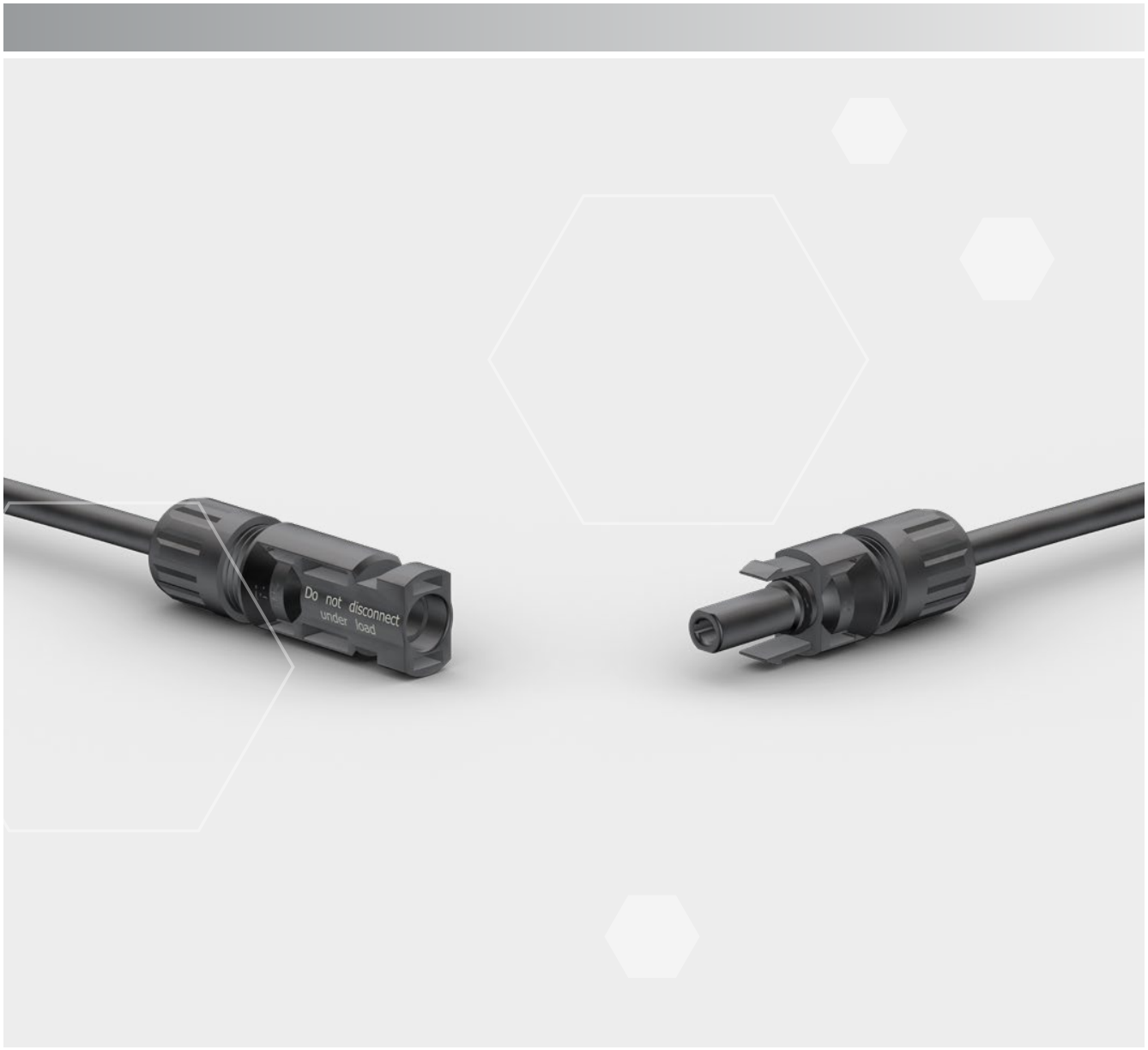
FAST MOVING TECHNOLOGY

# Photovoltaic main catalog

## Solarline | Connectors for renewable energy



STÄUBLI

## STÄUBLI ELECTRICAL CONNECTORS

# Long-term solutions – Expert connections



**Stäubli Electrical Connectors is a leading international manufacturer of high-quality electrical contacts and connector systems and solutions for industrial applications. We are part of the Stäubli mechatronics group, the technology leader in connection solutions, robotics and textile machinery.**

Stäubli develops, produces, sells and services products for markets with the highest productivity and safety standards. As recognized specialists, our focus is always on solutions and customers. Many new developments got their start here and are now becoming established as worldwide standards.

Our customers depend on our expertise and our active support, even when dealing with unusual challenges. With Stäubli, you're entering into a long-term partnership built on reliability, dedication, and exceptional quality in both products and services.

**Pioneering contact technology for increased efficiency**

The entire Stäubli Electrical Connectors product range meets market expectations for high performance, the highest number of mating cycles, and long-lasting reliability for safe, durable operation. Our proven **MULTILAM technology** is ideal for all types of connections in industrial applications.

Customers in the **power transmission and distribution** sector rely on our consistent, loss-free transmission performance in all voltage ranges. The **automotive industry** depends on our high-efficiency connections for spot-welding applications in production lines. Harsh conditions in the **transportation sector** require high vibration resistance, maximum reliability, and compact design. These attributes are vitally important for railway and e-mobility applications. The safety and reliability of our products are essential for **test and measurement technology.**

In the growing field of **alternative energy**, our products have been setting standards since the 1990s. About half of the solar energy generated worldwide is transmitted through safe, long-lasting, high-performance Stäubli connectors.

# Applications and benefits



**Offering a wide range of connection systems and accessories for photovoltaics, plug connectors, junction boxes and cables, we have been connecting any type of PV installation to the sun for more than 20 years. As a pioneer and global market leader for PV connectors, Stäubli has been setting the industry standard since the introduction of the original MC4 connector. In 2017, over 1 billion original MC4 connectors were installed to connect more than 150 GW which comes up to almost 50 % of the PV power worldwide.**

Thanks to the tried and tested MULTILAM advanced contact technology, our connectors keep your PV installation up and running efficiently and safely.

These apparently minor components can have a massive impact. Outstanding reliability and consistently low contact resistance guarantee:

- Low service cost and reduced downtime
- Elimination of risks for hotspots and fire
- Low power losses

Stäubli PV connectors guarantee proper operation over their whole lifetime (>25 years). By minimizing risk and maximizing the return in the long term, our components influence LCOE positively and have a decisive impact on the bankability of photovoltaic projects.

www.staubli-alternative-energies.com

# Content

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# Safety note

Plug connectors not manufactured by Stäubli are sometimes described by their manufacturers as being “Stäubli compatible” due to their ability to mate with Stäubli connectors. This, however, is not true: by doing so, they do not conform to the requirements for a safe electrical connection with long-term stability. For that reason, we accept no liability if these non-approved connectors are mated with Stäubli original connectors.

**Stäubli has not recognized any products from third-party suppliers as being plug-compatible with the MC4 family and does not intend to do so in the future.** Using unsuitable components or combining plugs from different manufacturers poses significant risks (high failure rates, fire, etc.) and is not permitted under any circumstances.

Please note that all certifications are voided when such a plug combination is used.

Statements made by TÜV and UL confirm this: TÜV Rheinland LGA Products GmbH, based in Cologne, stresses that compatibility can be confirmed “only for products of the same type family from the same manufacturer” and that the current certificate for the MC4 connector family is based “on positive results of tests on products with corresponding mating parts of the MC4 family.” As there is uncertainty in the case of warranty claims involving combined PV connector pairs from different manufacturers, “the PV installation inspectors are obliged to criticize the use of such combinations.” It is also stated in UL file QIJQ2.E343181 that only “connectors within a product family are approved by UL.” UL clearly distances itself from declaring compatibility of components from different manufacturers due to uncertainty over long-term behavior.




# General information

**Colour code**

For those items available in various colours, replace the asterisk “*” with the appropriate colour code.

| | | | |
|---|---|---|---|
| 21 | black | 22 | red |
| 23 | blue | 29 | white |

**Changes / Provisos**

All data, illustrations and drawings in the catalogue have been carefully checked. They are in accordance with our experience to date, but no responsibility can be accepted for errors. We also reserve the right to make modifications for design and safety reasons. When designing equipment incorporating our components, it is therefore advisable not to rely solely on the data in the catalogue but to consult us to make sure this information is up to date. We shall be pleased to advise you.

**Copyright**

The use of this catalogue for any other purpose, in whatever form, without our prior written consent is not permitted.

**RoHS ready**

Directive 2011 / 65 / EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

**Symbols**



**Accessories or special tools exist for this product**




**The assembly instruction MA000 is available for this product**




**Check out the interactive content for this product**

## UNLIMITED POSSIBILITIES FOR CONTACT SOLUTIONS

# MULTILAM Technology







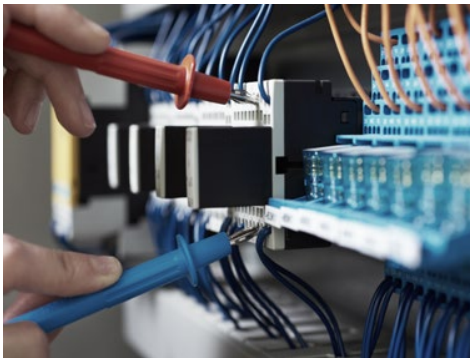
**MULTILAM are specially formed and resilient contact elements. All Stäubli Electrical Connectors products benefit from the unique and outstanding performance of the MULTILAM Technology.**
Thanks to their constant spring pressure, MULTILAM louvers ensure continuous contact with the contact surface, resulting in a constantly low contact resistance.
MULTILAM Technology allows to find solutions for connectors within the severest constraints and in certain products for up to 1 million mating cycles.

This makes the MULTILAM Technology the best choice for applications with demanding requirements:

- Reliable and longlife operation due to constantly high performance
- Safe operation under highest environmental demands on temperature, vibration and shock
- Suitable for data and signal contacts as well as high-current connectors
- Automated solutions with a high number of mating cycles







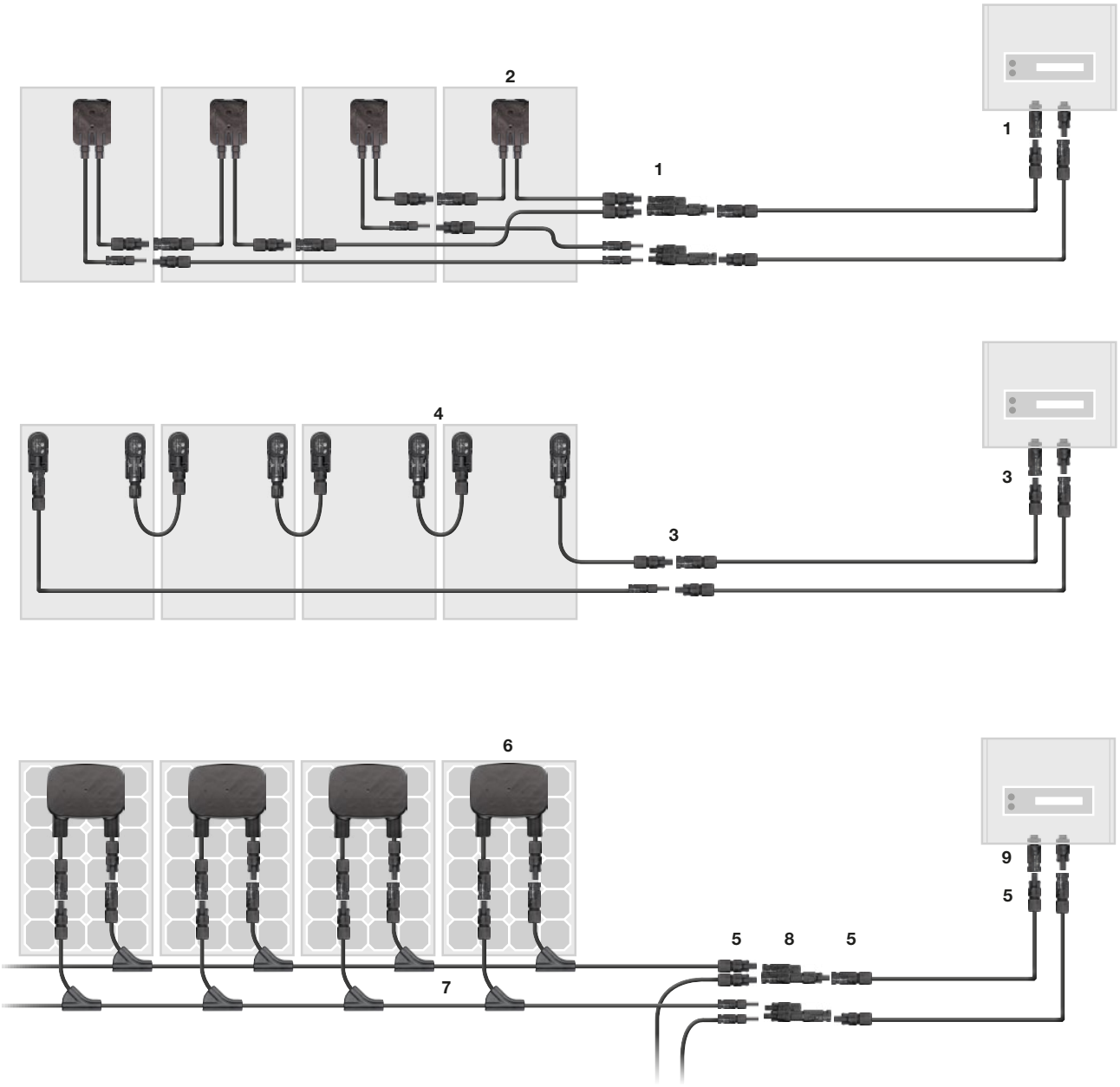
## INTRODUCTION

# Application possibilities of the Stäubli product portfolio

**Examples of a PV field installation**
The upper example shows the MC4 plug connector system (1) and a customized, two-pole junction box (2).

