

光伏组件连接器 <b>TL-CABLE01</b> 产品说明书 (PV Connector TL-CABLE01 Instruction Manual)	文档号 (Document code) XX-XX-XX	 <b>通灵电器</b> TONGLIN ELECTRIC
江苏通灵电器股份有限公司 (Jiangsu Tonglin Electric Co., Ltd)	版本号 (Revision) B1	页码(Page) 1/15

光伏组件连接器 TL-CABLE01  
PV Connector TL-CABLE01



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## 安装须知 Installation Instruction

请务必按照本说明书进行操作，并且使用指定的工具，否则可能会造成技术指标无法满足标准要求，同时避免可能导致个人伤害产品损害等潜在危害。

**Make sure to carefully read and understand the instruction before installation. If tools other than those specified by the instruction used or if the assembly instructions described here are disregarded, then compliance with the standard requirements can't be guaranteed. Meanwhile avoid potential hazards which may result in personal injury and product damage.**

### 注意事项:

#### Caution:

1.在自行安装时，如果所用的零件和工具不是我们公司所规定的，或者忽略了准备和安装操作，我们将不保证产品安全性和技术参数一致性。

During your self- installation, if the used part and tool are not ruled by our or if you ignore preparation and operation, we won't insure the safety compatible of the product technology your self-installation.

2.为防止电击，在拆装时连接器必须断开电源。

For protecting against electric shock, please cut off the power when installing PV connector.

3.终端产品必须提供防电击功能。

The final products must be supplied with the function electric shock proof.

4.在负载的情况下，连接器不允许断开。在带电情况下不允许拔插。

In the case of load, the connector is not allowed to disconnect. In the case of charged is not allowed to pull plug.

5.建议不要使用 H07RN—F 无镀锡电缆，因为铜线被氧化后，压接部位的接触电阻可能会超过允许值。H07RN cables without tinned are not recommended. Cause the contact resistance of crimping place will probably exceed the permitted value since the cooper wires are oxidized.

6.该系列连接器能够达到 IP67 (0.5m.1h) 防护等级,但是它们不能长久置于水下使用。

TL-CABLE01 are IP67 rated, and they can be positioned for half an hour under 1MT of water, But they can't be put under water for long time.

7.一些化学物质应该避免与连接器本体接触，参考下页表 1。

Some chemicals should avoid contacting with the connector body, refer to table 1.

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表 1 Table 1	
物质 Chemical Name	影响 Influence
天那水 Solvent-resistance	避免直接接触，可能导致连接器产生裂纹或开裂。 Avoid direct contact, or may cause the connector cracking.
脱模剂（如 Pelicoat S-6 等） Release agent (such as Pelicoat S-6 etc.)	避免直接接触，可能导致连接器产生裂纹或开裂。 Avoid direct contact, or may cause the connector cracking.
可产生肟气的粘板胶及灌封胶（如 KE-200、CX-200、Chemlok 等） Sticky adhesive and sealant can produce oxime gas (such as KE-200、CX-200、Chemlok etc.)	避免直接接触，可能导致连接器产生裂纹或开裂。 Avoid direct contact, or may cause the connector cracking.
TBP（可塑剂） TBP (Plasticizer)	避免直接接触，可能导致连接器产生裂纹或开裂。 Avoid direct contact, or may cause the connector cracking.
丙酮 Acetone	避免直接接触，可能导致连接器产生裂纹或开裂。 Avoid direct contact, or may cause the connector cracking.
机油（如 KV46 等） Machine oil (such as KV46, etc.)	避免直接接触机会，可能导致连接器产生裂纹。 Avoid direct contact with connector, or may lead to cracks in the connector.
模温油 Mold temperature oil	避免直接接触机会，可能导致连接器产生裂纹。 Avoid direct contact with connector, or may lead to cracks in the connector.
防锈油 Antirust oil	避免直接接触机会，可能导致连接器产生裂纹或开裂。 Avoid direct contact with connector, may lead to cracks in the connector.
酒精 Alcohol	避免直接接触机会，可能导致连接器表面轻微起皮。 Avoid direct contact with connector, or may lead to a slight skin on the connector surface.
汽油 Gasoline	避免直接接触机会，可能导致连接器表面轻微起皮。 Avoid direct contact with connector, or may lead to a slight skin on the connector surface.
油脂（如 Molykote EM-50L 等） Grease(such as Molykote EM-50L, etc.)	避免直接接触或封闭在密闭空间，可能导致连接器产生裂纹或开裂。 Avoid direct contact with connector, or may lead to a slight skin on the connector surface.
白花油 White flower oil	避免直接接触或封闭在密闭空间，可能导致连接器产生裂纹或开裂。 Avoid direct contact with connector, or may lead to a slight skin on the connector surface.
活络油 Activating collaterals oil	避免直接接触或封闭在密闭空间，可能导致连接器产生裂纹或开裂。 Avoid direct contact with connector, or may lead to a slight skin on the connector surface.

