPIC® SOLAR 4 THIN female with cable ÖLFLEX® SOLAR XL multi | | | | | | |
| 44428111 | EPIC® SOLAR 4 THIN F XL multi 2,5mm ² 1m | 2,5 | 21,0 | 1,0 | 24,0 | 100 |
| 44428112 | EPIC® SOLAR 4 THIN F XL multi 4mm ² 1m | 4 | 25,0 | 1,0 | 38,4 | 100 |
| 44428113 | EPIC® SOLAR 4 THIN F XL multi 6mm ² 1m | 6 | 30,0 | 1,0 | 57,6 | 100 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of 'Metal price basis' and 'Metal index' see Appendix T17
Other lengths and cable end versions on request.

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



RoHS ✓



Info

- 4mm connector with double locking hook
- Field mountable solar connector

EPIC® SOLAR 4 M



EPIC® SOLAR 4 F



■ Benefits

- Low contact resistance for efficient power transmission
- Crimp connection for field mounting
- Suitable for several ÖLFLEX® SOLAR cables

■ Application range

- Photovoltaic plants
- Crystalline and thin film PV-systems
- Solar tracker

■ Product features

- 4mm connector system with double locking hook
- Crimp connection for field mounting
- UL pending

■ Suitable cables

- ÖLFLEX® SOLAR XL multi
- ÖLFLEX® SOLAR XLS
- ÖLFLEX® SOLAR XLR TF
- ÖLFLEX® SOLAR XLR-R
- ÖLFLEX® SOLAR XLS-R
- ÖLFLEX® SOLAR XLR

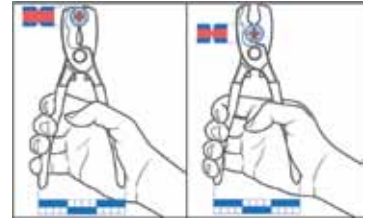
■ Technical data

- Rated voltage in V**
1000 V AC/DC
- Rated impulse voltage**
8 kV
- Pollution degree**
2
- Contact resistance**
< 0.5 mOhm
- Degree of protection**
IP67
- Protection class**
II
- Disconnection cycles**
100
- Range of temperature**
-40 °C up to +105 °C



| Part number | Article description | Cross-section in mm ² | Cable clamping range mm | Rated current in A | Pieces / PU |
|---|--------------------------------------|----------------------------------|-------------------------|--------------------|-------------|
| EPIC® SOLAR 4 Male field mountable | | | | | |
| 44428200 | EPIC® SOLAR 4 M 2,5mm ² | 2,5 | 4,5 - 6,5 | 22,0 | 100 |
| 44428201 | EPIC® SOLAR 4 M 4...6mm ² | 4 - 6 | 5,0 - 7,2 | 30,0 | 100 |
| EPIC® SOLAR 4 Female field mountable | | | | | |
| 44428203 | EPIC® SOLAR 4 F 2,5mm ² | 2,5 | 4,5 - 6,5 | 22,0 | 100 |
| 44428204 | EPIC® SOLAR 4 F 4...6mm ² | 4 - 6 | 5,0 - 7,2 | 30,0 | 100 |

KS 20 Cable shears



KS 20 Cable shears

■ Benefits

- Adjustable screw joint
- Easy, clean cut when operating with one hand
- Low force due to favourable transmission ratio and new blade geometry

■ Application range

- Cuts copper and aluminium cables up to 20 mm outer diameter
- Cutting with precision grinding

■ Product features

- Material: Special tool steel, forged, head burnished
- Pre and after cut (1st and 2nd blade) allows cables with an external outer diameter up to 20 mm to be cut
- Not suitable for steel wire and hard-drawn copper conductors

| Part number | Article description | For outer diameter mm | Weight kg | Length in mm | Pieces / PU |
|-------------|---------------------|-----------------------|-----------|--------------|-------------|
| 62120045 | KS 20 | 20.0 | 0.3 | 200 | 1 |

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

Universal Strip stripping and cutting tool



■ Benefits

- Special pliers for high quality, damage-free stripping of sheath and insulation from all single wires and possibly multiwire cables from 0.03 to 16 mm²
- Applicable with a great variety of insulations differing in hardness and dimension
- Exchangeable knives for different cable cross sections

■ Application range

- Universal stripping pliers with exchangeable stripping blades for cross sections 0.03 to 16 mm²
- Suitable for fluoropolymer & PVC cores, AS-I, Solar, POF cables

■ Product features

- Model: chrome-plated with plastic handle cover
- Exchangeable knives for different cable cross sections

■ Design

- Additional stripping knives on request
- No pinching/deformation of cable ends

■ Scope of delivery

- Tool and length stop

| Part number | Article description | for mm ² | Pieces / PU |
|-------------|-----------------------|---------------------|-------------|
| 21920120 | Universal Strip Solar | 1.5 - 6 | 1 |