The illustration in the middle shows the MC4 connector system (3) and the single-pole PV-JB/TB (4).

At the bottom an example of a PV roof installation with MC4 plug connector system (5), junction box (6) branch cable (7), branch socket/plug (8) and MC4 panel receptacles (9).



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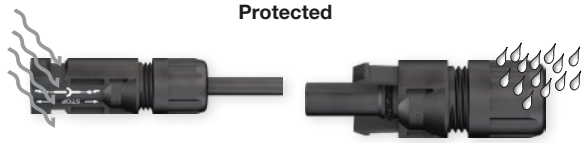
## PLUG CONNECTORS

# Advantages of the MC4 connector range

**Protected**

UV



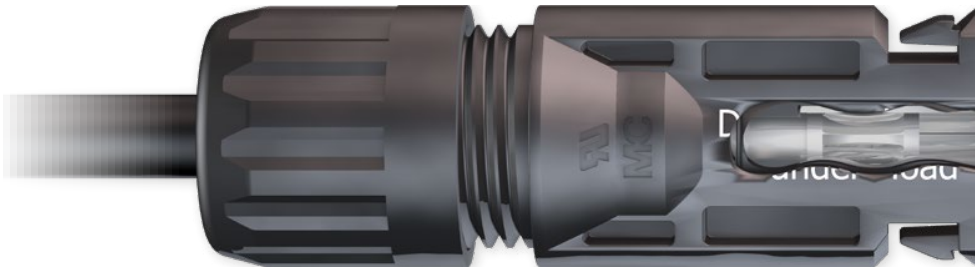
IP68

Safety class II

**Proven MULTILAM technology with high long-term stability**



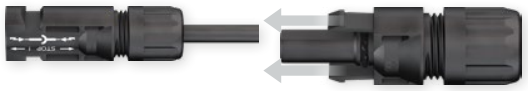
More than 50 years of experience and core competence



**Range of cable cross-sections**

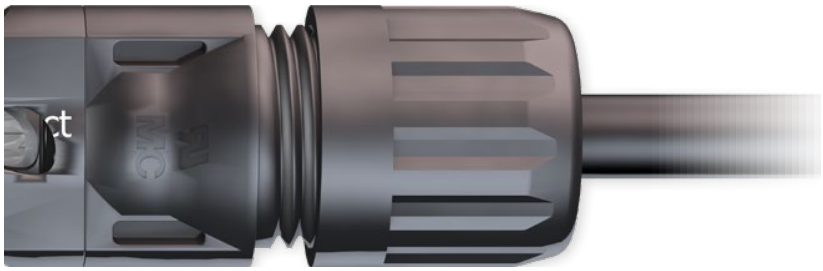
| | | | |
|---|---|---|---|
| 10 mm² | ◯ | ◯ | 8 AWG |
| 6 mm² | ◯ | ◯ | 10 AWG |
| 4 mm² | ◯ | ◯ | 12 AWG |
| 2.5 mm² | ○ | ○ | 14 AWG |
| 1.5 mm² | ○ | | |

**Locking system**

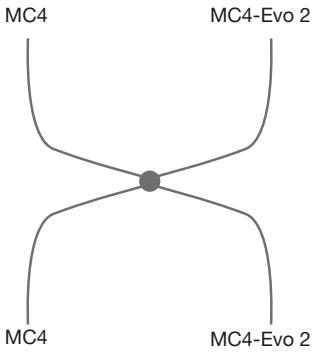


**Voltage level**

TÜV 1000 V/1500 V
UL 1000 V/1500 V



**Compatibility**




**Certificates**

TÜV These products are certified by TÜV Rheinland LGA GmbH

cTÜVus

UL recognized

EAC

CSA

JET

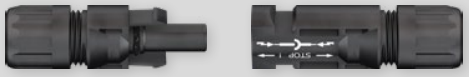
CQC

**Safety locking device**

NEC 2014



# Overview of plug connectors

| | Approvals [1] |
|---|---|
| **Plug connectors** | |
| MC4  | TÜV EAC UL CSA CQC |
| MC4-Evo 2  | TÜV UL JET |
| MC4-Evo AC  | TÜV UL |
| **Panel receptacles** | |
| MC4  | TÜV EAC UL CSA |
| MC4-Evo 2  | TÜV UL |
| **Branch connectors** | |
| MC4  | EAC UL |

## Legend

Assembly with tool

Available as ready-assembled product

For assembly on site

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| | Features | Salt mist spray test | Rated curren | Rated voltage (max.) | | | | Locking system (UL) | Degree of protection | | Safety class | Ambient temperature range | Sealing caps | Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Category | A | TÜV (V DC) | UL/CSA (V DC) | TÜV (V AC) | UL (V AC) | | mated | unmated | | °C | | |
| |  | VI | 22.5/30/45/50 | 1500 | 1500 | – | – | Locking | IP65 IP68 | IP2X | II | -40 ... +85 (TÜV) | × | 12 14 |
| |  | VI | 22/39/45/53/69 | 1500 | 1500 | – | – | Locking | IP65 IP68 | IP2X | II | -40...+85 (TÜV) | × | 16 18 |
| |  | – | 16/20/26/32/43 | – | – | 250 | 600 | Locking | IP65 IP67 | IP2X | II | -40...+85 | × | 20 |
| |  | – | 22.5/39/45/51 | 1250 | 1500 | – | – | Locking | IP65 IP68 | IP2X | II | -40...+85 | × | 22 24 |
| |  | – | 32/42/47 | 1500 | 1500 | – | – | Locking | IP65 IP68 | IP2X | II | -40...+90 (UL) | × | 26 28 |
| | | – | 50 | – | 1500 | – | – | Locking | IP67 | IP2X | II | -40...+85 (UL) | × | 30 |

 Suitable for customer-specific assembly

[1] Certifications are in some cases limited to specific types or still pending. Details are given on the relevant product pages.

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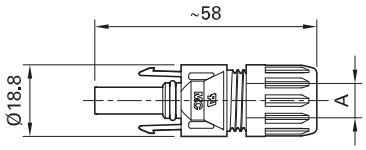
# Female and male cable coupler MC4

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

**PV-KBT4...**



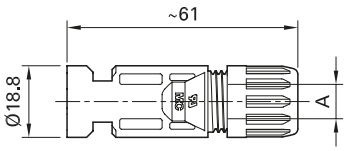





**PV-KST4...**








| Order No. | Type | Female cable coupler | Male cable coupler | Ø range of cable gland | Conductor cross section | | | Approvals | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A (mm) | mm² | AWG | b (mm) | TÜV | | | |
| **32.0010P0001-UR** | PV-KBT4/2,5I-UR | × | | 5-6 | 2.5 | 14 | 3 | × | × | × | × |
| **32.0011P0001-UR** | PV-KST4/2,5I-UR | | × | 5-6 | 2.5 | 14 | 3 | | | | |
| **32.0140P0001-UR** | PV-KBT4/2,5X-UR | × | | 5.5-7.4 | 2.5 | 14 | 3 | | | | |
| **32.0141P0001-UR** | PV-KST4/2,5X-UR | | × | 5.5-7.4 | 2.5 | 14 | 3 | | | | |
| **32.0012P0001-UR** | PV-KBT4/2,5II-UR | × | | 5.9-8.8 | 2.5 | 14 | 3 | | | | |
| **32.0013P0001-UR** | PV-KST4/2,5II-UR | | × | 5.9-8.8 | 2.5 | 14 | 3 | | | | |
| **32.0014P0001-UR** | PV-KBT4/6I-UR | × | | 5-6 | 4; 6 | 12; 10 | 5 | | | | |
| **32.0015P0001-UR** | PV-KST4/6I-UR | | × | 5-6 | 4; 6 | 12; 10 | 5 | | | | |
| **32.0142P0001-UR** | PV-KBT4/6X-UR | × | | 5.5-7.4 | 4; 6 | 12; 10 | 5 | | | | |
| **32.0143P0001-UR** | PV-KST4/6X-UR | | × | 5.5-7.4 | 4; 6 | 12; 10 | 5 | | | | |
| **32.0016P0001-UR** | PV-KBT4/6II-UR | × | | 5.9-8.8 | 4; 6 | 12; 10 | 5 | | | | |
| **32.0017P0001-UR** | PV-KST4/6II-UR | | × | 5.9-8.8 | 4; 6 | 12; 10 | 5 | | | | |
| **32.0080-UR** | PV-KBT4/8II-UR | × | | 6.05-8.56 | – | 8 | 4.4 | | × | × | |
| **32.0081-UR** | PV-KST4/8II-UR | | × | 6.05-8.56 | – | 8 | 4.4 | | | | |
| **32.0034P0001** | PV-KBT4/10II | × | | 5.9-8.8 | 10 | – | 7.2 | × | | | × |
| **32.0035P0001** | PV-KST4/10II | | × | 5.9-8.8 | 10 | – | 7.2 | | | | |

**Note:**
For more detailed information concerning the suitable cable gland range, please consult MA231

MA

**Assembly Instructions MA231**
www.staubli.com/electrical

**Sealing caps page 43**
**Assembly tools page 48**

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- Snap-in lock
- In accordance with NEC 2014, requires a tool to open
- Proven MULTILAM technology with high long-term stability, which ensures consistently low performance loss throughout the entire service life of the plug connector
- Tried and tested plug connectors, over 15 years of experience in the field
- Available for assembly with cross-sections of 10 mm²
- Also available as ready made leads
- Mating compatibility with MC4 connector family
- Leads made to customer's specifications, see page 50

| Technical data | |
|---|---|
| Connector system | Ø 4 mm |
| Rated voltage | 1000 V DC (IEC 62852)<br>1500 V DC (2Pfg2330)[1)]<br>1500 V DC (UL)[2)] |
| Rated current TÜV (85°C) | 22.5 A (2.5 mm²) 39 A (4 mm²/6 mm²)<br>45 A (10 mm²) |
| Rated current UL | 30 A (14 AWG) 30 A (12 AWG/10 AWG)<br>50 A (8 AWG) |
| Rated impulse voltage | 12 kV (1000 V DC (TÜV))<br>16 kV (1500 V DC (TÜV)) |
| Ambient temperature range | -40°C...+85°C (TÜV)<br>-40°C...+75°C (UL) |
| Upper limiting temperature | 105°C (TÜV) |
| Degree of protection, mated<br>unmated | IP65, IP68 (1 h/1 m)<br>IP2X |
| Overvoltage category/Pollution degree | CATIII/3 |
| Contact resistance of plug connectors | ≤0.25 mΩ |
| Safety class | 1000 V DC: II<br>1500 V DC: 0 |
| Contact system | MULTILAM |
| Type of termination | Crimping |
| Contact material | Copper, tin plated |
| Insulation material | PC/PA |
| Locking system (UL) | Locking type |
| Flame class | UL94-V0 |
| Ammonia resistance (acc. to DLG) | 1500 h, 70°C/70% RH, 750 ppm |
| Salt mist spray test, degree of severity 6 | IEC 60068-2-52 |
| TÜV-Rheinland certified,<br>in accordance with IEC 62852<br>TÜV-Rheinland certified,<br>in accordance with 2PfG2330<br>UL recognized component,<br>in accordance with UL 6703<br>CSA certified, in accordance with UL 6703<br>CQC certified according CNCA/CTS0002-2012 | R60127190[3)]<br><br>R60087448<br><br>E343181<br><br>250725<br>CQC16024138286 |

