

MA231 (cn_en)

安装说明

PV 公电缆连接器 PV-KST4/...-UR
PV 母电缆连接器 PV-KBT4/...-UR

MC4

MA231 (cn_en)

Assembly instructions

PV male cable coupler PV-KST4/...-UR
PV female cable coupler PV-KBT4/...-UR MC4

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母电缆连接器 / Female cable coupler

PV-KBT4/2.5...-UR/PV-KBT4/6...-UR/PV-KBT4/10...-UR



PV-KBT4/8II-UR



公电缆连接器 / Male cable coupler

PV-KST4/2.5...-UR/PV-KST4/6...-UR/PV-KST4/10...-UR



PV-KST4/8II-UR



选配件 / Optional
PV-SSH4

安全锁扣 / Safety lock clip





(见 / see www.staubli.com/electrical --> MA252)


安全说明

该产品应由有相应资质或经过专家培训的、具备相关安全应用规范的专业人员安装。
Stäubli不承担对于因不遵守这些警告而产生的任何责任。

仅可使用Stäubli指定的零件和工具。对于自行装配，请务必遵守指定的准备和安装说明，否则Stäubli不予保证对于产品的安全性及技术参数的一致性。对于产品请勿做任何形式的修改。

那些可与Stäubli零件相配的，非Stäubli原产的连接器和被制造商有时称为可与“Stäubli兼容”的连接器，它们不符合安全的、长期稳定的电气连接要求，并且出于安全方面的考虑，不允许它们与Stäubli零件连接。如果这些连接器（未经Stäubli认证）与Stäubli零件连接并产生损害，我们对此不承担任何责任。

-  此处所说明的操作不允许在带电或负载下进行。
-  终端产品必须提供电击保护（例如：通过正确安装插头连接器）
-  在负载的情况下，连接器不允许断开。在带电情况下允许插拔。
-  此产品的水密性按照IP产品特性防护等级。但是，它们不适合长期在水下使用。请勿将插头连接器直接放置在屋顶表面。
-  未插合状态的插头连接器必须带上密封盖以防防水防尘（32.0716用于插座，32.0717用于插头）。被污染的公母插头不能插合。
-  插头连接器不能承受持续的机械拉伸。电缆应该由电缆扎带固定。
-  出于安全原因，Stäubli强烈建议，不要使用PVC导线或H07RN-F无镀锡电缆。
-  所述额定电压为最大电压值，且仅适于插头连接器。最终的额定电压须根据组件中最小的最大额定电压及相关评估、认证的标准方可确定。









 更多的技术参数请见产品目录。

Safety Instructions

The products may be assembled and installed only by suitably qualified and trained specialists with due observance of all applicable safety regulations.
Stäubli Electrical Connectors (Stäubli) declines any liability in the event of failure to observe these warnings.




Use only the components and tools specified by Stäubli. Do not deviate from the preparation and assembly procedures described here, since in this event, in the event of self-assembly, no guarantee can be given as to safety or conformity with the technical data. Do not modify the product in any way.

Connectors not made by Stäubli which can be mated with Stäubli elements and in some cases are also described as “Stäubli-compatible” do not conform to the requirements for safe electrical connection with long-term stability, and for safety reasons must not be plugged together with Stäubli elements. Stäubli can therefore accept no liability for damage which occurs as a result of mating these connectors which lack Stäubli approval with Stäubli elements.




-  The work described here must not be carried out on live or load-carrying parts.
-  Protection from electric shock must be assured by the end product and its user.
-  The plug connections must not be disconnected under load. Plugging and unplugging when live is permitted.
-  The plug connectors are watertight in accordance with IP protection class. However, they are not suitable for continuous operation under water. Do not place the plug connectors directly on the roof membrane.
-  Unmated plug connectors must be protected from moisture and dirt with a sealing cap (MC4 Article No. 32.0716 for sockets and 32.0717 for plugs). The male and female parts must not be plugged together when soiled.
-  The plug connection must not be subjected to continuous mechanical tension. The cable should be fixed with cable binders.
-  For safety reasons Stäubli prohibits the use of either PVC cables or untinned cables of type H07RN-F.
-  Stated voltage ratings are maximum values and pertain only to the cable couplers. The final voltage rating of a cable lead assembly or harness is dictated by the lowest maximum voltage rating of any component contained in the assembly and the relevant standards to which they have been evaluated and certified.

