Wiring Solutions for Photovoltaic Power Systems

Standard Product Range and Customized Solutions for

- Module Producers
- Component Producers
- Installers and System Integrators

Overmolded connectors make the difference!
Overmolded connectors

- outstanding environmental seals
- excellent strain relief
- unsurpassed ruggedness and durability

Wiring system LC3®

- sleek and slim
- optional locking according to NEC 2008 NFPA 70
- connectors, cables and junction boxes

- industrially pre-assembled, overmolded and tested
- field-attachable versions also available

Wiring system LC4®

- with integrated locking
- alternatively to be unlocked either manually or only with a tool, according to NEC 2008 NFPA 70
- connectors, cables and junction boxes

- industrially pre-assembled, overmolded and tested
- field-attachable versions also available
Succeed together

- strong platform for global operations
- bundled know-how from various markets and branches worldwide
- interdisciplinary, international teams for a comprehensive support
- quick and flexible partner for nationally and globally acting customers
Junction boxes

for crystalline modules
2–6 terminal clamps
0–5 diodes

for thin film modules

two-pole junction boxes,
for ribbons fed through the
back plane of the module,
optionally with diode

two-pole junction boxes,
for ribbons fed over the
edge of the module,
optionally with diode

single-pole junction boxes,
for ribbons fed through the
back plane of the module

single-pole junction boxes,
for ribbons fed over the
edge of the module

Cables

• standard cables
• cables according to specific markets’ needs, i.e. for
America, Europe, Asia, or multistandard
• the ideal solution: pre-assembled cables with
overmolded connectors

2.5 mm²
AWG 14

4.0 mm²
AWG 12

6.0 mm²
AWG 10

Connectors

System LC3®
• sleek and slim
• optional locking according to NEC 2008 NFPA 70

System LC4®
• with integrated locking
• alternatively to be unlocked
manually or only with a tool, acc. to NEC 2008 NFPA 70
Module junction technology

**Features**

- special direct contacting inside the junction boxes, without soldering
- very flat junction box designs
- for crystalline or thinfilm modules
- single-pole and two-pole versions
- to be mounted on the back side or on the edge
- with self-adhesive pad or for gluing
- sealing by means of potting
- either with the slim LC3® connectors (optional locking) or with the new LC4® connectors with integrated locking
- overmolded connectors: outstanding environmental seals, excellent strain relief, unsurpassed ruggedness and durability

**Benefits**

- fast, easy to automate and secure connecting processes inside the junction boxes
- minimized contact resistance
- minimized cable lengths with single-pole junction boxes
- optimized for automatic assembly
- contracted dimensions of the junction boxes allow for high packaging density of the modules
- permanently reliable system operation
- minimized attendance and servicing expenditure
- the best solution available for each module type
- all from one source, available worldwide
- system meets international requirements, including NEC 2008 NFPA 70
- customized solutions at any time
Interface from the outside

Receptacles of **system LC3**
- optional locking according to NEC 2008 NFPA 70

Receptacles of **system LC4**
- with integrated locking
- alternatively to be unlocked manually or only with a tool, acc. to NEC 2008 NFPA 70

Internal wiring

- screw terminal blocks
- connectors with insulation displacement technology (IDT)
- connectors with screw clamp technology
- connectors with crimp technology
- indirect, two-part connectors
- direct connectors for the circuit board edge
- for discrete stranded wires or flat cables
- pitches from 1.27 mm (.050") up to 10.0 mm (.394")
- for load currents up to 15 A/630 V AC
- I/O interfaces including RJ45 and USB
- circular connectors up to IP 68

For the internal wiring of the components, Lumberg offers a wide range of solutions, all from one source.

- for inverters
- generator isolation housings
- combiner boxes
- auxiliary components

Detailed information about these connector systems can be found in additional Lumberg catalogs and on the Internet.

www.lumberg.com
From the field into the housing – and within the housing...

**Features**

- photovoltaic receptacles as the interface
- highest protection degree IP 68
- rugged and durable
- alternatively from the LC3® system (optional locking) or from the new LC4® system with integrated locking
- protective caps for transport and spare receptacles
- connector systems and terminal blocks for the internal wiring
- proven a billionfold in various industries

**Benefits**

- permanently reliable system operation
- fast and easy to assemble
- proven connector systems from one source: into the housing and within the housing
- many systems designed for automated processing
- available worldwide
- customized solutions
Wiring of solar power plants: industrially pre-assembled, overmolded, tested

Photovoltaic array harnesses LC3®
- ready-to-plug: industrially pre-assembled
- industrially tested
- type T or type X
- with the sleek and slim LC3® connectors
- optional locking according to NEC 2008 NFPA 70

Photovoltaic array harnesses LC4®
- ready-to-plug: industrially pre-assembled
- industrially tested
- type T or type X
- with the new LC4® connectors
- with integrated locking, alternatively to be unlocked manually or only with a tool, acc. to NEC 2008 NFPA 70

Components and auxiliaries for on-site assembly

Field-attachable connectors from system LC3®
- optional locking according to NEC 2008 NFPA 70

Field-attachable connectors from system LC4®
- with integrated locking
- alternatively to be unlocked manually or only with a tool, acc. to NEC 2008 NFPA 70

Crimp tool with exchangeable inserts

Convenient installer toolbox

Cables: standard or customized

Crimp tool: only one tool for all wire sections

- 2.5 mm² AWG 14
- 4.0 mm² AWG 12
- 6.0 mm² AWG 10
Solutions for installers and system integrators

Some of the world’s largest solar power plants are wired with Lumberg components. These plants (right) combine 700,000 resp. 550,000 thinfilm modules.

Wire faster and more effectively

**Features**

- photovoltaic array harnesses: everything is pre-assembled and ready-to-plug
- harnesses 100 % tested
- overmolded connectors: outstanding environmental seals, excellent strain relief, unsurpassed ruggedness and durability
- extremely sturdy: overmolded connector often even stronger than the cable
- either with the slim LC3® connectors (optional locking) or with the new LC4® connectors with integrated locking
- highest protection degree IP 68
- halogen-free
- UV and ozone-resistant

**Benefits**

- up to 30 % shorter installation time
- permanently reliable system operation
- minimized attendance and servicing expenditure
- no lengthy crimping on-site when using pre-assembled and overmolded harnesses
- ideal wiring strategy for every application: overmolded solution is pre-assembled and tested, field-attachable solution available for home run cables
- system meets international requirements, including NEC 2008 NFPA 70
- all from one source, available worldwide
- standard and customized solutions

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Phoenix Solar AG
PVStrom GmbH & Co. KG
SOLARPARK Rodenäsch GmbH
Inventux Technologies AG

Overmolded connectors make the difference!
Photovoltaic junction boxes LC3® and LC4® for crystalline modules