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**(一) 产品技术规格**  
Technical Parameter

表 2 Table 2	
型号 Type	TL-CABLE01
认证标准 Certification standards	IEC 62852 & UL6703
正负极型号 Positive and negative	TL-CABLE01-F TL-CABLE01-M
额定电压 Rated Voltage	TUV 1000V DC UL 1000V DC
额定电流 Rated Current	30A (TUV) 20A (UL)
保护等级 Protection Degree	IP68
安全等级 Safety Class	Class A
电缆线规格 Cable Specification	1×4mm <sup>2</sup> /12AWG
使用温度 Ambient Temperature	-40℃~+85℃
接触电阻 Contact Resistance	≤0.5mΩ
绝缘材料 Insulation Material	PC/PA

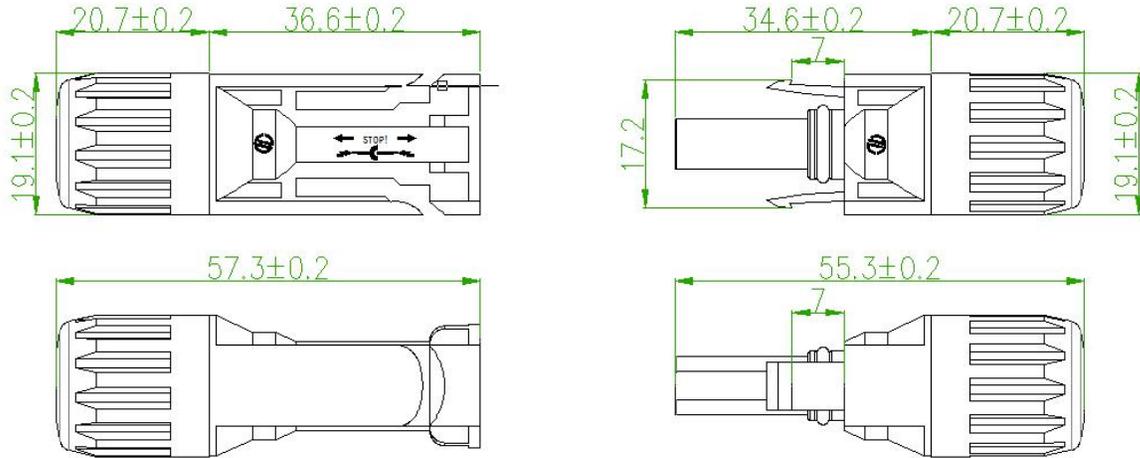
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## (二) 产品图纸

### Technical Drawing

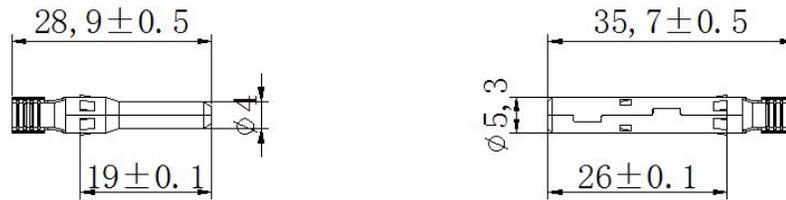
#### 1、连接器图纸

##### Connector Drawing



#### 2、套管插针图纸

##### Pin and Contact Drawing



Pin 插针

套管 Contact

##### 套管插针对应信息 Pin and contact info

型号 Type	电缆规格 Cable O.D	连接器极性 Connector	包装方式 Package
套管 Contact	4mm <sup>2</sup> /12AGW	Male 正极连接器	盘式口 Disc
			散装口 Bulk
插针 Pin	4mm <sup>2</sup> /12AGW	Female 负极极连接器	盘式口 Disc
			散装口 Bulk

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### (三) 使用工具

#### Required Tools

- 1、请尽量使用文档中所展示的工具。  
Please use the tools which shown on this file.
- 2、使用工具时注意做好保护。  
Be carefully while you use the tools.