 For further technical data please see the product catalogue.

符号解释

-  危险电压警告
-  危险区域警告
-  有用的提示

Explanation of the symbols

-  Warning of dangerous voltages
-  Warning of a hazard area
-  Useful hint or tip

存储注意事项

我们建议连接器零件的存储温度为-30°C - +60°C，相对湿度低于70%。

连接器零件不能暴露于因直接降雨、冷凝等带来的水汽中。确保各零件不能与酸、碱、瓦斯、丙酮或任何其他会影响材料使用的化学物质接触。

如果以上条件得到满足，从生产之日起，连接器零件可以存储长达两年的时间。

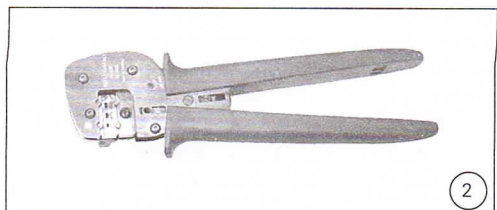
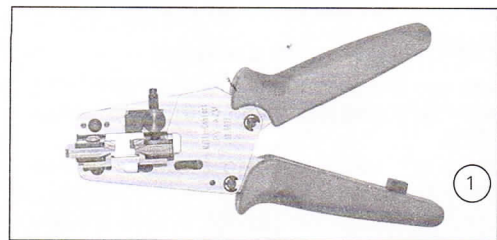
Note on storage

We recommend that you store connector components at a temperature between -30°C and +60°C and with a relative humidity of less than 70%.

The components must not be exposed to moisture due to direct rainfall, condensation, etc. Ensure that the individual components do not come into contact with acids, alkalis, gases, acetone, or any other chemical substances that could impact the materials used.

If these conditions are met, the components can be stored for a maximum period of up to two years from the date of manufacture.





工具要求

(ill. 1)
剥线钳**PV-AZM...**包括内置刀片和六角扳手A/F 2,5 mm。

电缆截面积: 1,5/2,5/4/6 mm²
型号: **PV-AZM-1.5/6**
订货号: **32.6029-156**

电缆截面积: 4/6/10 mm²
型号: **PV-AZM-4/10**
订货号: **32.6027-410**

(ill. 2)
压接钳**PV-CZM...**包括定位块和内置压接芯。

压接范围:
1,5/2,5/4 mm² (14/12 AWG)
型号: **PV-CZM-18100**
订货号: **32.6020-18100**

压接范围:
2,5/4/6 mm² (12/10 AWG)
型号: **PV-CZM-19100**
订货号: **32.6020-19100**

压接范围: 4/10 mm² (12 AWG)
型号: **PV-CZM-20100**
订货号: **32.6020-20100**

压接范围 12/10/8 AWG
型号: **PV-CZM-22100**
订货号: **32.6020-22100**

Tools required

(ill. 1)
Stripping pliers **PV-AZM...** incl. built-in blade as well as hexagonal screwdriver A/F 2,5mm.

Cable cross section: 1,5/2,5/4/6 mm²
Type: **PV-AZM-1.5/6**
Order No. **32.6029-156**

Cable cross section: 4/6/10 mm²
Type: **PV-AZM-4/10**
Order No. **32.6027-410**

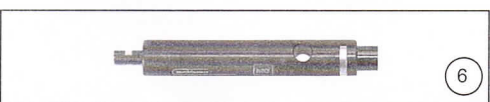
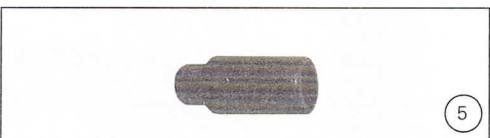
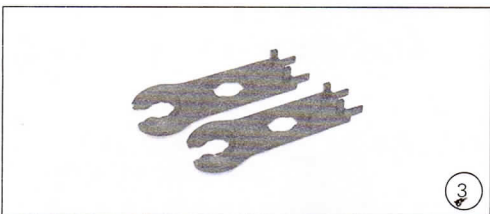
(ill. 2)
Crimping pliers **PV-CZM...** incl. Locator and built-in crimping insert.