**LC3-JC**
**LC4-JC**

JC = Junction boxes for Crystalline modules

Photovoltaic junction boxes LC3® and LC4® for thinfilm modules, single-pole and two-pole, for ribbons fed trough the back plane of the module or over the edge of the module

**LC3-JT**
**LC4-JT**

JT = Junction boxes for Thinfilm modules

Photovoltaic connecting cables LC3® and LC4®, with over-molded connector at one end

**LC3-AM**
**LC4-AM**

AM = Cable Assemblies, Modular harnesses

Photovoltaic connecting cables LC3® and LC4®, with over-molded connectors at both ends

Adapter cables LC3® to LC4®

**LC3-AT** - **LC3-AX**
**LC4-AT** - **LC4-AX**

AT = Cable Assemblies, T-type/X-type array harnesses

Photovoltaic array harnesses LC3® and LC4®, type T and type X, pre-assembled according to customer’s specification

**LC3-CP**
**LC4-CP**

CP = Connector Parts

Photovoltaic connectors LC3® and LC4®, field-attachable, with crimp contacts
### Photovoltaic chassis receptacles LC3® and LC4®, for front mounting, with crimp contacts

**Features**
- Overmolded connectors: outstanding environmental seals, excellent strain relief, unsurpassed ruggedness and durability
- LC3® with optional locking, LC4® with integrated locking according to NEC 2008 NFPA 70
- Highest protection degree IP 68
- Halogen-free, UV and ozone-resistant
- Two options: pre-assembled, overmolded and tested or field-attachable
- Standard product range and customized solutions

**Benefits**
- Permanently reliable system operation
- Minimized attendance and servicing expenditure
- No lengthy crimping on-site when using pre-assembled and overmolded harnesses
- Ideal wiring strategy for every application: overmolded solution is industrially pre-assembled and tested, field-attachable solution available complimentarily
- System meets international requirements, including NEC 2008 NFPA 70

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### Photovoltaic Y-connectors LC3®

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### Protective caps LC3® and LC4®

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### Unmating preventer LC3® (optional locking)

Unlocking tool LC4®

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### Processing tools and machines LC3® and LC4®

Photovoltaic cable, without connectors

Installer toolbox
**Wiring solutions for photovoltaic power systems**
**LC3*-JC and LC4*-JC – Junction boxes for Crystalline modules**

**LC3-JC**  
**LC4-JC**

Photovoltaic junction box for crystalline modules\(^1\), with connecting cables and overmolded connectors (alternative-ly LC3\(^*\) or LC4\(^*\)) with bend protection, with 2–6 spring clamps and 0–5 diodes, for ribbons fed through the back plane of the module, mounting with self-adhesive pad or by means of glue, cover for automatic assembly.

1. **Temperature range**
   -40 °C/+85 °C
   (+125 °C upper limit temperature)

2. **Materials**
   - Housing/cover: m-PPE, 5 VA according to UL 94
   - Contact: CuNiSi, tinned
   - Cap nut: m-PPE, 5 VA according to UL 94
   - Cable clamp: PPE/P, V0 according to UL 94
   - Seal: NBR
   - Pressure compensation seal: PTFE
   - Adhesive foil: PE
   - Further data: see LC3-AM/LC4-AM

3. **Mechanical data**
   - Tightening torque cap nut: 3.5–4 Nm
   - Mating with photovoltaic connectors LC3/LC4
   - Further data: see LC3-AM/LC4-AM
   - Protection degree (junction box): IP 65
   - Connectable contact ribbons\(^2\):
     - Width: ≤ 10 mm
     - Thickness: ≤ 0.1 mm

4. **Electrical data** (at \(T_{amb} 20 °C\))
   - Rated current\(^3\): 20 A
   - Rated voltage\(^4\): 1000 V DC (UL 600 V DC)
   - Overvoltage category\(^2\): III (8 kV)
   - Material group\(^4\): I (IEC)/0 (UL) (CTI ≥ 600)
   - Creepage distance\(^1\) between cable connections: ≥ 15.9 mm
   - Creepage distance\(^1\) between all other live parts: ≥ 12.7 mm
   - Creepage distance\(^1\) between live parts and touchable surfaces: ≥ 32.0 mm
   - Clearance\(^1\) between cable connections: ≥ 15.9 mm
   - Clearance\(^1\) between all other live parts: ≥ 9.5 mm
   - Clearance\(^1\) between live parts and touchable surfaces: ≥ 32.0 mm
   - Insulation resistance: > 10 GΩ
   - Protective class: II

\(^1\) according to application class A of IEC 61730-1/UL 1703
\(^2\) connection of other ribbons on request
\(^3\) without diode
\(^4\) according to DIN EN 60664/IEC 60664 resp. according to ANSI/UL 746A

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**Wiring diagram**

Two-pole junction boxes, for ribbons fed through the back plane of the module

**Designation**

<table>
<thead>
<tr>
<th>LC3-JC</th>
<th>details upon request</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC4-JC</td>
<td>details upon request</td>
</tr>
</tbody>
</table>

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* a self-adhesive pad option
* b spacer option for fixation by means of glue
* c assembly hole for contact ribbons, view without cover
* d left connecting cable for negative pole (-): see either LC3-AM or LC4-AM
* e right connecting cable for positive pole (+): see either LC3-AM or LC4-AM
* f left overmolded connector: LC3-AM resp. LC4-AM
* g right overmolded connector: LC3-AM resp. LC4-AM
* h modular design; measure “C” max. 141 mm (with 6 clamps)
Wiring solutions for photovoltaic power systems
LC3®-JT and LC4®-JT – Junction boxes for Thinfilm modules

**LC3-JT 4...**
**LC4-JT 4...**

Photovoltaic junction boxes for thin film modules, single-pole, with connecting cables and overmolded connectors (alternatively LC3® or LC4®) with bend protection, for ribbons fed through the back plane of the module, mounting with self-adhesive pad or by means of glue, for potting, cover for automatic assembly.