■ 剪线钳 Wire Cutter



■ 塑料扳手 Plastic Connector Spanner



■ 剥线钳 Strip Clamp



■ 保护套 Protective Sleeves



■ 铆接钳 Crimping Clamp



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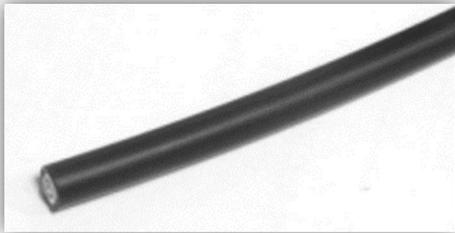
#### (四) 连接器安装流程

##### Connector Installation Process

##### 1、断线、剥线流程:

##### Cutting and Stripping Cable Process:

- 使用剪线钳剪出需要线缆长度。  
Use the Wire Cutter to cut out the required length of the cable.



注意：断线时请保持线缆截面的平整，选用线缆的外径需要控制在 5.8mm~7.2mm。

Note: Please keep the cable cross section flat when cutting the cable. The O.D of cable needs to be controlled within 5.8mm~7.2mm.

- 将线缆放置到合适位置，使用剥线钳剥离电缆绝缘层，剥线长度控制在  $7\pm 0.1\text{mm(L)}$ 。  
The cable is placed in a suitable position, using Strip Clamp to strip cable, the striped cable should be controlled within  $7\pm 0.1\text{mm(L)}$ .



注意：不要剪断绝缘层下的线芯。断股线不超过 3 根。

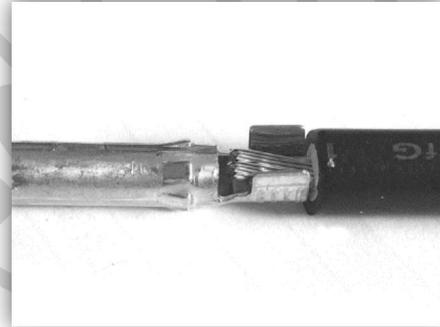
##### 3、铆接不上锡

Note: Don't cut the cable grands, the number of broken cable grands should be less than 3.

##### 2、铆接流程:

##### Crimping Process:

- 将已剥好线材的线芯放入端子孔内，并确保所有线芯都在端子孔内。  
Insert striped cable into contact barrel and insure all conductor strands are captured in the contact barrel.



- 电缆的绝缘层接触压接芯，将压接钳压紧。  
Inset the cable cores until the insulation comes up against the crimp insert. Completely close the crimping pliers.



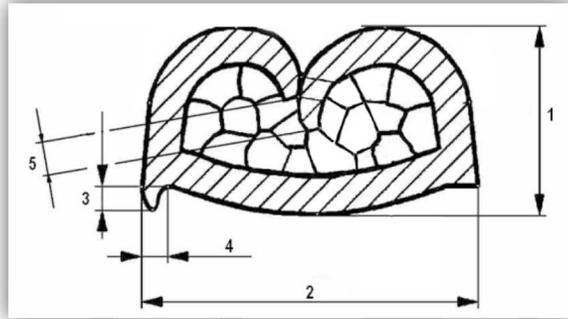
注意：线芯铆接部位不宜裸露太长；保证金属件与电缆线同心度。

Note: Cable core should not be exposed too long. Ensure the concentricity of the cable and metal parts.

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### Crimping and No Soldering

- 使用专用的刀具对线缆铆接，线缆与金属件的拉力需要大于 310N。  
Using specified Crimping Blade to crimping cable and Pin/Contact, the pull force between cable and metal parts should be more than 310N after crimping.