Crimping range:
1,5/2,5/4 mm² (14/12 AWG)
Type: **PV-CZM-18100**
Order No. **32.6020-18100**

Crimping range:
2,5/4/6 mm² (12/10 AWG)
Type: **PV-CZM-19100**
Order No. **32.6020-19100**

Crimping range: 4/10 mm² (12 AWG)
Type: **PV-CZM-20100**
Order No. **32.6020-20100**

Crimping range: 12/10/8 AWG
Type: **PV-CZM-22100**
Order No. **32.6020-22100**



(ill. 3)
开口扳手**PV-MS**, 1套=2片
订货号: **32.6024**

(ill. 4)
PV-WZ-AD/GWD 插座扳手用于紧固
订货号: **32.6006**

(ill. 5)
PV-SSE-AD4 插座扳手用于锁紧
订货号: **32.6026**

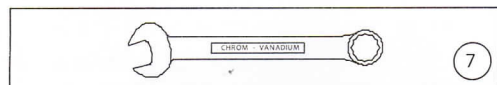
(ill. 6)
测试插头**PV-PST**
订货号: **32.6028**

(ill. 3)
Open-end spanner **PV-MS**,
1 Set = 2 pieces
Order No. **32.6024**

(ill. 4)
PV-WZ-AD/GWD socket wrench
insert to tighten
Order No. **32.6006**

(ill. 5)
PV-SSE-AD4 socket wrench insert to
secure
Order No. **32.6026**

(ill. 6)
Test plug **PV-PST**
Order No. **32.6028**



(ill. 7)
开口扳手A/F 15 mm

(ill. 7)
Open-end spanner A/F 15 mm



(ill. 8)
扭力工具A/F 12 mm

(ill. 8)
Torque screwdriver A/F 12 mm

电缆准备

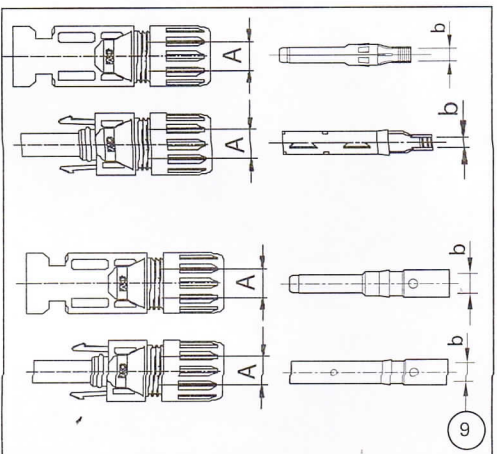
Cable preparation

能够连接等级5和6的带线束结构的电缆

Cables with a strand construction of classes 5 and 6 can be connected.

注意：
请勿使用未镀层的或已氧化的导线，我们推荐使用镀锡的导线。所有Stäubli光伏电缆都是高质量的镀锡导线。

Attention:
Use no uncoated or already oxidised conductors. It is recommended to use tinned conductors. All Stäubli solar cables have high-quality, tinned conductors.



(ill. 9, 表格.1 + 2)
依照插图9和表格1，检查A和b的尺寸

(ill. 9, Tab. 1 + 2)
Check dimensions A and b in accordance with illustration 9 and table 1 and 2.

说明：
如果您使用的电缆直径，未被表1或表2提及，请联系Stäubli获取更多信息，我们乐意为您提供支持。

Note:
Other cable combinations that are not mentioned in Tab. 1 or 2 are available. Please contact Stäubli for more information, we are pleased to support you.

TÜV-Rheinland检测认可的电缆与连接器选型

Selection of connector configuration proven by TÜV-Rheinland

Tab. 1

A: 电缆直径范围 [mm]
A: 0 range of the cable [mm]

导线截面积
Conductor cross section

	2,5 mm ²	4 mm ²	6 mm ²	10 mm ²
5,0 - 6,0	PV-K...T4/2,5I	PV-K...T4/6I	PV-K...T4/6I	PV-K...T4/10I
5,5 - 7,4	PV-K...T4/2,5X	PV-K...T4/6X	PV-K...T4/6X	PV-K...T4/10X
5,9 - 8,8	PV-K...T4/2,5II	PV-K...T4/6II	PV-K...T4/6II	PV-K...T4/10II
b: 控制尺寸 b: control dimension	~3 mm		~5 mm	~7,2 mm