1. **Temperature range**
   -40 °C/+85 °C
   (+140 °C upper limit temperature)

2. **Materials**
   - Housing/cover: PET GF, 5 VA according to UL 94
   - Contact: XCrNi
   - Crimp bushing: Cu, tinned
   - Self-adhesive pad: on request

3. **Mechanical data**
   - Mating with photovoltaic connectors LC3/LC4
   - See LC3-AM/LC4-AM
   - Protection degree (junction box): IP 65
   - Connectable contact ribbons:
     - Width: ≤ 6 mm
     - Thickness: ≤ 0.1 mm

4. **Electrical data (at T_{amb}, 20 °C)**
   - Rated current: 10 A at T_{amb}, 85 °C
   - Rated voltage: 1000 V DC
   - Overvoltage category: III (8 kV)
   - Material group:
     - IIIa (IEC)/II (UL) (CTI ≥ 250)
   - Creepage distance between contact and touchable surface: ≥ 20 mm
   - Clearance between contact and touchable surface: ≥ 20 mm
   - Insulation resistance: > 10 GΩ
   - Protective class:
     - II according to application class A of IEC 61730-1/UL 1703
     - II according to DIN EN 60664/IEC 60664 resp. according to ANSI/UL 746A

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* a option with self-adhesive pad
* b spacer option for fixation by means of glue
* c potting hole
* d deaerator hole
* e connecting cables: see either LC3-AM or LC4-AM, section
  - 2.5 mm² (AWG 14) or 4.0 mm² (AWG 12)
* f left overmolded connector: LC3-AM resp. LC4-AM
* g right overmolded connector: LC3-AM resp. LC4-AM
* h schematic diagrams of bottom of housing, with ribbon feed-through (alternative options)
* i cable exit alternatively on right or left side
* j opening in bottom of housing for ribbon feed-through

**Wiring diagram**

Single pole junction boxes, for ribbons fed through the back plane of the module

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**Designation**

| LC3-JT 4... | details upon request |
| LC4-JT 4... | details upon request |
Wiring solutions for photovoltaic power systems
LC3®-JT and LC4®-JT – Junction boxes for Thinfilm modules

LC3-JT 4...
LC4-JT 4...

Photovoltaic junction boxes for thin film modules\(^1\), two-pole, with connecting cables and overmolded connectors (alternatively LC3\(^®\) or LC4\(^®\)) with bend protection, with or without diode, for ribbons fed through the back plane of the module, mounting with self-adhesive pad or by means of glue, for potting, cover for automatic assembly

1. Temperature range

-40 °C/+85 °C
(+140 °C upper limit temperature)

2. Materials

- UV-resistant
- Housing/cover: PET GF, 5 VA according to UL 94
- Contact: XCrNi, tinned
- Crimp bushing: Cu, tinned
- Potting compound: on request
- Self-adhesive pad: on request

3. Mechanical data

- Mating with photovoltaic connectors LC3/LC4
- Further data: see LC3-AM/LC4-AM
- Protection degree (junction box): IP 65
- Connectable contact ribbons:
  - Width: ≤ 6 mm
  - Thickness: ≤ 0.1 mm

4. Electrical data (at Tamb 20 °C)

- Rated current: 10 A at Tamb 85 °C
- Rated voltage\(^2\): 1000 V DC
- Overvoltage category: III (8 kV)
- Material group\(^2\): IIIa (IEC)/2 (UL) (CTI ≥ 250)
- Creepage distance between contact and touchable surface: ≥ 20 mm
- Clearance between contact and touchable surface: ≥ 15.9 mm
- Insulation resistance: > 10 GΩ
- Protective class: II

\(^1\) according to application class A of IEC 61730-1/UL 1703
\(^2\) according to DIN EN 60664/IEC 60664 resp. according to ANSI/UL 746A

Wiring diagram

Two-pole junction boxes, for ribbons fed through the back plane of the module

Designation

LC3-JT 4... details upon request
LC4-JT 4... details upon request
Wiring solutions for photovoltaic power systems LC3®-JT and LC4®-JT – Junction boxes for Thinfilm modules

**LC3-JT 4...**

Photovoltaic junction boxes for thin film modules, single-pole, with connecting cables and overmolded connectors (alternatively LC3® or LC4®) with bend protection, for ribbons fed over the edge of the module, mounting by means of glue, for potting, cover for automatic assembly.

1. **Temperature range**
   -40 °C/+85 °C
   (+140 °C upper limit temperature)

2. **Materials**
   - UV-resistant
   - Housing/cover: PET GF, 5 VA according to UL 94
   - Contact: XCrNi
   - Crimp bushing: Cu, tinned
   - Potting compound: on request
   - Self-adhesive pad: on request

3. **Mechanical data**
   - Mating with photovoltaic connectors LC3/LC4
   - Protection degree (junction box): IP 65
   - Connectable contact ribbons:
     - Width: ≤ 6 mm
     - Thickness: ≤ 0.1 mm

4. **Electrical data** (at Tamb 20 °C)
   - Rated current: 10 A at Tamb 85 °C
   - Rated voltage: 1000 V DC
   - Overvoltage category: III (8 kV)
   - Material group: IIa (IEC)/II (UL) (CTI ≥ 250)
   - Creepage distance between contact and touchable surface: ≥ 20 mm
   - Clearance between contact and touchable surface: ≥ 20 mm
   - Insulation resistance: > 10 GΩ
   - Protective class: II

1. according to application class A of IEC 61730-1/UL 1703
2. according to DIN EN 60664/IEC 60664 resp. according to ANSI/UL 746A

**LC4-JT 4...**

Photovoltaic junction boxes for thin film modules, two-pole, with connecting cables and overmolded connectors (alternatively LC3® or LC4®) with bend protection, with or without diode, for ribbons fed over the edge of the module, mounting with self-adhesive pad or by means of glue, for potting, cover for automatic assembly.

1. **Temperature range**
   -40 °C/+85 °C
   (+140 °C upper limit temperature)

2. **Materials**
   - UV-resistant
   - Housing/cover: PET GF, 5 VA according to UL 94
   - Contact: XCrNi, tinned
   - Crimp bushing: Cu, tinned
   - Potting compound: on request
   - Self-adhesive pad: on request

3. **Mechanical data**
   - Mating with photovoltaic connectors LC3/LC4
   - Further data: see LC3-AM/LC4-AM
   - Protection degree (junction box): IP 65
   - Connectable contact ribbons:
     - Width: ≤ 6 mm
     - Thickness: ≤ 0.1 mm

4. **Electrical data** (at Tamb 20 °C)
   - Rated current: 10 A at Tamb 85 °C
   - Rated voltage: 1000 V DC
   - Overvoltage category: III (8 kV)
   - Material group: IIIa (IEC)/II (UL) (CTI ≥ 250)
   - Creepage distance between contact and touchable surface: ≥ 20 mm
   - Clearance between contact and touchable surface: ≥ 15.9 mm
   - Insulation resistance: > 10 GΩ
   - Protective class: II

1. according to application class A of IEC 61730-1/UL 1703
2. according to DIN EN 60664/IEC 60664 resp. according to ANSI/UL 746A
Wiring solutions for photovoltaic power systems

**LC3®-AM – Cable Assemblies, Modular harnesses**

**LC3-AM 00**
**LC3-AM 01**
**LC3-AM 6…**

Photovoltaic connecting cables, with overmolded connectors, with bend protection
LC3-AM 00: with plug and open end
LC3-AM 01: with socket and open end
LC3-AM 60: with two plugs
LC3-AM 61: with two sockets
LC3-AM 62: with plug and socket
LC3-AM 650: with LC3 plug and LC4 plug
LC3-AM 651: with LC3 socket and LC4 socket
LC3-AM 652: with LC3 plug and LC4 socket
LC3-AM 655: with LC3 socket and LC4 plug