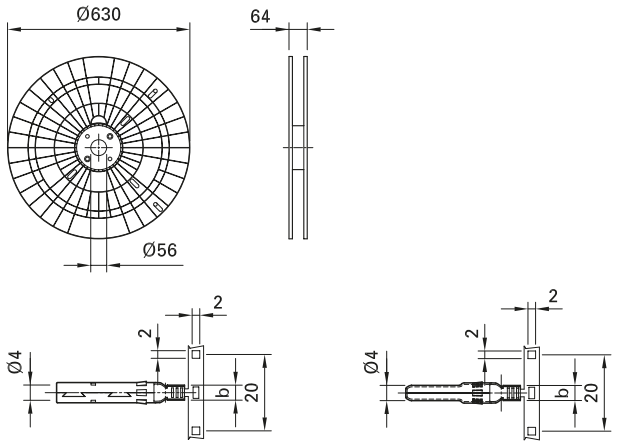
[1)] 2Pfg2330: only approved for locations with restricted access
[2)] for selected configurations; see assembly instructions MA231 for details
[3)] For PV junction boxes in accordance with IEC62790, lines in accordance with EN50618 must be used

# Female and male cable coupler MC4

## Contacts on carrier band (including insulating part)

**PV-KBT4...**
**PV-KST4...**






| Order No. | Type | Female cable coupler | Male cable coupler | Ø range of cable gland | Conductor cross section | | | Crimping tool | Contacts per reel[2] | Approvals | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A (mm) | mm² | AWG | b (mm) | | | TÜV | | | |
| **32.0010P2000-UR** | PV-KBT4/2,5I-UR | × | | 5-6 | 2.5 | 14 | 3 | [1] | 2000 | × | × | × | × |
| **32.0011P2000-UR** | PV-KST4/2,5I-UR | | × | 5-6 | 2.5 | 14 | 3 | [1] | 2000 | | | | |
| **32.0140P2000-UR** | PV-KBT4/2,5X-UR | × | | 5.5-7.4 | 2.5 | 14 | 3 | [1] | 2000 | | | | |
| **32.0141P2000-UR** | PV-KST4/2,5X-UR | | × | 5.5-7.4 | 2.5 | 14 | 3 | [1] | 2000 | | | | |
| **32.0012P2000-UR** | PV-KBT4/2,5II-UR | × | | 5.9-8.8 | 2.5 | 14 | 3 | [1] | 2000 | | | | |
| **32.0013P2000-UR** | PV-KST4/2,5II-UR | | × | 5.9-8.8 | 2.5 | 14 | 3 | [1] | 2000 | | | | |
| **32.0014P2000-UR** | PV-KBT4/6I-UR | × | | 5-6 | 4; 6 | 12; 10 | 5 | [1] | 2000 | | | | |
| **32.0015P2000-UR** | PV-KST4/6I-UR | | × | 5-6 | 4; 6 | 12; 10 | 5 | [1] | 2000 | | | | |
| **32.0142P2000-UR** | PV-KBT4/6X-UR | × | | 5.5-7.4 | 4; 6 | 12; 10 | 5 | [1] | 2000 | | | | |
| **32.0143P2000-UR** | PV-KST4/6X-UR | | × | 5.5-7.4 | 4; 6 | 12; 10 | 5 | [1] | 2000 | | | | |
| **32.0016P2000-UR** | PV-KBT4/6II-UR | × | | 5.9-8.8 | 4; 6 | 12; 10 | 5 | [1] | 2000 | | | | |
| **32.0017P2000-UR** | PV-KST4/6II-UR | | × | 5.9-8.8 | 4; 6 | 12; 10 | 5 | [1] | 2000 | | | | |
| **32.0034P1700** | PV-KBT4/10II | × | | 5.9-8.8 | 10 | – | 7.2 | [1] | 1700 | × | | | × |
| **32.0035P1700** | PV-KST4/10II | | × | 5.9-8.8 | 10 | – | 7.2 | [1] | 1700 | | | | |

**Note:**
For more detailed information concerning the suitable cable gland range, please consult MA231

MA

**Assembly Instructions MA231**
www.staubli.com/electrical

**Sealing caps page 43**
**Assembly tools page 48**

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- Feeder bands for fully automatic assembly
- Tools specially designed for MC4 are available for automatic crimping
- Process reliability as result of specially developed supply reel

| Technical data | |
|---|---|
| Connector system | Ø 4 mm |
| Rated voltage | 1000 V DC (IEC 62852)<br>1500 V DC (2Pfg2330)[3]<br>1500 V DC (UL)[4] |
| Rated current TÜV (85°C) | 22.5 A (2.5 $mm^2$) 39 A (4 $mm^2$/6 $mm^2$)<br>45 A (10 $mm^2$) |
| Rated current UL | 30 A (14 AWG) 30 A (12 AWG/10 AWG)<br>50 A (8 AWG) |
| Rated impulse voltage | 12 kV (1000 V DC (TÜV))<br>16 kV (1500 V DC (TÜV)) |
| Ambient temperature range | -40°C...+85°C (TÜV); -40°C...+75°C (UL) |
| Upper limiting temperature | 105°C (TÜV) |
| Degree of protection, mated<br>unmated | IP65, IP68 (1 h/1 m)<br>IP2X |
| Overvoltage category/Pollution degree | CATIII/3 |
| Contact resistance of plug connectors | ≤0.25 mΩ |
| Safety class | 1000 V DC: II<br>1500 V DC: 0 |
| Contact system | MULTILAM |
| Type of termination | Crimping |
| Contact material | Copper, tin plated |
| Insulation material | PC/PA |
| Locking system (UL) | Locking type |
| Flame class | UL94-V0 |
| Ammonia resistance (acc. to DLG) | 1500 h, 70°C/70% RH, 750 ppm |
| Salt mist spray test, degree of severity 6 | IEC 60068-2-52 |
| TÜV-Rheinland certified,<br>in accordance with IEC 62852<br>TÜV-Rheinland certified,<br>in accordance with 2PfG2330<br>UL recognized component,<br>in accordance with UL 6703<br>CSA certified, in accordance with UL 6703<br>CQC certified according CNCA/CTS0002-2012 | R60127190[5]<br><br>R60087448<br><br>E343181<br><br>250725<br>CQC16024138286 |

[1] Information about a semi-automatic crimp device or assembly device on request
[2] Reel type subject to alterations
[3] 2Pfg2330: Only for use in PV-systems with restricted access locations
[4] For selected configurations; see assembly instructions MA231 for details
[5] For PV junction boxes in accordance with IEC62790, lines in accordance with EN50618 must be used

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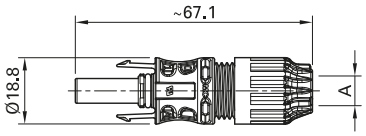
# Female and male cable coupler MC4-Evo 2

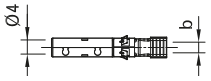
## Female and male cable coupler as individual part (including insulating part)

**PV-KBT4-EVO 2/...-UR**





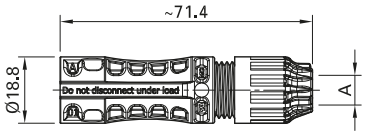


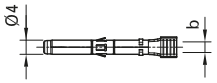




**PV-KST4-EVO 2/...-UR**








| Order No. | Type | Female cable coupler | Male cable coupler | Ø range of cable gland | Conductor cross section | | | Approvals |
|---|---|---|---|---|---|---|---|---|
| | | | | A (mm) | mm² | AWG | b (mm) | |
| **32.0082P0001-UR** | PV-KBT4-EVO 2/2,5I-UR | x | | 4.7-6.4 | 2.5 | 14 | 3 | TÜV, UL, JET, TÜV Rheinland |
| **32.0083P0001-UR** | PV-KST4-EVO 2/2,5I-UR | | x | | | | | |
| **32.0084P0001-UR** | PV-KBT4-EVO 2/2,5II-UR | x | | 6.4-8.4 | | | | |
| **32.0085P0001-UR** | PV-KST4-EVO 2/2,5II-UR | | x | | | | | |
| **32.0086P0001-UR** | PV-KBT4-EVO 2/6I-UR | x | | 4.7-6.4 | 4; 6 | 12; 10 | 5 | |
| **32.0087P0001-UR** | PV-KST4-EVO 2/6I-UR | | x | | | | | |
| **32.0088P0001-UR** | PV-KBT4-EVO 2/6II-UR | x | | 6.4-8.4 | | | | |
| **32.0089P0001-UR** | PV-KST4-EVO 2/6II-UR | | x | | | | | |
| **32.0092P0001-UR** | PV-KBT4-EVO 2/10II-UR | x | | | 10 | 8 | 7.2 | |
| **32.0093P0001-UR** | PV-KST4-EVO 2/10II-UR | | x | | | | | |

**Note:**
For more detailed information concerning the suitable cable gland range, please consult MA273.



**Sealing caps page 43**
**Assembly tools page 48**

MA

**Assembly Instructions MA273**
**www.staubli.com/electrical**

STÄUBLI

- Internationally certified with IEC, UL, JET, cTÜVus.
- Approved for 1500 V DC (IEC, JET), 1500 V DC (UL) unrestricted access
- MULTILAM Technology, has proven the quality and durability several 100 million times since 2004
- Suited for all climatic environments thanks to resistance to UV, ammonia, and high IP class (IP68).
- 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 |
| Rated voltage | 1500 V DC (TÜV) [1]<br>1500 V DC (UL) [2]<br>1500 V DC (JET) [3] |
| Rated current TÜV (85°C) | 39 A (2,5 mm²/14 AWG)<br>45 A (4,0 mm²/12 AWG)<br>53 A (6,0 mm²/10 AWG)<br>69 A (10,0 mm²/8 AWG) |
| Rated impulse voltage | 16 kV (1500 V) |
| Ambient temperature range | -40°C ... +85°C (TÜV/UL) |
| Upper limiting temperature | 115°C (TÜV) |
| Degree of protection, mated<br>unmated | IP65/IP68 (1h/1m)<br>IP2X |
| Overvoltage category/Pollution degree | CAT III/3 |
| Contact resistance of plug connectors | ≤0.2 mΩ |
| Safety class | II |
| Contact system | MULTILAM |
| Type of termination | Crimping |
| Contact material | Copper, tin plated |
| Insulation material | PA |
| Locking system (UL) | Locking type |
| Flame class | UL94-V0 |
| Ammonia resistance (acc. to TÜV) | Q60095359 |
| Salt mist spray test, degree of severity 6 | IEC 60068-2-52 |
| TÜV-Rheinland certified,<br>in accordance with IEC 62852<br>UL recognized component,<br>in accordance with UL 6703<br>cTÜVus certified according UL 6703<br>JET certified according IEC 61730-1:2004 | R60127169<br><br>E343181<br><br>CU 72141256 01<br>B13T0062 |

[1] Please take the cable to be used from MA273
[2] The connectors are to be used with USE2 or PV-Wire cables.
[3] The connectors are to be used with cables with the "S-JET mark" label.