使用UL认证电缆时的连接器选型

Selection of connector configuration when using cables certified at UL

Tab. 2

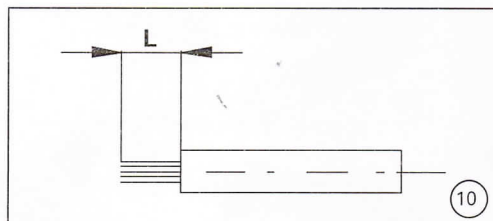
额定电压 [V] DC
Rated voltage [V] DC

导线截面积 / Conductor cross section
AWG (stranding)

600 / 1000 / 1500	600				
A: 电缆直径范围 [mm] A: 0 range of the cable [mm]					
ZKLA (PV-Wire)	TYLZ (USE-2)	14 (19-49)	12 (7-65)	10 (7-78)	8 (7-168)
5,60 - 6,20	4,83 - 6,20	PV-K...T4/2,5I	PV-K...T4/6I		
6,20 - 7,00	6,20 - 7,00	PV-K...T4/2,5X	PV-K...T4/6X	PV-K...T4/6X	
7,00 - 8,60	7,00 - 8,60	PV-K...T4/2,5II	PV-K...T4/6II	PV-K...T4/6II	
6,05 - 8,40	8,30 - 8,56				PV-K...T4/8II
b: 控制尺寸 b: control dimension		~3 mm	~5 mm	~4,4 mm	

说明：
如果您选择的电缆同时适用于表1和表2列出的选型，您可以将其作为双认证电缆（TÜV和UL）来使用。

Note:
If your chosen cable is suitable for both configurations named in Tab. 1 and 2, you can use it as double certified cable according TÜV and UL.



Tab. 3

型号	长度 "L"
PV-K...T4/2,5I	6 – 7,5 mm
PV-K...T4/6I	6 – 7,5 mm
PV-K...T4/10II	6 – 7,5 mm
PV-K...T4/8II	8,5 – 10 mm

(ill. 10)

根据插图10和表格3检查L的长度

⚠ 注意：

在剥线时请勿切断里面的铜丝

📖 说明：

剥线钳PV-AZM...和可互换刀片的操作说明见安装说明MA267，可在 www.staubli.com/electrical 网站下载

(ill. 10)

Check dimensions L accordance with illustration 10 and table 3.

⚠ Attention:

Do not cut individual strands at stripping

📖 Note:

For directions on the operation of stripping pliers PV-AZM... and changing blade sets, see operating instruction MA267 at www.staubli.com/electrical

压接

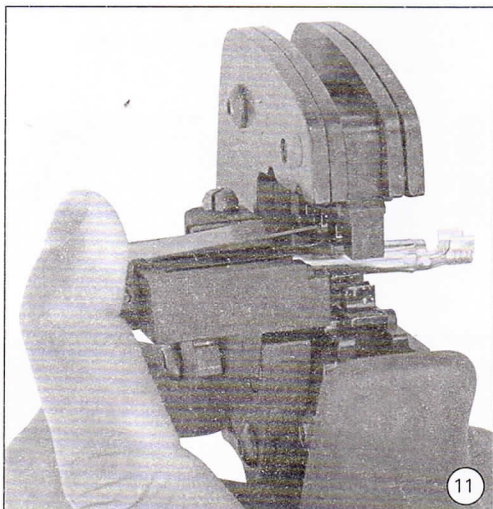
(ill. 11)

打开并按住夹子 (K) .把接头放在适合的截面区域。转动接头使开口朝上，松开夹子 (K) ，接头就固定好了。

Crimping

(ill. 11)

Open the clamp (K) and hold. Place the contact in the appropriate cross-section range. Turn the crimp lugs upwards. Release the clamp (K). The contact is fixed.