1. **Temperature range**
   -40 °C/+85 °C
   (+110 °C upper limit temperature)

2. **Materials**
   - Insulating body/housing: TPU, V0 according to UL 94
   - Contact pin/bush: CuZn, pre-nickel and tinned
   - Contact protection (plugs only): PA, V0 according to UL 94
   - Sleeve (sockets only): CuZn, nickeled

3. **Mechanical data**
   - Insertion force\(^1\) ≤ 89 N
   - Withdrawal force\(^1\) ≥ 89 N
   - Mating cycles\(^1\) 50
   - Mating with photovoltaic connectors LC3
   - Protection degree\(^2\) IP 68
   - Connected conductor
     - Photovoltaic cable, double-insulated, technical data on request
     - Section alternatively 2.5 mm\(^2\) (AWG 14)
     - 4.0 mm\(^2\) (AWG 12)
     - 6.0 mm\(^2\) (AWG 10)

4. **Electrical data** (bei \(T_{amb} 20 \, ^\circ C\))
   - Contact resistance\(^3\) ≤ 5.0 mΩ
   - Rated current\(^1\)
     - 22 A at \(T_{amb} 85 \, ^\circ C\), 2.5 mm\(^2\) (AWG 10)
     - 35 A at \(T_{amb} 85 \, ^\circ C\), 4.0 mm\(^2\) (AWG 12)
     - 40 A at \(T_{amb} 85 \, ^\circ C\), 6.0 mm\(^2\) (AWG 10)
   - Rated voltage\(^4\)
     - 1000 V DC
   - Overvoltage category\(^5\)
     - III (8 kV)
   - Material group\(^4\)
     - I (IEC)/0 (UL) (CTI ≥ 600)
   - Creepage distance
     - ≥ 12.5 mm
   - Clearance
     - ≥ 12.5 mm
   - Insulation resistance
     - > 10 GΩ

\(^1\) measured with a proper counterpart
\(^2\) IP X8 requirements under agreement between manufacturer and user only connectors without cable
\(^3\) according to DIN EN 60664/IEC 60664 resp. according to ANSI/UL 746A
\(^4\) adapter cables LC3 to LC4, for technical data of LC4 connectors see LC4-AM

* Designation
  - LC3-AM ... details upon request

* a recess for optional unmating preventer LC3-CX 90 according to NEC 2008 NFPA 70
* b marking + on LC3-AM ...-1
  marking – on LC3-AM ...-2
Wiring solutions for photovoltaic power systems
LC4®-AM – Cable Assemblies, Modular harnesses

LC4-AM 00
LC4-AM 01
LC4-AM 62...

Photovoltaic connecting cables, with overmolded connectors, integrated locking and bend protection
LC4-AM 00: with plug and open end
LC4-AM 01: with socket and open end
LC4-AM 60: with two plugs
LC4-AM 61: with two sockets
LC4-AM 62: with plug and socket
LC3-AM 650: with LC3 plug and LC4 plug
LC3-AM 651: with LC3 socket and LC4 socket
LC3-AM 652: with LC3 plug and LC4 socket
LC3-AM 655: with LC3 socket and LC4 plug

1. Temperature range
-40 °C/+85 °C
(+110 °C upper limit temperature)

2. Materials
- halogen-free, UV-resistant
- Insulating body/housing: m-PPE, V0 according to UL 94
- Contact pin/bush: CuNiSi, tinned
- Tubular rivet: CuZn
- Sealing (sockets only): NBR

3. Mechanical data
- Insertion force \[ \leq 20 \text{ N} \]
- Withdrawal force \[ \geq 10 \text{ N} \]
- Retaining force of locking latches \[ \geq 90 \text{ N} \]
- Mating cycles: 50
- Mating with photovoltaic connectors LC4
- Protection degree: IP 68

4. Electrical data
- Contact resistance \[ \leq 5.0 \text{ m} \Omega \]
- Rated current \[ 30 \text{ A at } T_{\text{amb}} 85 \text{ °C}, 4.0 \text{ mm}^2 \text{ (AWG 12)} \]
- Rated voltage \[ 1000 \text{ V DC} \]
- Overvoltage category: III (8 kV)
- Material group: I (IEC)/0 (UL) (CTI \( \geq 600 \))
- Creepage distance: \( \geq 28.2 \text{ mm} \)
- Clearance: \( \geq 28.2 \text{ mm} \)
- Insulation resistance: \( > 10 \text{ G} \Omega \)

1 measured with a polished steel gauge, nominal thickness 4.0 mm
2 measured with a proper counterpart
3 1 m/24 h, only in mated condition with a proper counterpart
4 IP X8 requirements under agreement between manufacturer and user
5 according to DIN EN 60664/IEC 60664 resp. according to ANSI/UL 746A
6 adapter cables LC3 to LC4, for technical data of LC3 connectors see LC3-AM

Designation
LC4-AM ...

Details upon request

* a marking + on LC4-AM ...-1
marking – on LC4-AM ...-2
**Wiring solutions for photovoltaic power systems**  
**LC3®-AT – Cable Assemblies, T-type array harnesses**

### LC3-AT

Photovoltaic array harness, type T, with overmolded connectors or branches with bend protection, total length, number of branches and distance between branches (plugs or sockets) according to customer’s specification

| 1. Temperature range | -40 °C/+85 °C  
(+110 °C upper limit temperature) |
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>2. Materials</td>
<td>halogen-free, UV-resistant</td>
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<tr>
<td>Insulating body/housing</td>
<td>TPU, V0 according to UL 94</td>
</tr>
<tr>
<td>Further data</td>
<td>see LC3-AM</td>
</tr>
<tr>
<td>3. Mechanical data</td>
<td></td>
</tr>
<tr>
<td>Mating with</td>
<td>photovoltaic connectors LC3</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP 68</td>
</tr>
<tr>
<td>Further data</td>
<td>see LC3-AM</td>
</tr>
<tr>
<td>Connected conductor</td>
<td></td>
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<tr>
<td>Photovoltaic cable, double-insulated, technical data on request</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>4.0 mm² (AWG 12) or 6.0 mm² (AWG 10)</td>
</tr>
<tr>
<td>4. Electrical data</td>
<td>(at Tamb 20 °C)</td>
</tr>
<tr>
<td>Contact resistance²</td>
<td>≤ 5.0 mΩ</td>
</tr>
<tr>
<td>Rated currents³</td>
<td>35 A at Tamb 85 °C</td>
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<tr>
<td>Rated voltage⁴</td>
<td>1000 V DC</td>
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<td>Overvoltage category⁴</td>
<td>III (8 kV)</td>
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<td>Material group⁴</td>
<td>I (IEC)/0 (UL) (CTI ≥ 600)</td>
</tr>
<tr>
<td>Creepage distance</td>
<td>≥ 12.5 mm</td>
</tr>
<tr>
<td>Clearance</td>
<td>≥ 12.5 mm</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>&gt; 10 GΩ</td>
</tr>
</tbody>
</table>