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

■ Accessories

- Additional stripping knives on request



Twist Tail™ Cable tie



Info

- No special tool needed
- Handled in the twinkling of an eye



Twist Tail™ Cable tie

Benefits

- Round, flat, edge-free tie heads allow assembly without catching and protect against injury and damage to adjoining cables and components
- The cable tie can be gripped securely and therefore tightened more easily
- In addition, the safety gripping butt prevents the tie from slipping out during assembly and secures it before tightening it by hand

Application range

- Industry cable ties for quick and secure assembly
- General purpose applications, indoor and outdoor

Design

- Wrap the cable tie around a bundle of cables, bend the excess tail in two directions and twist. The tail breaks right off, leaving no sharp edges to scratch your hands or your cables
- Available in 3 different lengths and 2 colours (white and UV-resistant black)

Technical data

- General**
Tensile strength: 133N
- Approvals**
Flammability class: UL 94 V-2
- Note**
Halogen free
Silicone free
- Colour delivered**
Black, RAL 9005, UV-resistant
White
- Material**
Polyamide 6.6
- Range of temperature**
-40 °C up to +85 °C

| Part number | Article description | Approval UL | Length in mm | Max. bundle Ø approx. in mm | Pieces / PU |
|--------------------------------------|-------------------------|-------------|--------------|-----------------------------|-------------|
| white | | | | | |
| 61832007 | TWIST TAIL TT-7-30-9-L | yes | 181 | 45,0 | 50 |
| 61832009 | TWIST TAIL TT-11-30-9-L | yes | 282 | 76,0 | 50 |
| 61832011 | TWIST TAIL TT-14-30-9-L | yes | 358 | 102,0 | 50 |
| Black, RAL 9005, UV-resistant | | | | | |
| 61832008 | TWIST TAIL TT-7-30-0-L | yes | 181 | 45,0 | 50 |
| 61832010 | TWIST TAIL TT-11-30-0-L | yes | 282 | 76,0 | 50 |
| 61832012 | TWIST TAIL TT-14-30-0-L | yes | 358 | 102,0 | 50 |

Twist Tail™ is a registered trademark of Thomas & Betts
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MINI- Box starter-set