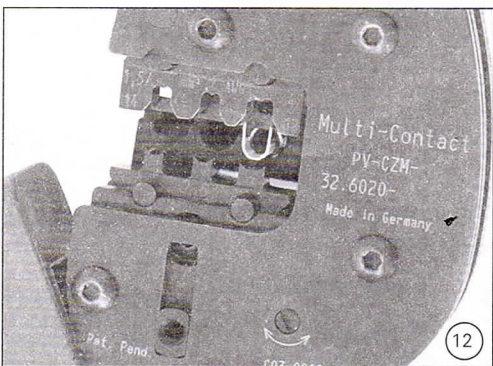


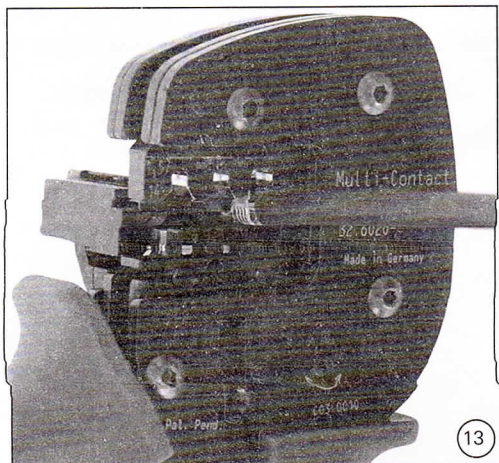
(ill. 12)

逐渐压压接钳直到接头开口完全接触到压接模。

(ill. 12)

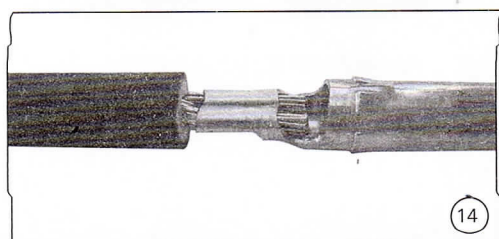
Press the pliers gently together until the crimp lugs are properly located within the crimping die.





(ill. 13)
插入电缆的剥线端直到电缆的绝缘层接触到压接芯。完全压紧压接钳。

(ill. 13)
Insert the stripped cable end until the insulation comes up against the crimp insert. Completely close the crimping pliers.



(ill. 14)
检查压接

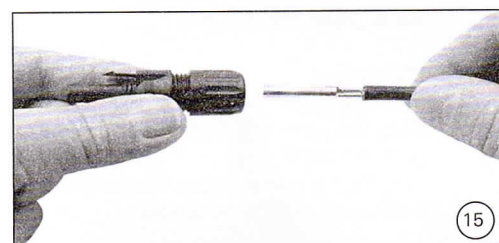
(ill. 14)
Visually check the crimp.

说明：
压接工具的操作说明见安装说明 MA251，可在 www.staubli.com/electrical 网站下载。

Note:
For directions on the operation of the crimping tool, please see operating instructions MA251 at www.staubli.com/electrical

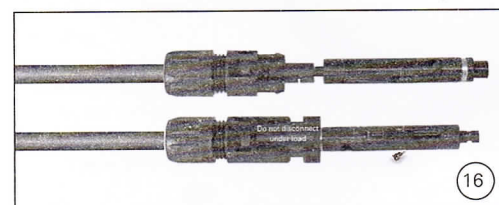
安装检查

Assembly check



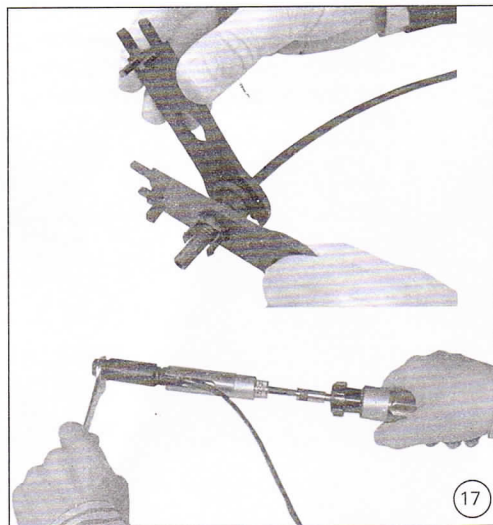
(ill. 15)
把压接好的接头插入到公连接器或母连接器的绝缘套内，直到听到滴答声说明安装到位。轻轻地拉导线检查金属件是否正确啮合。

(ill. 15)
Insert the crimped-on contact into the insulator of the male or female coupler until it clicks into place. Pull gently on the lead to check that the metal part is correctly engaged.



(ill. 16)
把测试插头的合适端尽可能深的插入公连接器或母连接器中。如果接触正确，那么测试插头上的白色标识必定可见。

(ill. 16)
Insert the appropriate end of the test pin into the male or female coupler as far as it will go. If the contact is correctly located, the white mark on the test pin must still be visible.