1 m/24 h, only in mated condition with a proper counterpart  
2 measured with a proper counterpart, only connectors without cable  
3 maximum current value for the whole component, measured with a proper counterpart  
4 according to DIN EN 60664/IEC 6064 resp. according to ANSI/UL 746A

---

**Photovoltaic array harnesses: wiring diagram type T**

Interconnection of module tables with complete, overmolded harnesses – pre-assembled at the customer’s specification

- a plug LC3-AM 00  
- b socket LC3-AM 01  
- c configuration examples  
- d T-branch  

Designation  
**LC3-AT ...** details upon request
Wiring solutions for photovoltaic power systems
LC4®-AT – Cable Assemblies, T-type array harnesses

**LC4-AT**

Photovoltaic array harness, type T, with overmolded connector branches with integrated locking and bend protection, total length, number of branches and distance between branches (plugs or sockets) according to customer’s specification

1. **Temperature range**
   -40 °C/+85 °C
   (+110 °C upper limit temperature)

2. **Materials**
   halogen-free, UV-resistant
   Insulating body/housing PPE/PS, V0 according to UL 94
   Further data see LC4-AM

3. **Mechanical data**
   Mating with photovoltaic connectors LC4
   Protection degree IP 68
   Further data see LC4-AM
   Connected conductor
   Photovoltaic cable, double-insulated, technical data on request
   Section 4.0 mm² (AWG 12) or 6.0 mm² (AWG 10)

4. **Electrical data**
   **Contact resistance** ≤ 5.0 mΩ
   **Rated current** 35 A at Tamb 85 °C
   **Rated voltage** 1000 V DC
   **Overvoltage category** III (8 kV)
   **Material group** I (IEC)/0 (UL) (CTI ≥ 600)
   **Creepage distance** ≥ 12.5 mm
   **Clearance** ≥ 12.5 mm
   **Insulation resistance** > 10 GΩ
   1 m/24 h, only in mated condition with a proper counterpart
   IP X8 requirements under agreement between manufacturer and user
   Measured with a proper counterpart, only connectors without cable
   Maximum current value for the whole component
   According to DIN EN 60664/IEC 60664 resp. according to ANSI/UL 746A

**Designation**

**LC4-AT ...**
details upon request

**Approvals**

under preparation

---

Photovoltaic array harnesses: wiring diagram type T

Interconnection of module tables with complete, overmolded harnesses – pre-assembled at the customer’s specification

*a* socket LC4-AM 01
*b* plug LC4-AM 00 IT
*c* configuration examples
*d* T-branch

---
Wiring solutions for photovoltaic power systems
LC3®-AX – Cable Assemblies, X-type array harnesses

**LC3-AX**

Photovoltaic array harness, type X, with overmolded cable branches and connectors with bend protection, total length, number of branches and distance between branches (plugs or sockets) according to customer’s specification

1. **Temperature range**
   -40 °C/+85 °C
   (+110 °C upper limit temperature)

2. **Materials**
   - halogen-free, UV-resistant
   - Insulating body/housing: TPU, V0 according to UL 94
   - Further data: see LC3-AM

3. **Mechanical data**
   - Mating with: photovoltaic connectors LC3
   - Protection degree: IP 68
   - Connected conductor: Photovoltaic cable, double-insulated, technical data on request
   - Further data: see LC3-AM

4. **Electrical data** (at Tamb 20 °C)
   - Contact resistance: ≤ 5.0 mΩ
   - Rated current: 40 A at Tamb 85 °C
   - Rated voltage: 1000 V DC
   - Overvoltage category: III (8 kV)
   - Material group: I (IEC)/0 (UL) (CTI ≥ 600)
   - Creepage distance: ≥ 12.5 mm
   - Clearance: ≥ 12.5 mm
   - Insulation resistance: > 10 GΩ

1. 1 m/24 h, only in mated condition with a proper counterpart
2. IP X8 requirements under agreement between manufacturer and user measured with a proper counterpart
3. maximum current value for the whole component, measured with a proper counterpart
4. according to DIN EN 60664/IEC 60664 resp. according to ANSI/UL 746A

---

**Photovoltaic array harnesses: wiring diagram type X**

Interconnection of module tables with complete, overmolded harnesses – pre-assembled at the customer’s specification

---

* a plug LC3-AM 00
* b socket LC3-AM 01
* c configuration examples
* d X-branch
* e Y-branch

**Designation**

LC3-AX ... details upon request
Wiring solutions for photovoltaic power systems
LC4®-AX – Cable Assemblies, X-type array harnesses

**LC4-AX**

Photovoltaic array harness, type X, with overmolded cable branches and connectors with integrated locking and bend protection, total length, number of branches and distance between branches (plugs or sockets) **according to customer's specification**

1. **Temperature range**
   -40 °C/+85 °C
   (+110 °C upper limit temperature)

2. **Materials**
   - halogen-free, UV-resistant
   - Insulating body/housing: PPE/PS, V0 according to UL 94
   - see LC4-AM

3. **Mechanical data**
   - Mating with: photovoltaic connectors LC4
   - Protection degree: IP 68
   - see LC4-AM
   - Connected conductor: Photovoltaic cable, double-insulated, technical data on request
     - Section main cable: 6.0 mm² (AWG 10)
     - Section branch cable: 4.0 mm² (AWG 12)

4. **Electrical data** (at Tamb 20 °C)
   - Contact resistance:<br>≤ 5.0 mΩ
   - Rated current:<br>35 A at Tamb 85 °C
   - Rated voltage:<br>1000 V DC
   - Overvoltage category:<br>III (8 kV)
   - Material group:<br>1 (IEC)/0 (UL) (CTI ≥ 600)
   - Creepage distance:<br>≥ 12.5 mm
   - Clearance:<br>≥ 12.5 mm
   - Insulation resistance:<br>＞ 10 GΩ
   - 1 m/24 h, only in mated condition with a proper counterpart

**Photovoltaic array harnesses: wiring diagram type X**

Interconnection of module tables with complete, overmolded harnesses – pre-assembled at the customer's specification

Designation

LC4-AX ... details upon request
**Composition of type designation**

- **Series:** LC3 or LC4
- **Type of product:** CP - Connector Part
- **Configuration:**
  - 30: field-attachable plug
  - 31: field-attachable socket
- **Polarity:**
  - -1
  - -2
- **Cable section:**
  - 2.5 mm² (AWG 14)
  - 4.0 mm² (AWG 12)
  - 6.0 mm² (AWG 10)
- **Package unit option:**
  - 50 pieces (standard, individual parts in bulk, sorted)
  - VP7: 500 pieces (individual parts in bulk, sorted)
  - VP19: 50 pieces (one plastic bag per connector)