MINI- Box Starter-Set

Application range

- Cable and component marking system
- Automotive industry
- Plant engineering

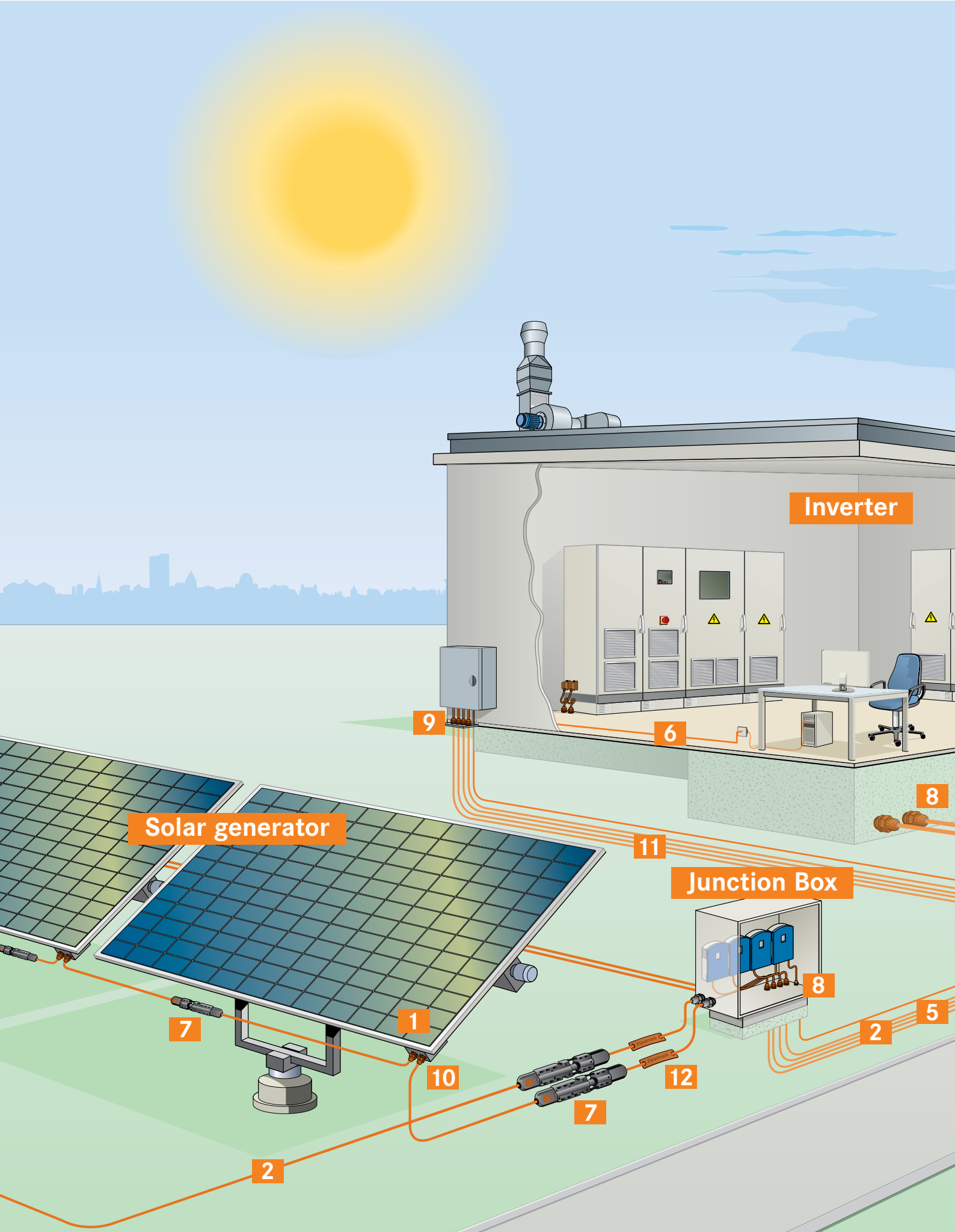
Scope of delivery

- Two character strips (letters, numbers, symbols, blank) with 10 markers for each character
- 40 locking buttons, 20 end pieces, 1 pair of special pliers (two alternatives), one bag of cable ties
- Two 285 mm MINI PGS holders
- Seven (for PTE) or two (for SK) 285-mm pieces of the standard character holder

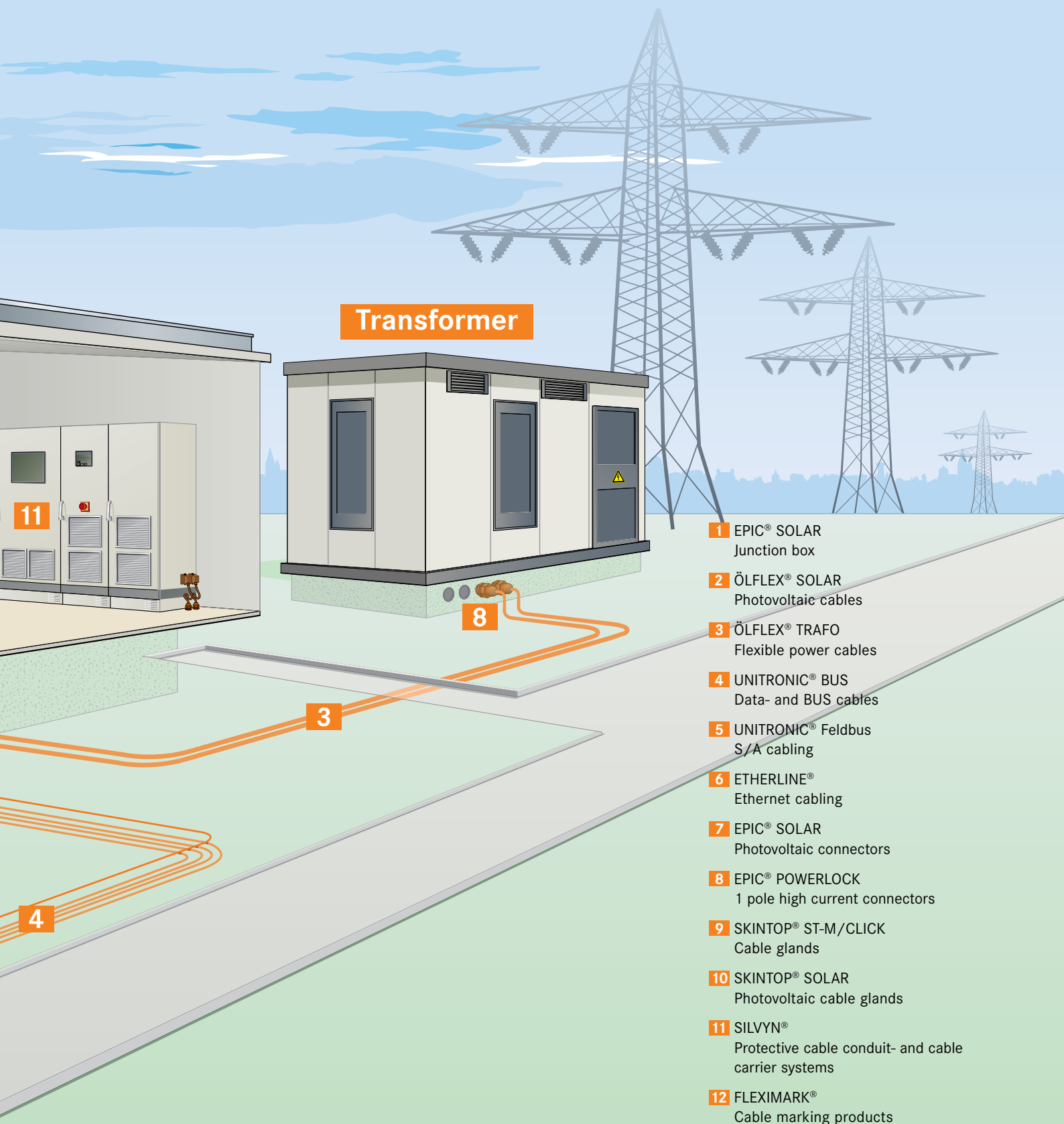
| Part number | Article description | Pieces / PU |
|-------------|----------------------------|-------------|
| 83252001 | MINI - Box - with FL52 ERA | 1 |