(ill. 17)
用手旋紧电缆固定头，再用工具**PV-MS**旋紧
或
用工具**PV-WZ-AD/GWD**和
PV-SSE-AD4旋紧电缆固定头

如论如何：
紧固扭矩都必须适合所用的电缆。典型的
数值在3,4 Nm至3,5 Nm之间¹⁾
¹⁾ 我们建议在安装前校准扭矩扳手。

说明：
i 组装连接器时，建议环境温度
为-15°C - +35°C。

说明：
i 不要将螺帽拧到底。

(ill. 17)
Screw up the cable gland hand-tight
with the tools **PV-MS**
or
tighten the cable gland with the tools
PV-WZ-AD/GWD and **PV-SSE-AD4**.

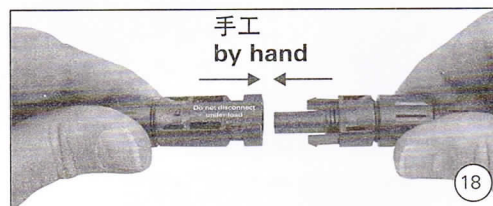
In both cases:
The tightening torque must be ap-
propriate for the solar cables used.
Typical values are between 3,4 Nm
and 3,5 Nm¹⁾.

¹⁾ We recommend to calibrate the torque wrench
before assembly.

Note:
i For assembling of components we
recommend an ambient temperature
between -15°C and 35°C

Note:
i Do not bottom out the capnut.

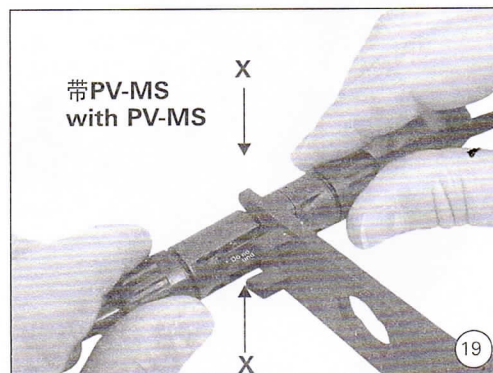
在无安全锁扣**PV-SSH4**的情况下
插拔电缆连接器



插入
(ill. 18)
把电缆插头插接在一起，发出滴答声说
明插合到位。拉电缆接头检查接头是否
完全接好。

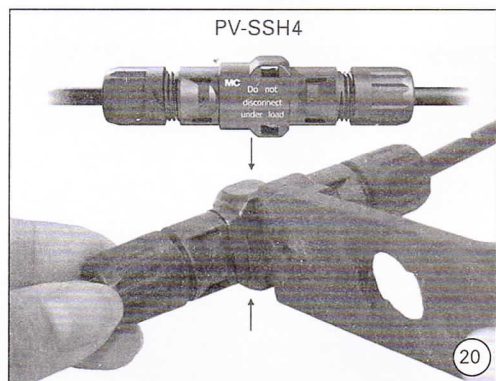
**Plugging and unplugging the
cable coupler without safety
lock clip PV-SSH4**

Plugging
(ill. 18)
Plug the parts of the cable coupler to-
gether until they click in place. Check
that they have engaged properly by
pulling on the cable coupler



拔出
(ill. 19)
拔出接头，用手或者工具**PV-MS**压锁
扣同时拉出，电缆连接器就会被拨开。

Unplugging
(ill. 19)
To disconnect the contacts, press the
latches (X) together either by hand
or with the tool PV-MS and pull the
halves of the cable coupler apart.



有安全锁扣PV-SSH4的情况下插拔电缆连接器

插入

(ill. 20)

把电缆插头插接在一起，发出滴答声说明插合到位。拉线缆接头检查接头是否完全接好。

拔出

只能用工具PV-MS来断开电缆连接器间的连接。用工具PV-MS压锁扣同时拉出，电缆连接器就会被拨开。

布线

必须保证从电缆密封处引出的20毫米电缆不弯曲或受压。
请参阅电缆生产商的最小弯曲半径说明。
请参考以下关于布线的配图。

Plugging and unplugging the cable coupler with safety lock clip PV-SSH4

Plugging

(ill. 20)