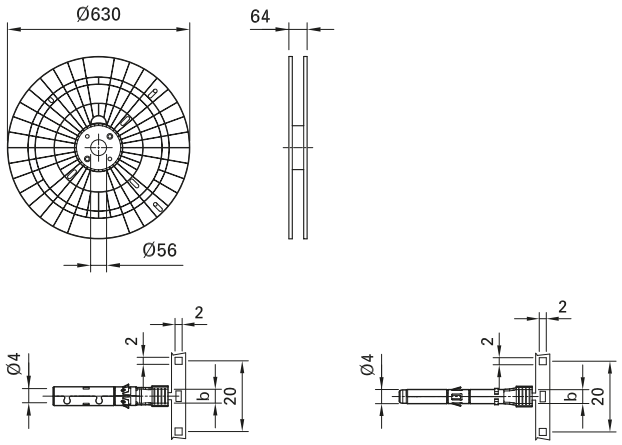
STÄUBLI

# Female and male cable coupler MC4-Evo 2

## Contacts on carrier band (including insulating part)

**PV-KBT4-EVO 2/...-UR**
**PV-KST4-EVO 2/...-UR**






| Order No. | Type | Female cable coupler | Male cable coupler | Ø range of cable gland | Conductor cross section | | | Crimping tool | Contacts per reel[2] | Approvals |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A (mm) | mm² | AWG | b (mm) | | | |
| **32.0082P2000-UR** | PV-KBT4-EVO 2/2,5I-UR | x | | 4.7-6.4 | 2.5 | 14 | 3 | [1] | 2000 | TÜV, UL, JET, TÜV Nord |
| **32.0083P2000-UR** | PV-KST4-EVO 2/2,5I-UR | | x | | | | | [1] | 2000 | |
| **32.0084P2000-UR** | PV-KBT4-EVO 2/2,5II-UR | x | | 6.4-8.4 | | | | [1] | 2000 | |
| **32.0085P2000-UR** | PV-KST4-EVO 2/2,5II-UR | | x | | | | | [1] | 2000 | |
| **32.0086P2000-UR** | PV-KBT4-EVO 2/6I-UR | x | | 4.7-6.4 | 4; 6 | 12; 10 | 5 | [1] | 2000 | |
| **32.0087P2000-UR** | PV-KST4-EVO 2/6I-UR | | x | | | | | [1] | 2000 | |
| **32.0088P2000-UR** | PV-KBT4-EVO 2/6II-UR | x | | 6.4-8.4 | | | | [1] | 2000 | |
| **32.0089P2000-UR** | PV-KST4-EVO 2/6II-UR | | x | | | | | [1] | 2000 | |
| **32.0092P1700-UR** | PV-KBT4-EVO 2/10II-UR | x | | | 10 | 8 | 7.2 | [1] | 1700 | |
| **32.0093P1700-UR** | PV-KST4-EVO 2/10II-UR | | x | | | | | [1] | 1700 | |

**Note:**
For more detailed information concerning the suitable cable gland range, please consult MA273.

**Sealing caps page 43**
**Assembly tools page 48**

MA

**Assembly Instructions MA273**
www.staubli.com/electrical

STÄUBLI

- Internationally certified with IEC, UL, JET, cTÜVus.
- Approved for 1500 V DC (IEC, JET), 1500 V DC (UL) unrestricted access
- MULTILAM Technology, has proven the quality and durability several 100 million times since 2004
- Suited for all climatic environments thanks to resistance to UV, ammonia, and high IP class (IP68).
- Mating compatibility with MC4 connector family

| Technical data | |
|---|---|
| Connector system | Ø 4 mm |
| Rated voltage | 1500 V DC (TÜV) [3]<br>1500 V DC (UL) [4]<br>1500 V DC (JET) [5] |
| Rated current TÜV (85°C) | 39 A (2,5 mm²/14 AWG)<br>45 A (4,0 mm²/12 AWG)<br>53 A (6,0 mm²/10 AWG)<br>69 A (10,0 mm²/8 AWG) |
| Rated impulse voltage | 16 kV (1500 V) |
| Ambient temperature range | -40°C ... +85°C (TÜV/UL) |
| Upper limiting temperature | 115°C (TÜV) |
| Degree of protection, mated<br>unmated | IP65/IP68 (1h/1m)<br>IP2X |
| Overvoltage category/Pollution degree | CAT III/3 |
| Contact resistance of plug connectors | ≤0.2 mΩ |
| Safety class | II |
| Contact system | MULTILAM |
| Type of termination | Crimping |
| Contact material | Copper, tin plated |
| Insulation material | PA |
| Locking system (UL) | Locking type |
| Flame class | UL94-V0 |
| Ammonia resistance (acc. to TÜV) | Q60095359 |
| Salt mist spray test, degree of severity 6 | IEC 60068-2-52 |
| TÜV-Rheinland certified,<br>in accordance with IEC 62852<br>UL recognized component,<br>in accordance with UL 6703<br>cTÜVus certified according UL 6703<br>JET certified according IEC 61730-1:2004 | R60127169<br><br>E343181<br><br>CU 72141256 01<br>B13T0062 |

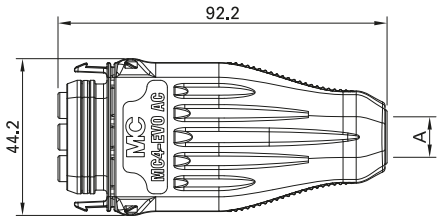
[1] Information about a semi-automatic crimp device or assembly device on request
[2] Reel type subject to alterations
[3] Please take the cable to be used from MA273
[4] The connectors are to be used with USE2 or PV-Wire cables.
[5] The connectors are to be used with cables with the “S-JET mark” label

# Female and male cable coupler MC4-Evo AC

## Preassembled with cable

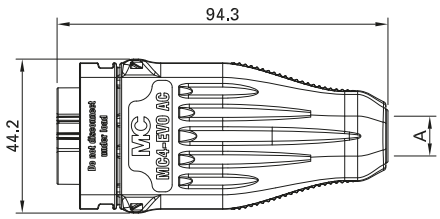
**MC-K...PV-AC1/B...**






**MC-K...PV-AC1/S...**






| Order No. | Type | Female cable coupler | Male cable coupler | Conductor cross section | | Cable | | Rated voltage | | Approvals | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | mm² | AWG | Type | Length (cm) | TÜV (V AC) | UL (V AC) | TÜV | |
| **32.1208-10021** | MC-K1,5Y3/PV-AC1/BI/100 | × | | 1.5 | – | BETAFlam Solar AC flex FRNC | 100 | 250 | – | × | |
| **32.1209-10021** | MC-K1,5Y3/PV-AC1/SI/100 | | × | 1.5 | – | | | | | | |
| **32.1210-10021** | MC-K2,5Y3/PV-AC1/BII/100 | × | | 2.5 | – | | | | | | |
| **32.1211-10021** | MC-K2,5Y3/PV-AC1/SII/100 | | × | 2.5 | – | | | | | | |
| **32.1212-10021** | MC-K4Y3/PV-AC1/BIII/100 | × | | 4 | – | | | | | | |
| **32.1213-10021** | MC-K4Y3/PV-AC1/SIII/100 | | × | 4 | – | | | | | | |
| **32.1214-10021** | MC-K1,5Z3/PV-AC1/BII/100 | × | | – | 16 | Baohing | | – | 600 | | × |
| **32.1215-10021** | MC-K1,5Z3/PV-AC1/SII/100 | | × | – | 16 | | | | | | |
| **32.1216-10021** | MC-K2,5Z3/PV-AC1/BII/100 | × | | – | 14 | | | | | | |
| **32.1217-10021** | MC-K2,5Z3/PV-AC1/SII/100 | | × | – | 14 | | | | | | |
| **32.1218-10021** | MC-K4Z3/PV-AC1/BIII/100 | × | | – | 12 | | | | | | |
| **32.1219-10021** | MC-K4Z3/PV-AC1/SIII/100 | | × | – | 12 | | | | | | |

MA
**Assembly Instructions MA284**
www.staubli.com/electrical

**Sealing caps page 43**
**Assembly tools page 48**

STÄUBLI

- AC plug connector for micro, nano, and string inverters.
- 250 V (IEC) 600 V (UL)
- MULTILAM technology
- Available preassembled from the factory
- Protection class IP65/IP67
- IP2X unmated protected against contact
- Various codings possible
- Compact form for hidden installation in the module frame or for stackable modules

| **Technical data** | |
|---|---|
| Connector system | MC4 |
| Rated voltage | 250 V AC (TÜV)<br>600 V AC (UL) |
| Rated current TÜV (85°C) | 1.5 mm²: 16 A<br>2.5 mm²: 20 A<br>4.0 mm²: 26 A |
| Rated current UL (85°C) | 16AWG: 26 A<br>14AWG: 32 A<br>12AWG: 43 A |
| Rated impulse voltage | 4 kV |
| Ambient temperature range | -40°C...+85°C |
| Upper limiting temperature | 115°C (TÜV) |
| Degree of protection, mated<br>unmated | IP65/IP67<br>IP2X |
| Overvoltage category / Pollution degree | CATIII/3 |
| Contact resistance of plug connectors | 0.25 mΩ |
| Safety class | II (mated condition) |
| Contact system | MULTILAM |
| Type of termination | Crimping |
| Contact material | Copper, tin plated |
| Insulation material | PC |
| Locking system (UL) | Snap-in |
| Flame class | UL94-V1 |
| TÜV-Rheinland certified,<br>in accordance with 2 Pfg 1915<br>UL recognized component,<br>in accordance with UL 6703 | R60126938<br><br>E467440 |

STÄUBLI

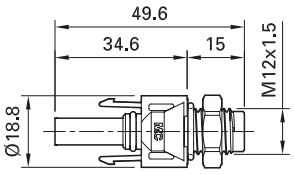
# Female and male panel receptacle MC4

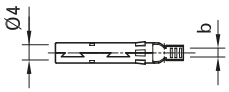
## Female and male panel receptacles as individual part (including insulating part)

**PV-ADBP4-S2...**





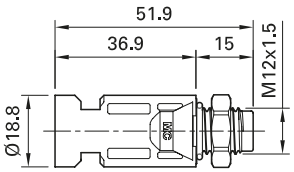


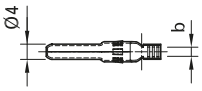




**PV-ADSP4-S2...**






| Order No. | Type | Female cable coupler | Male cable coupler | Conductor cross section | | | Approvals | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | mm² | AWG | b (mm) | TÜV | | |
| **32.0076P0001-UR** | PV-ADBP4-S2/2.5-UR | × | | 2.5 | 14 | 3 | × | × | × |
| **32.0077P0001-UR** | PV-ADSP4-S2/2.5-UR | | × | 2.5 | 14 | 3 | | | |
| **32.0078P0001-UR** | PV-ADBP4-S2/6-UR | × | | 4; 6 | 12; 10 | 5 | | | |
| **32.0079P0001-UR** | PV-ADSP4-S2/6-UR | | × | 4; 6 | 12; 10 | 5 | | | |
| **32.0150P0001** | PV-ADBP4-S2/10 | × | | 10 | | 7.2 | × | | |
| **32.0151P0001** | PV-ADSP4-S2/10 | | × | 10 | | 7.2 | | | |

**Note:**
For more detailed information concerning the suitable cable gland range, please consult MA275.



**Sealing caps page 43**
**Special socket wrench insert page 47**
**Unlocking tool page 48**

MA

**Assembly Instructions MA275**
**www.staubli.com/electrical**

STÄUBLI

- MC4 panel-receptacle connectors are the interface between an inverter or junction box or junction and a branch cable
- Mounting directly by means of screw thread or in perforated plate with plastic nut (included in delivery)
- Rapid, precise plugging
- Protection class IP68 (1 m/1 h) guarantees the highest connection safety
- Mating compatibility with MC4 connector family
- Includes sealing element for enclosure

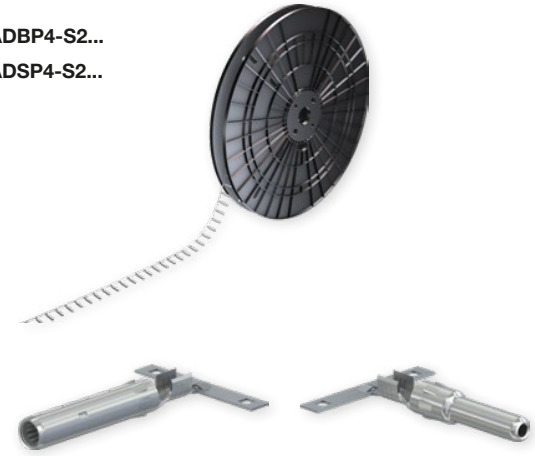
| **Technical data** | |
|---|---|
| Connector system | Ø 4 mm |
| Rated voltage | 1250 V DC (TÜV)<br>1500 V DC (UL) |
| Rated current TÜV (85°C) | 22.5 A (2.5 $mm^2$; 14 AWG)<br>39 A (4 $mm^2$; 12 AWG)<br>45 A (6 $mm^2$; 10 AWG)<br>51 A (10 $mm^2$) |
| Rated impulse voltage | 16 kV (1250 V) |
| Ambient temperature range | -40°C...+85°C (TÜV/UL) |
| Upper limiting temperature | 105°C (TÜV) |
| Degree of protection, mated<br>unmated | IP65; IP68 (1 m/1 h)<br>IP2X |
| Overvoltage category/Pollution degree | CATIII/3 |
| Contact resistance of plug connectors | ≤0.25 mΩ |
| Safety class | II |
| Contact system | MULTILAM |
| Type of termination | Crimping |
| Contact material | Copper, tin plated |
| Insulation material | PC/PA |
| Locking system (UL) | Locking type |
| Flame class | UL94-V0 |
| TÜV-Rheinland certified, in accordance with IEC 62852<br>UL recognized component, in accordance with UL 6703<br>CSA certified, in accordance with UL 6703 | R60127181<br>E343181<br>250725 |