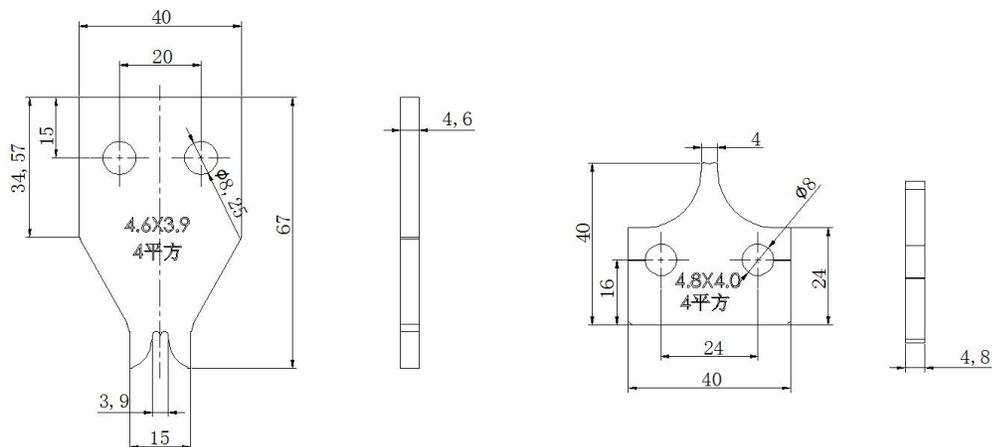


- 需要定期对铆接结构做剖面分析，分析内容应该包含如下几条：  
It is very important to do a micro-cutting tests, the test should be contained following items:  
压缩比 (Profile compression ratio) : 70%~90%;  
空洞率 (Void ratio) :  $\leq 1\%$ ;

  - 1) 压接厚度 (Crimping thick) :  $4.0 \pm 0.1\text{mm}$ ;
  - 2) 压接宽度 (Crimping width) :  $2.2 \pm 0.2\text{mm}$ ;
  - 3) 毛刺高度 (Burr height) :  $\leq 0.7\text{mm}$ ;
  - 4) 毛刺宽度 (Burr width) :  $\leq 0.5\text{mm}$ ;
  - 5) 铆接末端卷曲高度差 (The distance between the crimp face ends) :  $< 0.35\text{mm}$ .

- 铆接刀具图纸

### Crimping Blade Drawing



注意：上述剖面分析以及铆接刀具内容只针对 12AWG\ 4mm<sup>2</sup>线缆，其他规格线缆暂不提供。  
Note: The above cross-sectional analysis and crimping tool are only for 12AWG \ 4mm<sup>2</sup> cable.

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#### 4、铆接上锡

##### Crimping and Soldering

- 铆接后电缆线与金属件拉力需大于 150N。锡液需要熔入压接开口，不能只熔于表面。焊锡完成后，拉力值需要大于 310N。

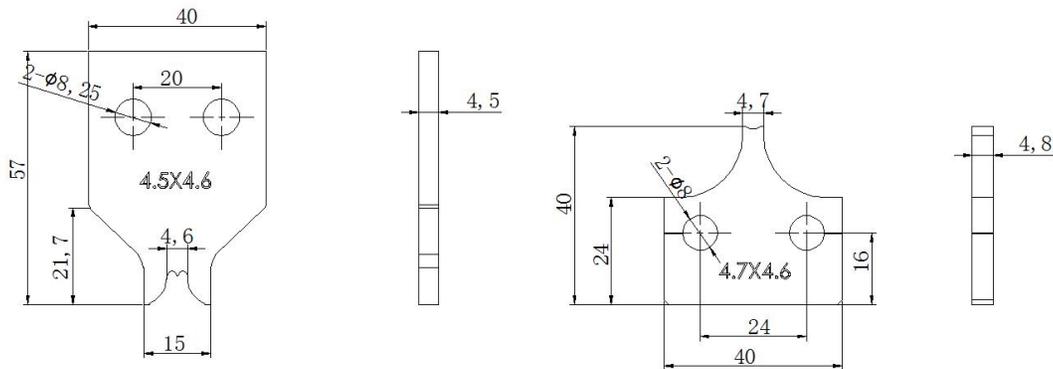
The pull force between cable and metal parts should be more than 150N after crimping. Tin liquor need to melt into the crimping opening, not only melt on the surface. The pull force between cable and metal parts should be more than 310N after soldering.



- 铆接控制尺寸，铆接宽度： $4.5 \pm 0.3\text{mm}$ ，铆接厚度： $2.75 \pm 0.25\text{mm}$ ；  
Crimping width:  $4.5 \pm 0.3\text{mm}$ , Crimping thick:  $2.75 \pm 0.25\text{mm}$ ；