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

The Solar system by Lapp



Transformer



- 1** EPIC® SOLAR
Junction box
- 2** ÖLFLEX® SOLAR
Photovoltaic cables
- 3** ÖLFLEX® TRAFOL
Flexible power cables
- 4** UNITRONIC® BUS
Data- and BUS cables
- 5** UNITRONIC® Feldbus
S/A cabling
- 6** ETHERLINE®
Ethernet cabling
- 7** EPIC® SOLAR
Photovoltaic connectors
- 8** EPIC® POWERLOCK
1 pole high current connectors
- 9** SKINTOP® ST-M/CLICK
Cable glands
- 10** SKINTOP® SOLAR
Photovoltaic cable glands
- 11** SILVYN®
Protective cable conduit- and cable
carrier systems
- 12** FLEXIMARK®
Cable marking products

EPIC® SOLAR RAZOR

Junction box with a revolutionary concept

Easy access shortens maintenance time and reduces service cost – Upgradeable with future electronics – Significantly optimised automated assembly to modules

Due to the increasing use of electronics in photovoltaic modules and the associated required service concepts, the Lapp Group and FPE Fischer have developed the EPIC® SOLAR RAZOR junction box. In line with the principle 'think outside the box', a completely new connection concept has been created.

Thanks to the EPIC® SOLAR RAZOR, for the first time, the functional components in the junction box are accessed easily from the front side of the module and protected from environmental influences. It is considerably easier to reach and replace the

functional components, such as surge protection, shut-down mechanism, performance monitor and performance optimisers, saving time and money when servicing is required. Furthermore, the design of the junction box allows the module to be upgraded with future technologies, such as MPP tracking, at a later date. The photovoltaic modules can be individually equipped with electronic components at the factory, by the dealer or even by the installer.

The extremely flat junction box allows significant optimisation of production steps. The design of the junction box allows for a simplified contacting through automatic welding. There is no curing time required for the adhesive elements, as the upper and lower elements are mechanically interlocked with one another.

The modular design of the aluminium junction box increases the flexibility of product variants. This enables the module manu-

facturer to optimally position its products on the market. In addition, the logo of the module manufacturer on the upper cover of the junction box increases the recognition of the manufacturer's module, opening up new branding opportunities.

The junction box consists of extremely durable aluminium material. This reduces thermal load of the components and increases the service life compared to standard plastic junction boxes considerably. At the same time, fire hazards are drastically reduced. The junction box is watertight in compliance with IP 67 protection class. This prevents contact corrosion, resulting in constant, high-level performance and minimises the risk of hot spots and electric arcing. The junction box is preconfigured with the EPIC® SOLAR 4 Thin connectors. Due to its welded contacts, the contact resistance of the connector is at a low level, unrivalled by its competitors.

Innovative production concept

- Service concept
- Modular design and access to electronics
- Functional components can be reached and exchanged from the front of the module
- Functional components can be equipped at the factory, by the dealer or the installer

- Installation of future technologies possible at any time
- Customer-specific solutions on one module platform
- Front cover as a design and CI element
- Decoupling of the connection areas from the functional elements
- Automated mounting by welding or soldering
- No curing time required as components

- are mechanically interlocked
- Aluminium reduces the thermal stress on the functional components and prolongs the service life
- Opening and closing for service purposes is possible anytime
- Extremely flat design
- Tested and proven components from experienced manufacturers of junction boxes, cables and connectors.



For the use of our products is valid

The conformity of our products with 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 authorized 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 laid down 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 001 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 this 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 specialized personnel and for the purpose for which they

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