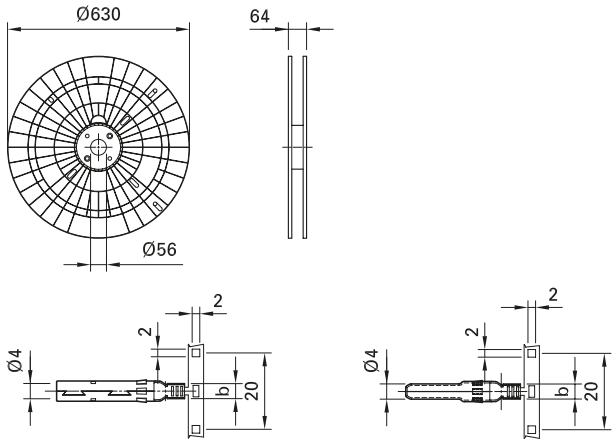
**Note:**
Custom made special versions with cable are also available. Lengths and choice of cable ends on request, see page 50

# Female and male panel receptacle MC4

## Contacts on carrier band (including insulating part)

**PV-ADBP4-S2...**
**PV-ADSP4-S2...**






| Order No. | Type | Female cable coupler | Male cable coupler | Conductor cross section | | | Crimping tool | Contacts per Reel[2] | Approvals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | mm² | AWG | b (mm) | | | TÜV | | |
| **32.0076P2000-UR** | PV-ADBP4-S2/2.5-UR | × | | 2.5 | 14 | 3 | [1] | 2000 | × | × | × |
| **32.0077P2000-UR** | PV-ADSP4-S2/2.5-UR | | × | 2.5 | 14 | 3 | [1] | 2000 | | | |
| **32.0078P2000-UR** | PV-ADBP4-S2/6-UR | × | | 4; 6 | 12; 10 | 5 | [1] | 2000 | | | |
| **32.0079P2000-UR** | PV-ADSP4-S2/6-UR | | × | 4; 6 | 12; 10 | 5 | [1] | 2000 | | | |
| **32.0150P1700** | PV-ADBP4-S2/10 | × | | 10 | | 7.2 | [1] | 1700 | × | | |
| **32.0151P1700** | PV-ADSP4-S2/10 | | × | 10 | | 7.2 | [1] | 1700 | | | |

**Note:**
For more detailed information concerning the suitable cable gland range, please consult MA275.



**Sealing caps page 43**
**Special socket wrench insert page 47**
**Unlocking tool page 48**




**Assembly Instructions MA275**
www.staubli.com/electrical

STÄUBLI

- Feeder bands for fully automatic assembly
- Tools specially designed for MC4 available for automatic crimping
- Process reliability as result of specially developed supply reel

| Technical data | |
|---|---|
| Connector system | Ø 4 mm |
| Rated voltage | 1250 V DC (TÜV)<br>1500 V DC (UL) |
| Rated current TÜV (85°C) | 22.5 A (2.5 mm²; 14 AWG)<br>39 A (4 mm²; 12 AWG)<br>45 A (6 mm²; 10 AWG)<br>51 A (10 mm²) |
| Rated impulse voltage | 16 kV (1250 V) |
| Ambient temperature range | -40°C...+85°C (TÜV/UL) |
| Upper limiting temperature | 105°C (TÜV) |
| Degree of protection, mated<br>unmated | IP65; IP68 (1 m/1 h)<br>IP2X |
| Overvoltage category / Pollution degree | CATIII / 3 |
| Contact resistance of plug connectors | ≤ 0.25 mΩ |
| Safety class | II |
| Contact system | MULTILAM |
| Type of termination | Crimping |
| Contact material | Copper, tin plated |
| Insulation material | PC / PA |
| Locking system (UL) | Locking type |
| Flame class | UL94-V0 |
| TÜV-Rheinland certified, in accordance with IEC 62852<br>UL recognized component, in accordance with UL 6703<br>CSA certified, in accordance with UL 6703 | R60127181<br>E343181<br>250725 |

[1] Information about a semi-automatic crimp device or assembly device on request

[2] Reel type subject to alterations

STÄUBLI

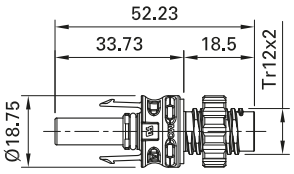
# Female and male panel receptacle MC4-Evo 2

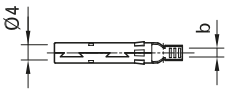
## Female and male panel receptacles as individual part (including insulating part)

**PV-ADB4-EVO 2**





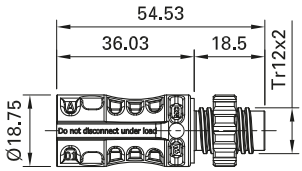


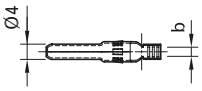




**PV-ADS4-EVO 2**






| Order No. | Type | Female cable coupler | Male cable coupler | Conductor cross section | | | Approvals | |
|---|---|---|---|---|---|---|---|---|
| | | | | mm² | AWG | b (mm) | TÜV | |
| **32.0020P0001-UR** | PV-ADB4-EVO 2/2,5-UR | × | | 2.5 | 14 | 3 | × | × |
| **32.0021P0001-UR** | PV-ADS4-EVO 2/2,5-UR | | × | 2.5 | 14 | 3 | | |
| **32.0022P0001-UR** | PV-ADB4-EVO 2/6-UR | × | | 4.0; 6.0 | 12; 10 | 5 | | |
| **32.0023P0001-UR** | PV-ADS4-EVO 2/6-UR | | × | 4.0; 6.0 | 12; 10 | 5 | | |

**Note:**
For more detailed information concerning the suitable cable gland range, please consult MA285.



**Sealing caps page 43**
**Unlocking tool page 48**

MA

**Assembly Instructions MA285**
www.staubli.com/electrical

STÄUBLI

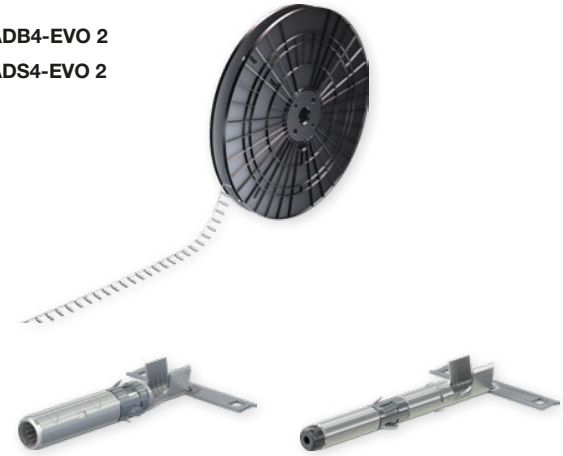
- MC4-Evo 2 panel-receptacle connectors are the interface between the inverter or the distributor housing and string
- Assembly directly via the threads or in the perforated plate with the plastic nut (contained in scope of delivery)
- Thanks to the D shape, the threaded connection is secured against turning
- For 1500 V DC (IEC), 1500 V DC (UL) approved unobstructed
- Degree of protection IP68 (1m/1h) guarantees highest connection safety
- Fast and clean connection
- Plug compatible with the original MC4 plug connector family
- With preassembled flat seal

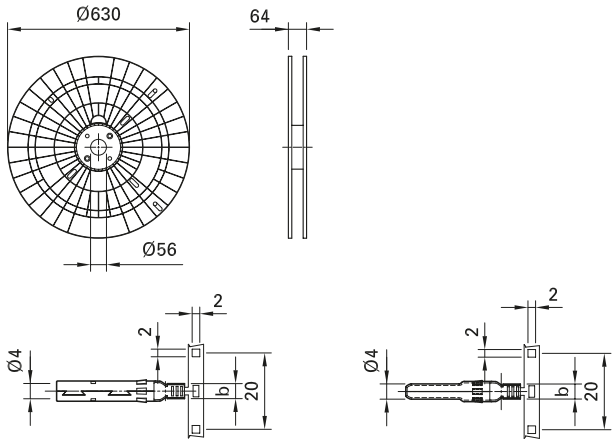
| **Technical data** | |
|---|---|
| Connector system | Ø 4 mm |
| Rated voltage | 1500 V DC (TÜV)<br>1500 V DC (UL) |
| Rated current TÜV | 32 A (2.5 $mm^2$ / 14 AWG)<br>42 A (4.0 $mm^2$ / 12 AWG)<br>47 A (6.0 $mm^2$ / 10 AWG) |
| Rated impulse voltage | 16 kV (1500 V) |
| Ambient temperature range | -40°C...+85°C (TÜV)<br>-40°C...+90°C (UL) |
| Upper limiting temperature | 115°C |
| Degree of protection, mated<br>unmated | IP65; IP68 (1m/1h)<br>IP2X |
| Overvoltage category / Pollution degree | CATIII / 3 |
| Contact resistance of plug connectors | ≤ 0.2 mΩ |
| Safety class | II |
| Contact system | MULTILAM |
| Type of termination | Crimping |
| Contact material | Copper, tin plated |
| Insulation material | PA |
| Locking system (UL) | Locking type |
| Flame class | UL94-V0 |
| TÜV-Rheinland certified,<br>in accordance with IEC 62852<br>UL recognized component,<br>in accordance with UL 6703 | R60127171<br><br>E343181 |

# Female and male panel receptacle MC4-Evo 2

## Contacts on carrier band (including insulating part)

**PV-ADB4-EVO 2**
**PV-ADS4-EVO 2**






| Order No. | Type | Female cable coupler | Male cable coupler | Conductor cross section | | | Crimping tool | Contacts per Reel[2)] | Approvals | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | mm² | AWG | b (mm) | | | TÜV | |
| **32.0020P2000-UR** | PV-ADB4-EVO 2/2,5-UR | × | | 2.5 | 14 | 3 | [1)] | 2000 | × | × |
| **32.0021P2000-UR** | PV-ADS4-EVO 2/2,5-UR | | × | 2.5 | 14 | 3 | [1)] | 2000 | | |
| **32.0022P2000-UR** | PV-ADB4-EVO 2/6-UR | × | | 4.0; 6.0 | 12; 10 | 5 | [1)] | 2000 | | |
| **32.0023P2000-UR** | PV-ADS4-EVO 2/6-UR | | × | 4.0; 6.0 | 12; 10 | 5 | [1)] | 2000 | | |

**Note:**
For more detailed information concerning the suitable cable gland range, please consult MA285.



**Sealing caps page 43**
**Unlocking tool page 48**

MA

**Assembly Instructions MA285**
**www.staubli.com/electrical**

STÄUBLI

- Feeder bands for fully automatic assembly
- Tools specially designed for MC4-Evo 2 available for automatic crimping
- Process reliability as result of specially developed supply reel

| Technical data | |
|---|---|
| Connector system | Ø 4 mm |
| Rated voltage | 1500 V DC (TÜV)<br>1500 V DC (UL) |
| Rated current TÜV | 32 A (2.5 $mm^2$ / 14 AWG)<br>42 A (4.0 $mm^2$ / 12 AWG)<br>47 A (6.0 $mm^2$ / 10 AWG) |
| Rated impulse voltage | 16 kV (1500 V) |
| Ambient temperature range | -40°C...+85°C (TÜV)<br>-40°C...+90°C (UL) |
| Upper limiting temperature | 115°C |
| Degree of protection, mated<br>unmated | IP65; IP68 (1m/1h)<br>IP2X |
| Overvoltage category / Pollution degree | CATIII / 3 |
| Contact resistance of plug connectors | ≤ 0.2 mΩ |
| Safety class | II |
| Contact system | MULTILAM |
| Type of termination | Crimping |
| Contact material | Copper, tin plated |
| Insulation material | PA |
| Locking system (UL) | Locking type |
| Flame class | UL94-V0 |
| TÜV-Rheinland certified,<br>in accordance with IEC 62852<br>UL recognized component,<br>in accordance with UL 6703 | 60127171<br><br>E343181 |

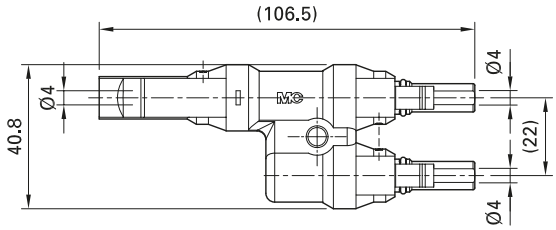
[1] Information about a semi-automatic crimp device or assembly device on request