- 铆接刀具图纸

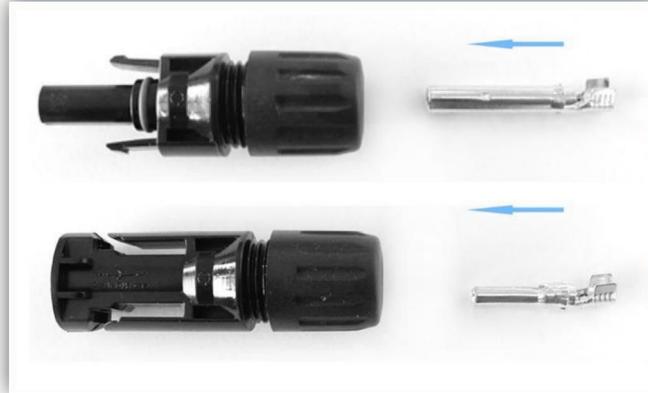
##### Crimping Blade Drawing



- 5、将铆接好的套管和插头对应地插入正、负极预组装接线座，直到其啮合。当卡到位后会听到“滴”的卡位声，端子插入后不可再拔出。

Insert crimping socket and pin into back of male and female connector. A “click” should be heard or felt when the contact cable assembly is seated in correct position.

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注意：轻轻拉动导线，检查金属件是否啮合牢固；不要将插针插入正极的预组装接线座，不要将套管插入负极的预组装接线座。

Note: Gently pull the cable, check whether metal meshing firmly. Do not insert the pin to the pre-assembled positive connector and do not insert the socket to the pre-assembled negative connector.

6、安装电缆后罩，先用手预拧紧，再用塑料扳手旋紧电缆后罩。

When installing the back cap, need to pre-tighten by hand, then tighten the back cap with the lock tool.



注意：拧后罩时，需保证电缆线与后罩同心。

Note: Screw the back cap, need to ensure that cable concentric with the back cap.

7、连接器适用线缆以及相关工艺参数

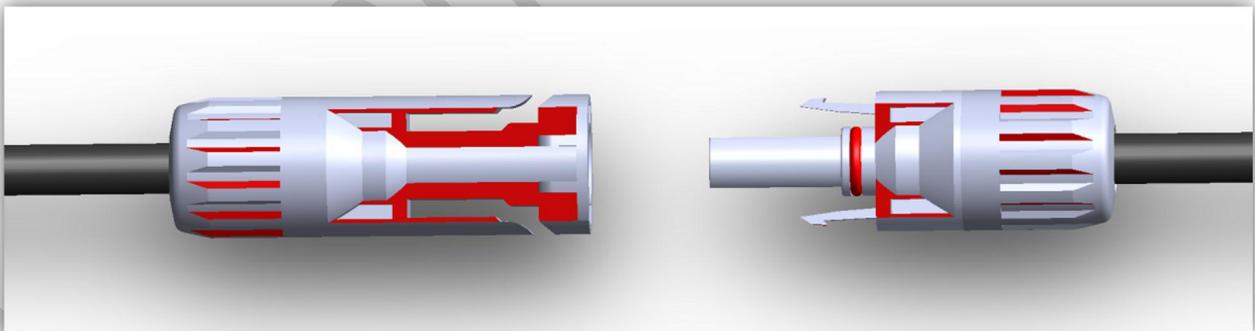
- 适用 TL-CABLE01 S\S-F 连接器的线材外径范围为 5.8mm-7.2mm。  
Cables O.D range of TL-CABLE01 S\S-F PV connector is from 5.8mm to 7.2mm.
- 针对不同的线材，客户可以通过螺帽与连接器接线座之间的距离确认螺帽是否组装到位。  
For different O.D PV cables, through the gap between back cap and connector socket, you can confirm whether the connector cap is installed correctly.

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- 下表是不同外径线缆的工艺参数表。  
The specific measured data refer to Table 4.

连接器(Connector)	M\F	扭矩(Torque) N·m	间隙/mm	线缆 Cable	
				O.D/mm	供应商 Supplier
TL-CABLE01	M	1.6-3.2	≤0.5	5.8±0.2	/
	F	1.6-3.4			
	M	1.6-3.2	≤0.5	6.2±0.2	/
	F	1.8-3.4			
	M	2.0-3.6	≤0.5	6.6±0.2	/
	F	2.0-3.8			
	M	2.6-4.2	≤0.5	6.7±0.2	/
	F	2.6-4.2			
	M	3.0-4.8	≤0.5	7.1±0.2	/
	F	3.0-4.8			

- 以上螺母扭矩、间隙范围只适用于太阳能光伏组件线缆。不同规格线材组装完成后需要通过 IP68 测试及拉力测试。  
Above nut torque and gap range is just applied to PV cables, the connectors should pass IP68 and Pullout test after connector assembled with different cables.
- 光伏线缆的线芯只用铜材。  
The material of PV cable core should be used copper.
- 连接器组装时的受力面(下图红色位置)。  
The stress surface when the connector assembly (red area) .