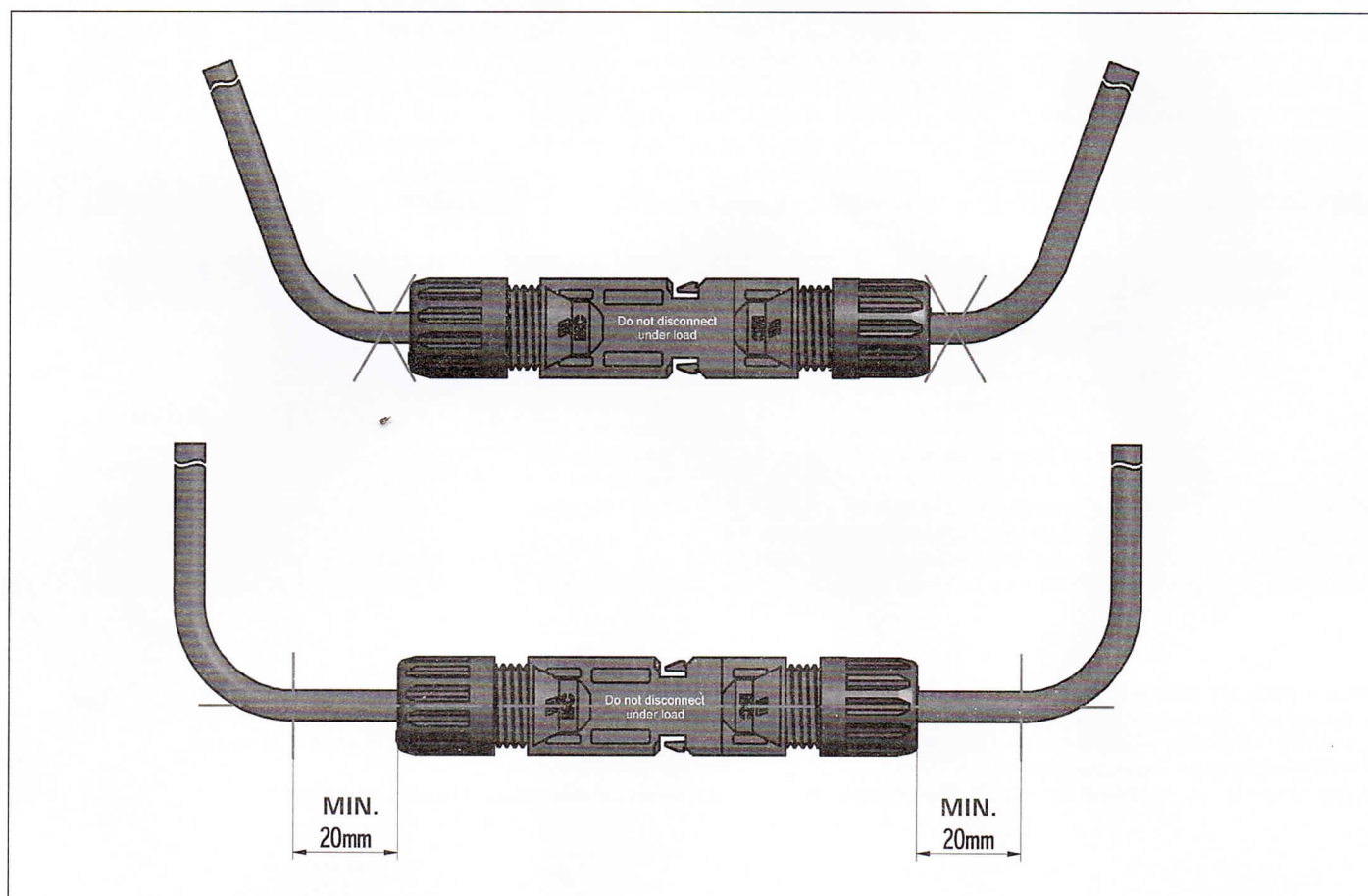
Plug the parts of the cable coupler together until they click in place. Check that they have engaged properly by pulling on the cable coupler.

Unplugging

The cable coupler can be disconnected only with the tool PV-MS. Press the latches (X) together with the tool PV-MS and pull the halves of the coupler apart.

Cable routing

Cable management must allow a minimum of 20 mm of cable that exits directly from the cable seal without bending or stress. Refer to cable manufacturers specification for minimum bending radius. Please see picture regarding detailed cable routing.