[2] Reel type subject to alterations

# Branch socket, branch plug MC4

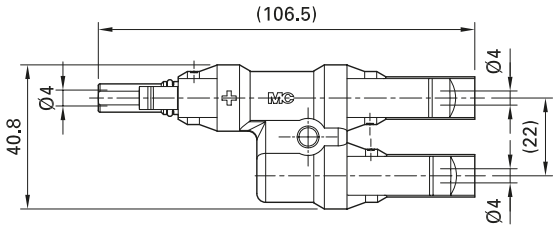
**PV-AZB4**




**PV-AZS4**




| Order No. | Type | Description | Approvals |
|---|---|---|---|
| **32.0018** | PV-AZB4 | Branch socket | |
| **32.0019** | PV-AZS4 | Branch plug | |

**Sealing caps page 43**

**Unlocking tool page 48**

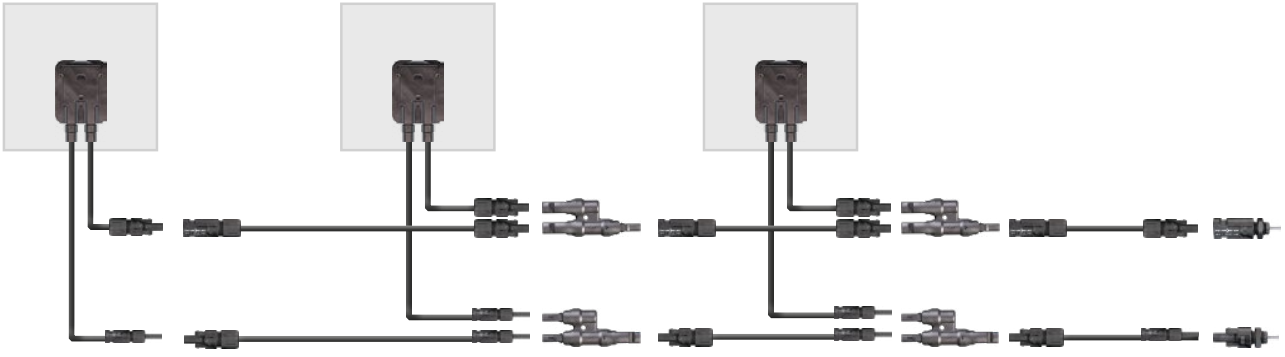
MA

**Assembly Instructions MA250**

**www.staubli.com/electrical**

- For a safe and simple parallel or serial-parallel connection of PV-modules.
- Pluggable with single-pole Stäubli PV-cable coupler MC4. Unmated connections must be protected by sealing caps.

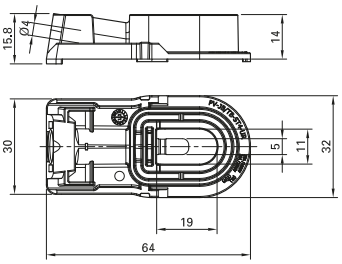
| Technical data | |
|---|---|
| Connector system | Ø 4 mm |
| Rated voltage | 1500 V DC (UL) |
| Rated current | 50 A |
| Rated impulse voltage | 12 kV |
| Ambient temperature range | -40°C…+85°C (UL) |
| Upper limiting temperature | 105°C (Stäubli) |
| Degree of protection, mated<br>unmated | IP67<br>IP2X |
| Overvoltage category / Pollution degree | CATIII / 2 |
| Contact resistance of plug connectors | ≤ 0.5 mΩ |
| Safety class | II |
| Contact system | MULTILAM |
| Contact material | Copper, tin plated |
| Insulation material | PC |
| Locking system (UL) | Locking type |
| Flame class | UL94-V0 |
| UL recognized component, in accordance with UL 6703 | E343181 |



# PV-Junction box TwinBox PV-JB/TB-...

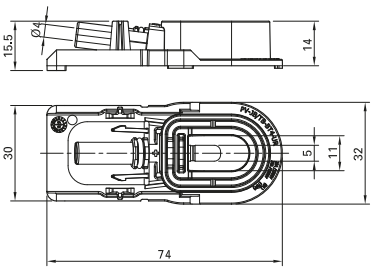
**PV-JB/TB-ST4**






**PV-JB/TB-BT4**






| Order No. | Type | Description |
|---|---|---|
| **32.7242-UR** | PV-JB/TB-BT4-UR | Socket junction box, complete with cover and adhesive foil |
| **32.7243-UR** | PV-JB/TB-ST4-UR | Plug junction box, complete with cover and adhesive foil |

**Sealing caps page 43**
**Unlocking tool page 48**

MA

**Assembly Instructions MA263**
**www.staubli.com/electrical**

STÄUBLI

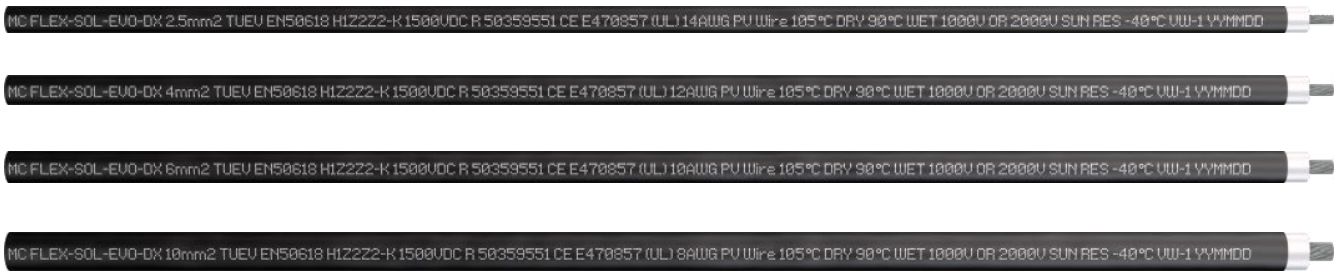
- Suitable for use with crystalline and thin-film PV modules
- Designed for fully automated assembly
- High dependability due to perfect matching of components, potting compound, silicone and adhesive foil.
- Compartment for electrical connection between box and panel hermetically sealed with potting compound.
- Compact design due to integration of the MC4 connection technology directly into the junction box.

**Pre-assembled PV cables:**
The connection of the TwinBox is achieved by using the MC4 connector system. Depending on the choice of cables and connectors various voltage systems may be realized: IEC 1000 V – 1500 V as well as UL 600 V – 1000 V.

| Technical data | |
|---|---|
| Connector system | MC4 |
| Rated current | 25 A |
| Rated voltage[1)] | MC4:<br>1000 V DC / 1500 V DC[2)] (TÜV)<br>600 V DC (UL) |
| Rated surge voltage | 16 kV |
| Maximum permitted operating voltage | 1500 V |
| Upper limiting temperature | 105°C (TÜV) |
| Ambient temperature range | -40°C…+90°C |
| Upper limiting temperature | +105°C |
| Degree of protection, mated<br>unmated | IP65/IP68 (1 h/1 m)<br>IP2X |
| Degree of pollution | 3 mated |
| Contact resistance of plug connectors | ≤0.25 mΩ |
| Contact material | Copper alloy, tin plated |
| Insulation material | PA |
| Locking system plug connectors | Locking type |
| Safety class | III |
| Flame class | UL94-V0 |
| TÜV-Rheinland certified according EN 50548<br>UL recognized component, in acc. with UL 3730 | R60110180<br>E335016 |
| Intended for Module type | Thin film |
| Poles | 1 |
| Diodes | 0 |
| Number of bus ribbons | 1 |
| Orientation of the bus ribbons | Vertical or horizontal |
| Connection of the bus ribbons | Welding (UL, TÜV)/Soldering (TÜV) |
| Installation | Silicone and potting compound |
| Suitable for automated assembly | Yes |

[1)] The rated voltage of the components and connectors used must be checked in the certificates.
[2)] 1500 V DC (IEC) according 2PFG2330: only for restricted access locations

# PV Cable Flex-Sol-Evo-DX...




| Order No. | Type | Conductor cross section | | Conductor Ø | Outer-Ø | Strand design | Conductor resistance | Approvals |
|---|---|---|---|---|---|---|---|---|
| | | $mm^2$ | AWG | mm | mm | Number x Ø mm | Ω/km 20°C | |
| **62.7434-91021** | FLEX-SOL-EVO-DX 2,5 | 2.5 | 14 | 2.0 | 5.94 | 47 × Ø 0.25 | 8.21 | |
| **62.7435-91021** | FLEX-SOL-EVO-DX 4,0 | 4.0 | 12 | 2.4 | 6.35 | 52 × Ø 0.30 | 5.09 | |
| **62.7436-91021** | FLEX-SOL-EVO-DX 6,0 | 6.0 | 10 | 3.0 | 6.97 | 78 × Ø 0.30 | 3.39 | |
| **62.7437-91021** | FLEX-SOL-EVO-DX 10 | 10 | 8 | 4.1 | 8.57 | 77 × Ø 0.40 | 1.95 | |

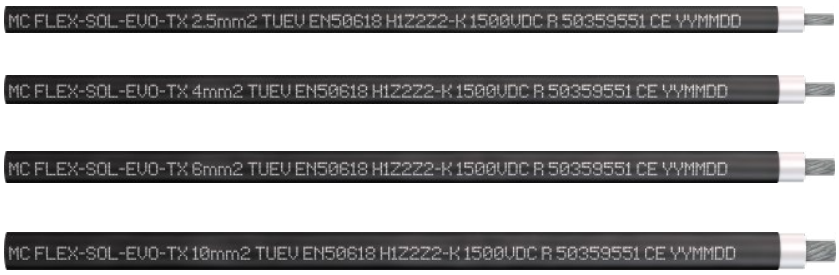
STÄUBLI

Halogen free cross-linked polyolefin double layers photovoltaic cables for use at the photovoltaic power systems.

This cable can match with most PV-components like PV-junction boxes and PV-connectors, which have a rated voltage of 1500 V DC.

| **Technical data** | |
|---|---|
| Nominal voltage | 2000 V (UL)<br>1500 V / max. 1800 V (U0) (IEC) |
| Test voltage according to EN 50395-6 | 7.5 kV AC / 15 kV DC (5 min.) |
| Rated current | 41 A (2.5 $mm^2$ / 14 AWG),<br>55 A (4.0 $mm^2$ / 12 AWG),<br>70 A (6.0 $mm^2$ / 10 AWG),<br>98 A (10 $mm^2$ / 8 AWG) |
| Rated voltage | 1500 V DC (IEC) / 2000 V DC (UL) PV-Wire |
| Insulation resistance of the complete cable according to EN 50395-8.2 | ≥ 1000 MΩkm |
| Ambient temperature | -40°C ...+90°C |
| Maximum conductor temperature | max. +120°C |
| Bending radius Dynamic<br>Static | >5 × OD<br>>4 × OD |
| Resistant to... | UV Ozone Hydrolysis |
| Resistance to... tested acc. to IEC 60811-2-1 | Acids, alcalis and oil (IRM 902) |
| Isolation, acc. IEC 60332-1-2 | Flame retardant<br>with particularly low smoke emission |
| Conductor: fine-wire tinned copper strands<br>Number larger than standard | Class 5<br>in accordance to IEC/EN 60228 |
| Inner insulation (white)<br>Sheath insulation, with colour patch (black) | XLPO (RAL9003)<br>Polyolefin |
| Sheat color | Black |
| TÜV certified according EN50618<br>UL recognized component | R50359551<br>UL E 470857 |

# PV Cable Flex-Sol-Evo-TX...




| Order No. | Type | Conductor cross section | Conductor Ø | Outer-Ø | Strand design | Conductor resistance | Approvals |
|---|---|---|---|---|---|---|---|
| | | $mm^2$ | mm | mm | Number x Ø mm | Ω/km 20°C | |
| **62.7430-91021** | FLEX-SOL-EVO-TX 2,5 | 2.5 | 2.0 | 5.0 | 47 × Ø 0.25 | 8.21 | TÜV |
| **62.7431-91021** | FLEX-SOL-EVO-TX 4,0 | 4.0 | 2.4 | 5.4 | 52 × Ø 0.30 | 5.09 | |
| **62.7432-91021** | FLEX-SOL-EVO-TX 6,0 | 6.0 | 3.0 | 6.0 | 78 × Ø 0.30 | 3.39 | |
| **62.7433-91021** | FLEX-SOL-EVO-TX 10 | 10 | 4.1 | 7.2 | 77 × Ø 0.40 | 1.95 | |