**Wiring solutions for photovoltaic power systems**

**LC3-CP 30**

- Photovoltaic connector, field-attachable, with crimp contact
- LC3-CP 30: plug
- LC3-CP 31: socket

### 1. Temperature range
- -40 °C/+85 °C
- (+110 °C upper limit temperature)

### 2. Materials
- **Insulating body/housing:** TPU, V0 according to UL 94
- **Contact pin/bush:** CuZn, pre-nickelized and tinned
- **Contact protection (plugs only):** PA, V0 according to UL 94
- **Sleeve (sockets only):** CuZn, nickleled
- **Cap nut:** PA, V0 according to UL 94
- **Seal:** NBR

### 3. Mechanical data
- **Insertion force**¹ ≤ 89 N
- **Withdrawal force**¹ ≥ 89 N
- **Mating cycles**¹ 50
- **Tightening torque cap nut**² 2–3 Nm
- **Protection degree**³ IP 68

**Connectable conductors crimp terminal**

- Photovoltaic cable, double-insulated¹⁴
- Section LC3-CP ... 2.5: 2.5 mm² (AWG 14)
- Section LC3-CP ... 4.0: 4.0 mm² (AWG 12)
- Section LC3-CP ... 6.0: 6.0 mm² (AWG 10)
- Cable diameter: 4–8 mm

**4. Electrical data** (at T amb 20 °C)
- **Contact resistance**¹ ≤ 5.0 mΩ
- **Rated current**¹ LC3-CP ... 2.5: 22 A at T amb 85 °C
- **Rated current**¹ LC3-CP ... 4.0: 35 A at T amb 85 °C
- **Rated current**¹ LC3-CP ... 6.0: 40 A at T amb 85 °C
- **Rated voltage**⁵ 1000 V DC
- **Overvoltage category**⁵ III (B kV)
- **Material group**⁵ I (IEC)/0 (UL) (CTI ≥ 600)
- **Creepage distance** ≥ 12.5 mm
- **Clearance** ≥ 12.5 mm
- **Insulation resistance** > 10 GΩ

¹ measured with a proper counterpart
² strain relief test according to TÜV specification ensured by use of cable according to Lumberg specification
³ 1 m/24 h, only in mated condition with a proper counterpart
⁴ IP X8 requirements under agreement between manufacturer and user
⁵ wire construction preferably according to IEC 60228 class 5, otherwise crimp connection must be tested

---

* a recess for optional unmating preventer LC3-CX 90 according to NEC 2008 NFPA 70
* b marking + on LC3-CP ...-1, - bei LC3-CP ...-2

Standard packaging: individual parts in bulk, sorted in plastic bags of 50 pieces, in a cardboard box

**LC3-CP 30-1 4.0 VP7**
Wiring solutions for photovoltaic power systems

**LC4®-CP – Connector Parts without cable**

**LC4-CP 30**
Photovoltaic connector, field-attachable, with integrated locking and crimp contact
LC4-CP 30: plug
LC4-CP 31: socket

1. **Temperature range**
   -40 °C/+85 °C
   (+110 °C upper limit temperature)

2. **Materials**
   - Insulating body/housing: m-PPE, V0 according to UL 94
   - Contact pin/bush: CuNiSi, tinned
   - Seal: NBR
   - Cap nut: PC, V1 according to UL 94

3. **Mechanical data**
   - Insertion force\(^1\) \(\leq 20\) N
   - Withdrawal force\(^1\) \(\geq 10\) N
   - Retaining force of locking latches\(^2\) \(\geq 90\) N
   - Mating cycles\(^3\) \(\geq 50\)
   - Tightening torque cap nut \(3.5-4.5\) N
   - Mating with photovoltaic connectors LC4
   - Protection degree\(^4\) IP 68

* Connectable conductors crimp terminal
  - Photovoltaic cable, double-insulated\(^4\)
  - Section LC4-CP ... 2.5 \(2.5\) mm² (AWG 14)
  - Section LC4-CP ... 4.0/6.0 \(4.0\) mm² (AWG 12), \(6.0\) mm² (AWG 10)

4. **Electrical data** (at \(T_{amb} 20\) °C)
   - Contact resistance\(^2\) \(\leq 5.0\) mΩ
   - Rated current\(^2\) LC4-CP ... 2.5 \(22\) A at \(T_{amb} 85\) °C
   - Rated current\(^2\) LC4-CP ... 4.0/6.0 \(30\) A at \(T_{amb} 85\) °C
   - Rated voltage\(^5\) 1000 V DC (UL 600 V DC)
   - Overvoltage category\(^5\) III (8 kV)
   - Material group\(^5\) I (IEC)/0 (UL) (CTI \(\geq 600\))
   - Creepage distance \(\geq 28.2\) mm
   - Clearance \(\geq 28.2\) mm
   - Insulation resistance \(> 10^8\) Ω

* measured with a polished steel gauge, nominal thickness 4.0 mm
* measured with a proper counterpart
* only in mated condition with a proper counterpart
* IP X8 requirements under agreement between manufacturer and user
* wire construction preferably according to IEC 60228 class 5, otherwise crimp connection must be tested
* according to DIN EN 60664/IEC 60664 resp. according to ANSI/UL 746A

---

**Composition of type designation**

Series: LC3 or LC4
Type of product
CP Connector Part
Configuration
30 field-attachable plug
31 field-attachable socket
Polarity
-1
-2
+

Locking option
IT Internal locking is only unlockable with a Tool, otherwise it can be unlocked manually

Cable section
- 2.5 \(2.5\) mm² (AWG 14)
- 4.0/6.0 \(4.0\) mm² (AWG 12) and \(6.0\) mm² (AWG 10)

Package unit option
50 pieces (standard, pre-assembled, contacts in bulk)
VP7 500 pieces (one plastic bag per connector, pre-assembled, contacts in bulk)
VP19 50 pieces (one plastic bag per connector, pre-assembled, contacts in bulk)

---

* a marking + on LC4-CP ...-1, - bei LC4-CP ...-2
* b hexagonal nut

Standard packaging: pre-assembled, contacts in bulk, sorted in plastic bags of 50 pieces, in a cardboard box
LC3-CP 10
LC3-CP 11

Photovoltaic chassis receptacle, with crimp contact, for front mounting
LC3-CP 10: plug
LC3-CP 11: socket

1. Temperature range
   -40 °C/+85 °C
   (+110 °C upper limit temperature)

2. Materials
   - Insulating body/housing: TPU, V0 according to UL 94
   - Contact pin/bush: CuZn, pre-nickelized and tinned
   - Contact protection (plugs only): PA, V0 according to UL 94
   - Sleeve (sockets only): CuZn, nickel-plated
   - Hexagonal nut: PA GF

3. Mechanical data
   - Insertion force\(^1\): \(\leq 89\) N
   - Withdrawal force\(^1\): \(\geq 89\) N
   - Mating cycles\(^1\): 50
   - Mating with: photovoltaic connectors LC3
   - Protection degree\(^2\): IP 68