技术参数

Technical data

类别名称	Type designation	MC4
连接器系统	Connector system	Ø 4 mm
额定电压	Rated voltage	1000 V (EN 50521 / IEC62852) ¹⁾ 1500 V DC (2PFG2330) ^{1) 2)} 600 V / 1000 V / 1500 V (UL) ³⁾
额定电流 IEC (85 °C)	Rated current IEC (85 °C)	17 A (1,5 mm ²) 22,4 A (2,5 mm ²) 39 A (4 mm ² / 6 mm ²) 45 A (10 mm ²)
额定电流 (UL)	Rated current (UL)	22,5 A (14 AWG) 30 A (12 AWG / 10 AWG) 50 A (8 AWG)
额定浪涌电压	Rated surge voltage	12 kV (1000 V DC (IEC)) 16 kV (1500 V DC (IEC))
环境温度范围	Ambient temperature range	-40 °C...+85 °C (IEC) -40 °C...+75 °C (UL)
温度上限	Upper limiting temperature	105 °C (IEC)
防护等级, 已插合 未插合	Degree of protection, mated unmated	IP65 / IP68 (1 m/1 h) IP2X
过压类别 / 污染等级	Overvoltage category / Pollution degree	CATIII/3
连接器的接触电阻	Contact resistance of plug connectors	0,35 mΩ
连接器极性	Polarity of the connectors	插座 / Socket = Plus / positive 插头 / Plug = Minus / negative
锁紧系统	Locking system	Snap-in
安全等级 (IEC)	Safety class (IEC)	1000 V DC:II 1500 V DC:0
连接系统	Contact system	MULTILAM
接线方式	Type of termination	压接 / Crimping
警告	Warning	在负载的情况下不允许断开 Do not disconnect under load
接触材料	Contact material	铜、镀锡 / Copper, tin plated
绝缘材料	Insulation material	PC/PA
阻燃等级	Flame class	UL94-V0
盐雾试验, 严酷等级6	Salt mist spray test, degree of severity 6	IEC 60068-2-52
耐氨性 (参考DLG)	Ammonia resistance (according to DLG)	1500 h, 70 °C / 70 % RH, 750 ppm
根据IEC 62852获得TÜV-Rheinland认证。	TÜV-Rheinland certified according to IEC 62852	R60111354 ⁴⁾
根据EN 50521获得UL认证。	TÜV-Rheinland certified according to EN 50521	R60028286 ⁵⁾
根据UL 6703获得UL认证。	UL certified according to UL 6703	E343181
根据UL 6703获得CSA认证。	CSA certified according to UL 6703	250725

1)

额定电压 [V] DC Rated voltage [V] DC	适用电线 Suitable wires	生产商 Manufacturer	导线截面积 [mm ²] Cable cross section [mm ²]	证书编号 Certificate no.
1000	适用2PFG 1169/07.08或EN50618认可的1000V电缆 ⁶⁾ Valid with 1000 V wires approved according to 2PFG 1169/07.08 or EN50618 ⁶⁾ FLEX-SOL-XL (Ø 4,70 mm)	Stäubli Electrical Connectors	1,5 / 2,5 / 4 / 6 / 10 1,5	R 60024459
	FELX-SOL-EVO-TL (Ø 4,82 mm)	Stäubli Electrical Connectors	4,0	R 50326973
	Byson Electronics 7052 (Ø 4,82 mm)	Byson Electronics	4,0	R 50181294
1500	仅适用2PFG 1990/05.12或EN50618认可的1500V电缆 ⁶⁾ Only with valid 1500 V according to 2PFG 1990/05.12 or EN50618 approved wires ⁶⁾		1,5 / 2,5 / 4 / 6 / 10	

²⁾ 1500 V 2PFG2330: 仅用于限制进入的光伏电站系统 / Only for use in PV-systems with restricted access locations

³⁾ 可用电缆直径, 请参考本安装说明中的表2 / For usable cable diameter please see table 2 in this assembly instructions.

⁴⁾ IEC62790认证的接线盒, 必须使用EN50618认证的电缆。 / For PV junction boxes according IEC62790 cables according EN50618 must be used

⁵⁾ 有效期至2017年10月 / valid till October 2017

⁶⁾ 从2017年10月起, 仅适用于EN50618认证的电缆 / From October 2017 only valid in connection with cables certified according EN50618