STÄUBLI

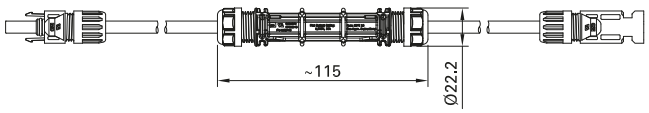
Halogen free cross-linked polyolefin double layers photovoltaic cables for use at the photovoltaic power systems.

| **Technical data** | |
|---|---|
| Nominal voltage | 1500 V / max. 1800V (U0) (IEC) |
| Test voltage according to EN 50395-6 | 6.5 kV AC / 15 kV DC (5 min.) |
| Rated current | 41 A (2.5 $mm^2$). 55 A (4.0 $mm^2$).<br>70 A (6.0 $mm^2$). 98 A (10 $mm^2$) |
| Rated voltage | 1500 V DC IEC |
| Insulation resistance of the complete cable according to EN 50395-8.2 | ≥ 1000 MΩkm |
| Ambient temperature | -40°C ...+90°C |
| Maximum conductor temperature | max. +120°C |
| Bending radius Dynamic<br>Static | >5 × OD<br>>4 × OD |
| Resistant to... | UV Ozone Hydrolysis |
| Resistance to... tested acc. to IEC 60811-2-1 | Acids, alcalis and oil (IRM 902) |
| Isolation, acc. IEC 60332-1-2 | Flame retardant<br>with particularly low smoke emission |
| Conductor: fine-wire tinned copper strands<br>Number larger than standard | Wire class 5<br>in accordance to IEC/EN 60228 |
| Inner insulation (white)<br>Sheath insulation, with colour patch (black) | XLPE (RAL9003)<br>Polyolefin |
| Sheat color | Black |
| TÜV Approval according EN50618 | R50359551 |

# In-line-Fuse PV-K/ILF

**PV-K/ILF...UL**






| Order No. | Type | Safety | Type of connector/socket | Length | Approvals |
|---|---|---|---|---|---|
| | | A/V | mm | cm | |
| **55000140-0050UL** | PV-K/ILF4/6N0050UL | 4/1000 | MC4 | 50 | |
| **55000127-0050UL** | PV-K/ILF10/6N0050UL | 10/1000 | | | |
| **55000128-0050UL** | PV-K/ILF15/6N0050UL | 15/1000 | | | |
| **55000129-0050UL** | PV-K/ILF20/6N0050UL | 20/1000 | | | |
| **55000130-0050UL** | PV-K/ILF30/6N0050UL | 30/1000 | | | |
| **55000189-0055UL** | PV-K/1500ILF4/6N0055UL | 4/1500 | MC4 | 55 | |
| **55000190-0055UL** | PV-K/1500ILF10/6N0055UL | 10/1500 | | | |
| **55000191-0055UL** | PV-K/1500ILF15/6N0055UL | 15/1500 | | | |
| **55000192-0055UL** | PV-K/1500ILF20/6N0055UL | 20/1500 | | | |

STÄUBLI

The in-line fuse PV-K/ILF with a crimping connection guarantees a long-lasting, stable connection in comparison to conventional clip-in clamps:

- Minimal energy loss, low heat generation
- Robust housing, safety class IP68
- Cable cross section 10 AWG/6 mm²
- Cable cTÜVus certified
- Two standard lengths:
- 50 cm (1000 V) and 55 cm (1500 V)
- Other lengths upon request

| Technical data | |
|---|---|
| Connector system | MC4 |
| Rated current fuse | 1000 V: 4 A, 10 A, 15 A, 20 A, 30 A<br>1500 V: 4A , 10 A, 15 A, 20 A |
| Rated voltage fuse | 1000 V (50 cm)<br>1500 V (55 cm) |
| Insulation test voltage | 6600 V |
| Ambient temperature | -40°C...+50°C (UL9703) |
| Upper limiting temperature | 105°C |
| Contact resistance of plug connectors | ≤0.25 mΩ |
| Contact material | Copper alloy, tin-plated |
| Insulation material | PC/PA/PA + GF |
| Flame class | UL94-V0 |
| UL-recognized components in accordance with UL 9703 | E474445 |

## ACCESSORIES

# Adapter leads

### Adapter test lead MC4

One end equipped with Stäubli PV connector, the other end with Ø 4 mm Stäubli safety plug for measuring instruments with Ø 4 mm safety sockets ensuring safe current and voltage measuring on PV-modules and systems.

**PV-AMLB4/150**



**PV-AMLS4/150**



| Order No. | Type | PV-plug | PV-socket | System | Colours |
|---|---|---|---|---|---|
| **32.1198-150*** | PV-AMLB4/150 | | × | MC4 | 21 23 29 |
| **32.1199-150*** | PV-AMLS4/150 | × | | MC4 | 21 22 |

| Technical data | |
|---|---|
| Connector system | MC4 |
| Rated voltage | 1000 V DC |
| Rated current | 19 A |
| Conductor cross section | 1 mm² |
| Cable length | 150 cm |
| Cable insulation | PVC |
| Overvoltage category / Pollution degree | CATIII / 2 |

* Add the desired colour code



**Sealing caps page 43**

# Test socket and plug MC4

Special construction with gold plated contacts for test and measurement to achieve higher mating cycles.
**Without locking system.**

**PV-KBT4II-P AU**



**PV-KST4II-P AU**



| Order No. | Type | Socket | Plug | Suitable for | MA Assembly instruction |
|---|---|---|---|---|---|
| **32.0044** | PV-KBT4II-P AU | × | | PV-KST4..., PV-ADSP4-S2..., PV-AZS4, PV-AZB4 | MA260 |
| **32.0045** | PV-KST4II-P AU | | × | PV-KBT4..., PV-ADBP4-S2..., PV-AZS4, PV-AZB4 | MA260 |

| Technical data | |
|---|---|
| Connector system | MC4 |
| Rated voltage | 1000 V DC |
| Rated current | 30 A (10 AWG / 4 $mm^2$) |
| Test voltage | 6 kV (50 Hz, 1 min.) |
| Conductor cross section | 2.5 $mm^2$; 4 $mm^2$; (14 AWG; 12 AWG; 10 AWG) |
| Degree of protection, unmated | IP2X |
| Overvoltage category / Pollution degree | CATIII / 2 |
| Contact resistance of plug connectors | ≤ 0.25 mΩ |
| Contact material | Copper, gold plated |
| Insulation material | PC / PA |

# Test plugs

## Test plug MC4

This test plug is used to control the correct location of the MC4 contact in the insulation.

**PV-PST**





| Order No. | Type | MA Assembly instruction |
|---|---|---|
| **32.6028** | PV-PST | MA231, MA260, MA275 |

## Test plug MC4-Evo 2

This test plug is used to control the correct location of the MC4-Evo 2 contact in the insulation.

**PV-EVO-PST**





| Order No. | Type | MA Assembly instruction |
|---|---|---|
| **32.6073** | PV-EVO-PST | MA273 |

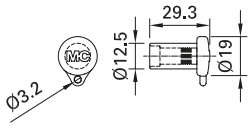
# Sealing caps

## Sealing caps MC4, MC4-Evo 2 and MC4-Evo AC

Sealing caps for tight sealing of unplugged PV connectors.

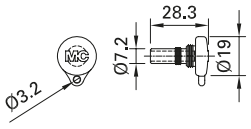
**PV-BVK4**





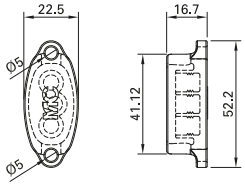

**PV-SVK4**





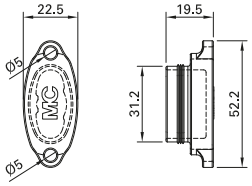

**PV-BVK-EVO AC**






**PV-SVK-EVO AC**






| Order No | Type | Suitable for plug side | Suitable for socket side | System |
|---|---|---|---|---|
| **32.0716** | PV-BVK4 | | × | MC4, MC4-Evo 2 |
| **32.0717** | PV-SVK4 | × | | MC4, MC4-Evo 2 |
| **32.0748** | PV-BVK-EVO AC | | × | MC4-Evo AC |
| **32.0749** | PV-SVK-EVO AC | × | | MC4-Evo AC |

| Technical data | |
|---|---|
| Material | TPE |
| Degree of protection, mated | IP67 |

MA

**Assembly Instructions MA258**

www.staubli.com/electrical

TOOLS

# Assembly tools

## Stripping pliers PV-AZM-...

With length stop for conductor cross sections 1.5 mm², 2.5 mm², 4 mm², 6 mm² and 10 mm². Specially adapted for the Flex-Sol-Evo... PV cable, for stripping small cable quantities on the roof.

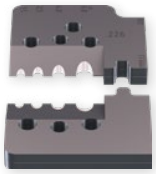
**PV-AZM-...**



| Order No. | Type | Designation | for cable cross sections | MA Assembly instruction |
|---|---|---|---|---|
| | | | mm² | |
| **32.6027-156** | PV-AZM-156 | Pliers with Insert | 1.5; 2.5; 4; 6 | MA231, MA260, MA267 |
| **32.6027-410** | PV-AZM-410 | Pliers with Insert | 4; 6; 10 | MA231, MA267 |

**Individual parts**

PV-M-AZM-156



PV-M-AZM-410



| | | | | |
|---|---|---|---|---|
| **32.6057-156** | PV-M-AZM-156 | Insert | 1.5; 2.5; 4; 6 | MA231, MA260, MA267 |
| **32.6057-410** | PV-M-AZM-410 | Insert | 4; 6; 10 | MA231, MA267 |

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## Crimping pliers for industrial use PV-CZ...

Only the tools stated below may be used for the assembly of UL- and TÜV-approved products.

These are suited for the processing of high numbers of pieces and can be adjusted to the product to be processed with the help of changeable locators and crimp inserts.

**PV-CZM...**



| Order No. | Type | Designation | Crimp range | | suitable for | | MA Assembly instruction |
|---|---|---|---|---|---|---|---|
| | | | mm² | AWG | MC4 | MC4-Evo 2 | |
| **32.6020-18100** | PV-CZM-18100 | Crimping pliers incl. locator and insert | 1.5; 2.5; 4 | 14; 12 | × | | MA251 |
| **32.6020-19100** | PV-CZM-19100 | | 2.5; 4; 6 | 14; 12; 10 | × | | MA251 |
| **32.6020-20100** | PV-CZM-20100 | | 4; 10 | – | × | | MA251 |
| **32.6020-21100** | PV-CZM-21100 | | 6; 10 | – | × | | MA251 |
| **32.6020-22100** | PV-CZM-22100 | | – | 12; 10; 8 | × | | MA251 |
| **32.6020-40100** | PV-CZM-40100 | | 1.5; 2.5; 4 | 16; 14; 12 | | × | MA251 |
| **32.6020-41100** | PV-CZM-41100 | | 2.5; 4; 6 | 14; 12; 10 | | × | MA251 |
| **32.6020-42100** | PV-CZM-42100 | | 4; 10 | 12; 8 | | × | MA251 |

**Individual parts, only for PV-CZM...**

PV-ES-CZM-18100



PV-ES-CZM-19100



PV-ES-CZM-20100



PV-ES-CZM-21100



PV-LOC




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **32.6021-18100** | PV-ES-CZM-18100 | Insert | 1.5; 2.5; 4 | 14; 12 | × | | MA251 |
| **32.6021-19100** | PV-ES-CZM-19100 | Insert | 2.5; 4; 6 | 14; 12; 10 | × | | MA251 |
| **32.6021-20100** | PV-ES-CZM-20100 | Insert | 4; 10 | – | × | | MA251 |
| **32.6021-21100** | PV-ES-CZM-21100 | Insert | 6; 10 | – | × | | MA251 |
| **32.6021-22100** | PV-ES-CZM-22100 | Insert | – | 12; 10; 8 | × | | MA251 |
| **32.6021-40100** | PV-ES-CZM-40100 | Insert | 1.5; 2.5; 4 | 16; 14; 12 | | × | MA251 |
| **32.6021-41100** | PV-ES-CZM-41100 | Insert | 2.5; 4; 6 | 14; 12; 10 | | × | MA251 |
| **32.6021-42100** | PV-ES-CZM-42100 | Insert | 4; 10 | 12; 8 | | × | MA251 |
| **32.6040** | PV-LOC | Locator | universal | | × | | MA251 |
| **32.6055** | PV-LOC-B | Locator | – | 12; 10; 8 | × | | MA251 |
| **32.6056** | PV-LOC-C | Locator | universal | | | × | MA251 |

## Crimping pliers for private use PV-CZM-BS

Suitable for the assembly of products approved by TÜV in small amounts.

Complete tool for the assembly of the original MC4.