Connectable conductors crimp terminal stranded wire\(^3\)
- Section LC3-CP 10--...-2.5: 2.5 mm\(^2\) (AWG 14)
- Section LC3-CP 10--...-4.0: 4.0 mm\(^2\) (AWG 12)
- Section LC3-CP 10--...-6.0: 6.0 mm\(^2\) (AWG 10)

4. Electrical data (at \(T_{amb}\) 20 °C)
   - Contact resistance\(^1\): \(\leq 5.0\) m\(\Omega\)
   - Rated current\(^1\) LC3-CP ...-2.5: 22 A at \(T_{amb}\) 85 °C
   - Rated current\(^1\) LC3-CP ...-4.0: 35 A at \(T_{amb}\) 85 °C
   - Rated current\(^1\) LC3-CP ...-6.0: 40 A at \(T_{amb}\) 85 °C
   - Rated voltage\(^4\): 1000 V DC
   - Overvoltage category\(^4\): III (8 kV)
   - Material group\(^4\): I (IEC)/0 (UL) (CTI ≥ 600)
   - Creepage distance: \(\geq 12.5\) mm
   - Clearance: \(\geq 12.5\) mm
   - Insulation resistance: > 10 G\(\Omega\)

\(^1\) measured with a proper counterpart
\(^2\) 1 m/24 h, only in mated condition with a proper counterpart
\(^3\) IP X8 requirements under agreement between manufacturer and user
\(^4\) wire construction preferably according to IEC 60228 class 5, otherwise
crimp connection must be tested

\(T_{amb}\) means ambient temperature

---

*(a) recess for optional unmating preventer LC3-CX 90
   according to NEC 2008 NFPA 70
*(b) marking * on LC3-CP ...-1, - bei LC3-CP ...-2
*(c) nut enclosed separately
*(d) port

Package unit: 100 pieces in a cardboard box
Wiring solutions for photovoltaic power systems
LC4®-CP – Connector Parts without cable

**LC4-CP 10**

Photovoltaic chassis receptacle, with integrated locking and crimp contact, for front mounting
LC4-CP 10: plug
LC4-CP 11: socket

1. **Temperature range**
   
<table>
<thead>
<tr>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40 °C +85 °C</td>
</tr>
<tr>
<td>(+110 °C upper limit temperature)</td>
</tr>
</tbody>
</table>

2. **Materials**
   
<table>
<thead>
<tr>
<th>Component</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulating body/housing</td>
<td>m-PPE, V0 according to UL 94</td>
</tr>
<tr>
<td>Contact pin/bush</td>
<td>CuNiSi, tinned</td>
</tr>
<tr>
<td>Seal</td>
<td>NBR</td>
</tr>
<tr>
<td>Hexagonal nut</td>
<td>PA GF, V0 according to UL 94</td>
</tr>
</tbody>
</table>

3. **Mechanical data**
   
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion force</td>
<td>≤ 20 N</td>
</tr>
<tr>
<td>Withdrawal force</td>
<td>≥ 10 N</td>
</tr>
<tr>
<td>Retaining force of locking latches</td>
<td>≥ 90 N</td>
</tr>
<tr>
<td>Mating cycles</td>
<td>50</td>
</tr>
<tr>
<td>Mating with</td>
<td></td>
</tr>
<tr>
<td>Photovoltaic connectors LC4</td>
<td></td>
</tr>
<tr>
<td>Protection degree</td>
<td></td>
</tr>
</tbody>
</table>

   **Connectable conductors crimp terminal**
   
   - **Stranded wire**
     
     | Section       | Insulation type |
     |---------------|-----------------|
     | LC4-CP ... 2.5 | 2.5 mm² (AWG 14) |
     | LC4-CP ... 4.0/6.0 | 4.0 mm² (AWG 12) |

4. **Electrical data**
   
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact resistance</td>
<td>≤ 5.0 mΩ</td>
</tr>
<tr>
<td>Rated current</td>
<td>22 A at Tamb, 85 °C</td>
</tr>
<tr>
<td>Rated current</td>
<td>30 A at Tamb, 85 °C</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>1000 V DC (UL 600 V DC)</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>III (8 kV)</td>
</tr>
<tr>
<td>Material group</td>
<td>I (IEC/UL (CTI ≥ 600)</td>
</tr>
<tr>
<td>Creepage distance</td>
<td>≥ 28.2 mm</td>
</tr>
<tr>
<td>Clearance</td>
<td>≥ 28.2 mm</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>&gt; 10 GΩ</td>
</tr>
</tbody>
</table>

   **Notes:**
   
   - Measured with a polished steel gauge, nominal thickness 4.0 mm
   - Measured with a proper counterpart
   - Only in mated condition with a proper counterpart
   - IP X8 requirements under agreement between manufacturer and user
   - Wire construction preferably according to IEC 60228 class 5, otherwise crimp connection must be tested
   - According to DIN EN 60664-IEC 60664 resp. according to ANSI/UL 746A

---

**Composition of type designation**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>LC3 or LC4</td>
</tr>
<tr>
<td>Type of product</td>
<td>CP Connector Part</td>
</tr>
<tr>
<td>Configuration</td>
<td>10, 11 chassis plug, socket</td>
</tr>
<tr>
<td>Polarity</td>
<td>-1, -2</td>
</tr>
</tbody>
</table>

**Locking option**

- **IT:** Internal locking is only unlockable with a Tool, otherwise it can be unlocked manually

**Cable section**

<table>
<thead>
<tr>
<th>Section</th>
<th>Insulation type</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>2.5 mm² (AWG 14)</td>
</tr>
<tr>
<td>4.0/6.0</td>
<td>4.0 mm² (AWG 12)</td>
</tr>
<tr>
<td>4.0</td>
<td>4.0 mm² (AWG 10)</td>
</tr>
</tbody>
</table>

**Package unit option**

- **100 pieces (standard, individual parts in bulk, sorted)**
- **VP19 100 pieces (one plastic bag per connector, individual parts)**

---

* a marking + on LC4-CP ...-1, - bei LC4-CP ...-2
* b sealing
* c chassis panel
* d nut enclosed separately
* e cable with mounted contact to be inserted into the housing after crimping process*
* f port

Standard packaging: individual parts in bulk, sorted in plastic bags of 100 pieces, in a cardboard box
Wiring solutions for photovoltaic power systems
LC3®-CP – Connector Parts without cable, LC3®-CX – Connector auxiliaries