**PV-CZM-BS**

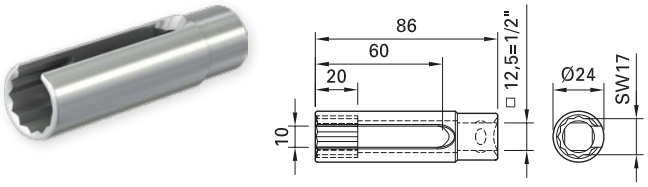


| Order No. | Type | Crimp range | | suitable for | | MA Assembly instruction |
|---|---|---|---|---|---|---|
| | | $mm^2$ | AWG | MC4 | MC4-Evo 2 | |
| **32.6025** | PV-CZM-BS | 2.5; 4; 6 | – | × | | MA289 |

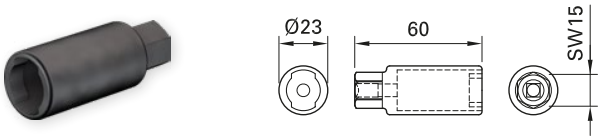
## Socket wrench insert

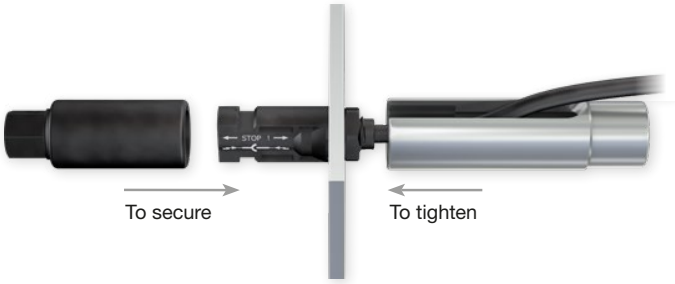
Stäubli recommends these socket wrench inserts for a simple and safe assembly of the panel receptacles.

**PV-WZ-AD/GWD**




**PV-SSE-AD4**



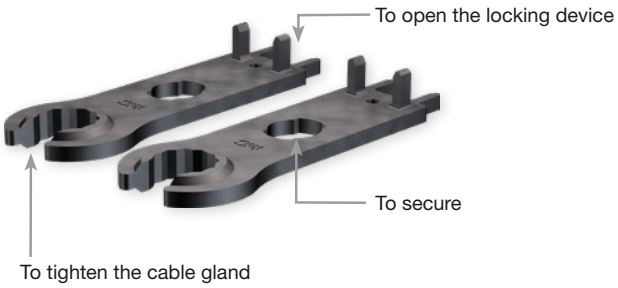




| Order No. | Type | suitable for panel receptacles | MA Assembly instruction |
|---|---|---|---|
| **32.6006** | PV-WZ-AD/GWD | MC4 | MA231, MA260, MA275 |
| **32.6026** | PV-SSE-AD4 | MC4 | MA231, MA260, MA275 |

## Open-end spanner and unlocking tool MC4, MC4-Evo 2 and MC4-Evo AC

To tighten and unscrew the cable gland and
to open the locking device of the connection.

**PV-MS**




**PV-MS-PLS**



**PV-MS-MC4-EVO**



**PV-MS-EVO AC**



| Order No. | Type | Description | suitable for | MA Assembly instruction |
|---|---|---|---|---|
| **32.6024** | PV-MS | Open-end spanner set (consisting of 2 open-end spanners), plastics | MC4 | MA231, MA260 |
| **32.6058** | PV-MS-PLS | Assembly and unlocking tool, incl. belt pouch (consisting of 2 open-end spanners), metal | MC4<br>MC4-Evo 2 | MA270 |
| **32.6066** | PV-MS-MC4-EVO | Unlocking tool | MC4<br>MC4-Evo 2 | |
| **32.6075** | PV-MS-EVO AC | Unlocking tool | MC4-Evo AC | MA284 |

## MC4 Tool case PV-WZ4-SET

Plastic case with tools for assembly of PV connectors.

**PV-WZ4-SET**




| Pos. | Order No. | Type | Designation | Width | Height | Depth |
|---|---|---|---|---|---|---|
| | **32.6019** | PV-WZ4-SET | Case, incl. Pos. 1–3 | 345 mm | 90 mm | 275 mm |
| **Einzelteile** | | | | | | |
| 1 | **32.6020-19100** | PV-CZM-19100 | Crimping pliers 2.5 mm²; 4 mm²; 6 mm²/14 AWG; 12 AWG; 10 AWG | | | |
| 2 | **32.6024** | PV-MS | Open-end spanner set | | | |
| 3 | **–** | – | Plastic box | | | |
| **Optional** | | | | | | |
| | **32.6006** | PV-WZ-AD/GWD | Socket wrench insert | | | |
| | **32.6026** | PV-SSE-AD4 | Socket wrench insert | | | |
| | **32.6021-...** | PV-ES-CZM-... | Insert, see page 45 | | | |
| | **...** | PV-LOC... | Locator, see page 45 | | | |
| | **32.6027-156** | PV-AZM-156 | Stripping pliers | | | |
| | **32.6027-410** | PV-AZM-410 | Stripping pliers | | | |

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## FORMS

# Cable assemblies

### According to customer request

☐ Quantity ☐ Order ☐ Quotation ☐ Reference

**Side 1**

**MC4**

- ☐ PV-KBT4 
- ☐ PV-KST4 
- ☐ PV-ADBP4-S2 
- ☐ PV-ADSP4-S2 

**MC4-Evo2**

- ☐ PV-KBT4-EVO 2 
- ☐ PV-KST4-EVO 2 
- ☐ PV-ADB4-EVO 2 
- ☐ PV-ADS4-EVO 2 

☐ **Cable lug**

☐ Ø 

☐ Ø 

Isolation: ☐ without ☐ with

☐ **Partial stripping** 

Length ☐ (max. 45 mm)

☐ **Not stripped** 

☐ **Other**

**Cable**

**Cable cross section (mm²):**

☐ 2.5 ☐ 4 ☐ 6 ☐ 10

**Length of cable[1]:**

☐ cm

**Sender**

Company

Name

Department

Address

Tel.

Fax

E-Mail

Date

Signature

Other

**Side 2**

**MC4**

-  PV-KBT4 ☐
-  PV-KST4 ☐
-  PV-ADBP4-S2 ☐
-  PV-ADSP4-S2 ☐

**MC4-Evo2**

-  PV-KBT4-EVO 2 ☐
-  PV-KST4-EVO 2 ☐
-  PV-ADB4-EVO 2 ☐
-  PV-ADS4-EVO 2 ☐

☐ **Cable lug**

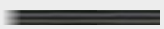
 ☐ Ø

 ☐ Ø

Isolation: ☐ without ☐ with

 ☐ **Partial stripping**

Length ☐ (max. 45 mm)

 ☐ **Not stripped**

☐ **Other**

www **Interactive form:** www.staubli.com/electrical
> Downloads > Online-Forms

[1] Definition, see page 51

# Definition of cable lengths

## Cable lengths of cable assemblies

For ordering ready made leads, the cable length L is defined as in the examples shown below.

**Female cable coupler**



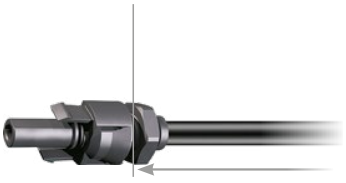

**Male cable coupler**



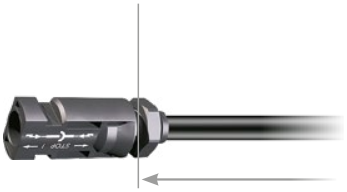

**Cable lug**




**Female panel receptacle**




**Male panel receptacle**




**Complete or partial stripping**




# Customized solutions

**PV junction box – Example**



| Technical data | |
|---|---|
| Rated voltage | 1000 V DC (IEC) |
| Rated current | 2.5 A-10 A |
| Degree of protection, mated | IP65 |
| Connection of the bus ribbons | Soldering |
| Installation | Adhesive pad<br>Silicone |
| TÜV Rheinland certified, EN 50548 + A1 | R60090328 |

APPENDIX

# General information

Users wishing to employ products listed in the catalogue for applications we have not considered are themselves responsible for making certain that the products comply with standards other than those stated.

**Changes / Provisos**
All data, illustrations and drawings in the catalogue have been carefully checked. They are in accordance with our experience to date, but no responsibility can be accepted for errors. We also reserve the right to make modifications for design and safety reasons. When designing equipment incorporating our components, it is therefore advisable not to rely solely on the data in the catalogue but to consult us to make sure this information is up to date. We shall be pleased to advise you.

# Technical information

**Crimped terminations**
For termination of the conductors to the crimping sleeves of the PV plug connectors we recommend using the stated crimping tools. For UL certified products only the tools mentioned can be used for self-assembly according to the assembly instructions. The crimping sleeves are designed for highly flexible conductors of the stated cross-section ranges. The use of flexible conductors is possible. It is advantageous to use tinned conductors.

**Connecting cables**
To ensure that the cable outlets of the PV plug connectors are sufficiently watertight, connecting cables of the specified diameter ranges for the insulating casings must be used.

**Laying conditions**
When laying the PV leads, avoid having the connecting cable resting on a sharp edge at the exit from the PV connector. We recommend observing the minimum bending radius of the connecting cables.

**Plugging cycles**
The maximum life of the PV connectors is 100 plugging cycles.

**Rated current**
See derating diagram

**Max. system voltage**
Is the maximum voltage for which the components of the PV plug connector system may be used and are rated in accordance with IEC 60664-1.

**Contact resistance**
is the resistance at the point of contact between two contact surfaces.

**Test voltage**
Is the voltage at which the new components of the PV plug connector system are tested under defined conditions without breakdown or arcing.

**Unplugging under load**
PV plug connections must not be unplugged while under load. Plugging and unplugging while under tension is permitted.

**Protection against weather**
Sealing caps must be used to protect unplugged PV-connectors from moisture and dirt.

**Positioning of the junction box**
The junction box must be fixed on the PV module in such a position that the cable outlets of the junction box point downwards when in use.

# Further technical data on leads

**Smallest Permissible Bend Radii**

VDE 0298, part 3, stipulates minimum permissible bend radii of leads. In the following table, the minimum bend radii are shown for fixed and mobile flexible leads.

| Bend radi | |
|---|---|
| Rated voltage | > 600 V |
| Fixed | 6 d |
| Mobile | 10 d |

d = Outside diameter of lead

**Why tinned multistrand copperwires?**

If bright-soft copper stranded wires are exposed to temperatures > 90°C, this can result in discoloration of the copper and an impairment of its soldering properties. Reactions between the copper and the insulating material may also occur which have a deleterious effect on the mechanical properties of the flexible leads.

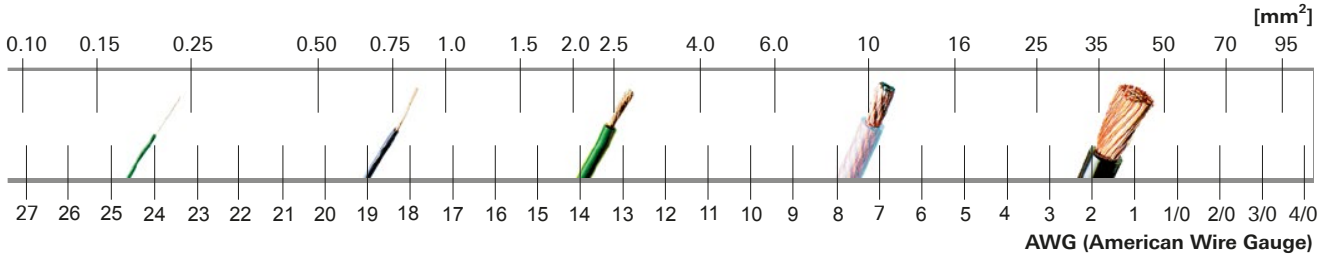
| Nominal cross section | Conductor resistance |
|---|---|
| mm² | Ω/km |
| 1.5 | 13.3 |
| 2.5 | 7.98 |
| 4.0 | 4.95 |
| 6.0 | 3.30 |
| 10 | 1.91 |

**Resistance of conductor at 20°C for class 5 Cu conductors**

The following table shows the conductor resistance for fine-stranded copper wires with bare individual strands at 20°C inrelation to the nominal cross-section according to IEC/EN 60228.

**Table mm²/AWG**

The nominal cross-section of our multistrand wires is stated in sq. mm. The following chart gives an indication of their comparability with corresponding AWG values.[1)]




[1)] The chart is based on values for strandedwires given in UL 758 "UL Standard for Safety for Appliance Wiring Material".

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