**LC3-CP 20**
**LC3-CP 21**
Photovoltaic Y-connector
LC3-CP 20: socket-plug-plug
LC3-CP 21: plug-socket-socket

1. **Temperature range**
   -40 °C/+85 °C
   (+110 °C upper limit temperature)
2. **Materials**
   - Insulating body/housing: TPU, V0 according to UL 94
   - Contact pin/bush: CuZn, pre-nickeled and tinned
   - Sleeve: CuZn, nickeled
3. **Mechanical data**
   - Protection degree: IP 68
   - Rated current: 35 A at Tamb 85 °C
   - 1 m/24 h, only in mated condition with a proper counterpart
   - IP X8 requirements under agreement between manufacturer and user
4. **Electrical data** (at Tamb 20 °C)
   - Rated current: 35 A at Tamb 85 °C
   - 1 m/24 h, only in mated condition with a proper counterpart
   - IP X8 requirements under agreement between manufacturer and user

**Designation** | **Description** | **Polarity**
---|---|---
LC3-CP 20-1 | socket-plug-plug | +
LC3-CP 20-2 | socket-plug-plug | –
LC3-CP 21-1 | plug-socket-socket | +
LC3-CP 21-2 | plug-socket-socket | –

Package unit: 100 pieces in a cardboard box

**LC3-CX 90**
Unmating preventer, can be used with photovoltaic connectors LC3 as an optional locking according to NEC 2008 NFPA 70

1. **Material**
   - halogen-free, UV-resistant
   - TPU, V0 according to UL 94

**Designation** | **Description**
---|---
LC3-CX 90 | unmating preventer

Package unit: 100 pieces in a cardboard box

---

**LC3-CX 91**
**LC3-CX 92**
Protective cap for photovoltaic connectors LC3
LC3-CX 91: for sockets
LC3-CX 92: for plugs

1. **Material**
   - halogen-free, UV-resistant
   - TPU, V0 according to UL 94
Wiring solutions for photovoltaic power systems
LC4\textsuperscript{®}-CX – Connector auxiliaries

### LC4-CX 94
Installer toolbox for the photovoltaic building site, empty, with convenient partitioning for connector storage, crimp tools and additional material

### LC4-CX 91
LC4-CX 92
Protective cap for photovoltaic connectors LC4
LC4-CX 91: for sockets
LC4-CX 92: for plugs

### 1. Materials

<table>
<thead>
<tr>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC4-CX 91</td>
<td>for sockets</td>
</tr>
<tr>
<td>LC4-CX 92</td>
<td>for plugs</td>
</tr>
</tbody>
</table>

Package unit: 100 pieces in a cardboard box

### LC4-CX 93
Unlocking tool for photovoltaic connectors LC4 IT, also wrench for field-attachable connectors and chassis receptacles LC3-CP and LC4-CP

<table>
<thead>
<tr>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC4-CX 93</td>
<td>unlocking tool, wrench</td>
</tr>
</tbody>
</table>
Manual crimp tool for termination of photovoltaic connectors LC3/LC4 with crimp contacts, with stripper

1. **Range of applications**
   - LC3-CX CZ... photovoltaic connectors LC3
   - LC4-CX CZ... photovoltaic connectors LC4

2. **Features**
   - Application: middle and high-volume production
   - Machine cycle: ca 1 s
   - Stroke capacity: ca 240/h
   - Optional features LC3-CX CZ...: exchangeable processing tools for other sections

3. **Dimensions**
   - Dimensions (H x W x D): LC3-CX CZ47 45 mm x 80 mm x 270 mm
   - Dimensions (H x W x D): LC3-CX CZ47 50 mm x 95 mm x 205 mm
   - Weight: ca 0.7 kg

wire construction preferably according to IEC 60228 class 5, otherwise crimp connection must be tested

Processing machine for termination of photovoltaic connectors LC3/LC4 with crimp contacts

1. **Range of applications**
   - LC3-CX CM... photovoltaic connectors LC3
   - LC4-CX CM... photovoltaic connectors LC4

2. **Features**
   - Application: medium and high-volume production
   - Machine cycle: ca 1 s
   - Stroke capacity: ca 600/h
   - Optional features LC3-CX CM...: exchangeable processing tools for other sections

3. **Dimensions and supply data**
   - Dimensions (H x W x D): LC3-CX CM47 290 mm x 270 mm x 390 mm
   - Weight: LC3-CX CM47 ca 13 kg
   - Electric power supply: 230 V/50 Hz

wire construction preferably according to IEC 60228 class 5, otherwise crimp connection must be tested

Photovoltaic cable, single-pole, double-insulated stranded wire

**Designation** | **Description**
--- | ---
LC3-CX 96 | details upon request

Package unit: 1000 m on reel
<table>
<thead>
<tr>
<th>Series</th>
<th>Designation</th>
<th>Obsolete Designation</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC3 (47)</td>
<td>LC3-AM 00</td>
<td>4700</td>
<td>16</td>
</tr>
<tr>
<td>LC3 (47)</td>
<td>LC3-AM 01</td>
<td>4701</td>
<td>16</td>
</tr>
<tr>
<td>LC3 (47)</td>
<td>LC3-AM 60</td>
<td>4760</td>
<td>16</td>
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**Important notice**

Lumberg products can be used according to the characteristics specified in the data sheet. Beyond that, all applicable regulations, standards and directives for the use of these products and for the intended application must be obeyed by the user. It is the user's responsibility to ensure the appropriateness of a chosen Lumberg product for the intended application.

Connector systems with crimp technology require suitable cables and accurate processing. In order to assure safe function of the connectors they must be processed with Lumberg harnessing equipment and according to Lumberg harnessing instructions. On the Internet (www.lumberg.com) a choice of “approved cables” is available for every connector type.

Due to continuous development of Lumberg products, serving technical progress, the descriptions and data provided hereafter are for information only and subject to change without notice.

We will be pleased to discuss your detailed requirements.
Systems Technology

- connector systems with insulation displacement, screw clamp technology and crimp technology
- pitches from 1.27 mm up to 5.08 mm (0.050" up to 0.200")
- connectors according to RAST 2.5 and RAST 5 standard
- Micromodul™, Minimodul™, Multimodul™ and others

Connection Technology

- circular connectors with threaded joint according to IEC 60130-9
- IP 40 up to IP 68
- connectors for 3G/4G mobile radio networks, according to AISG
- terminal blocks with screw clamp, spring clamp and insulation displacement technology
- pitches from 3.5 mm up to 10.0 mm (0.138" up to 0.394")

Consumer Electronics and Communications

- circular connector series: miniature connectors, DIN connectors, Jack connectors, RCA connectors, Power supply connectors
- rectangular connector series: I/O interfaces such as IEEE 1394b and IDB-1394 connectors, IEEE 1394 connectors, USB connectors, modular connectors
Photovoltaics

- innovative wiring solutions for direct current circuits in solar power systems
- with overmolded connectors: industrially pre-assembled and tested, ready-to-plug
- junction boxes for crystalline and thinfilm modules, cable assemblies, array harnesses and connectors
- IP 68
- series: LC3® and LC4®

Tools and Harnessing Machines

- tooling for processing connectors
- insulation displacement, crimp and piercing technology
- manual, semi-automatic and fully automatic solutions