注意：请注意检验红色区域的结构完整性以免出现装配不良现象。  
Note: Please check the red area to prevent possible failure during the installing.

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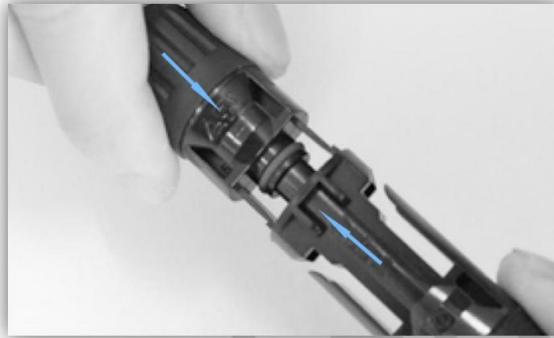
## (六) 连接器使用方式

### The Use of Connectors

#### 1、正负极连接器对插:

##### Male and female connectors engagement:

- 将公母头对插，直到他们啮合，该步骤可以校验连接器是否安装到位。  
Insert male connector and female connector until they engaged, which can verify whether the connector is in place.



注意：连接时发出滴答声则说明插合到位；连接完成后可以向左右方向拉动电缆，以确认连接器是否组装良好。

Note: Plug parts of the cable coupler together until they click in place. When connection is completed, the cable can be pulled to the left and right direction to confirm whether the connector is assembled well.

#### 2、正负极连接器拔出:

##### Pull Out Process:

- 用手依据图示中的方式拔出正负极连接器。  
The connectors can be unlocked by hands.



#### 3、连接器包装

##### Connector Packing

- 连接器未对插时，不具有防护等级，需要进行防尘防水包装。

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The connectors do not have any protection before male and female connectors engaged, it is very important to waterproof, dustproof.

- 连接器线缆不宜弯曲角度过大，一般来说弯曲半径不超过线缆外径的 4 倍，具体最小弯曲半径请依据线缆规格书。

The cable of connector should not be bend too much, the minimum bending radius should be not more the four times of cable O.D generally . For accurate information , refer to cable manufacture's specification.



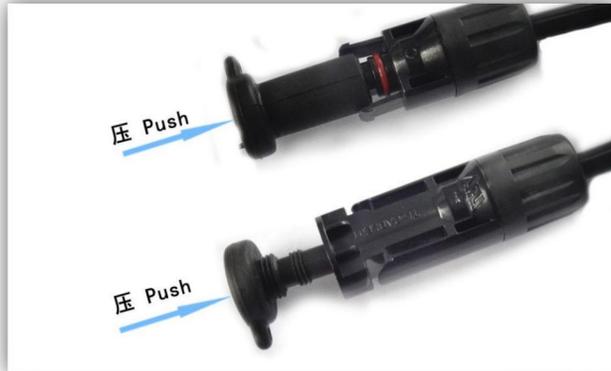
#### 4、连接器防护套

##### Connector Protective Sleeves

- 在光伏连接器运输过程中，使用前，对连接器内部金属件的防尘，防水而设计的一款防护套。只需要将护套压进连接器正负极的前端，就可以完成安装操作，在使用前拔出即可。

Because of the waterproof, dustproof requirements during connectors in storage and transportation, the connector protective sleeves were designed. It is a simple operation when we install it on connectors. Push it in the front of the connector tightly. And before we use it, pull it out from connectors.

<p>光伏组件连接器 TL-CABLE01 产品说明书 (PV Connector TL-CABLE01 Instruction Manual)</p>	<p>文档号 (Document code) XX-XX-XX</p>	 <p>通灵电器 TONGLIN ELECTRIC</p>
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注意：该防护套防护等级为 IP65，不可以长久置于水下；上图红色未知需要贴合紧密；防护套材料为 TPE 材料，该部件可以回收使用；该防护套只能用于说明书规定的连接器。

Note: The protection degree of the Connector Protective Sleeves is IP65, it should not be placed in the water so long. It should be closed tightly with connector as the picture above shows. The material of Connector Protective Sleeves is TPE, and it can be recycled. The protective sleeves can be used in the specified connectors.

<p>光伏组件连接器 <b>TL-CABLE01</b> 产品说明书 (PV Connector TL-CABLE01 Instruction Manual)</p>	<p>文档号 (Document code) XX-XX-XX</p>	 <p><b>通灵电器</b> TONGLIN ELECTRIC</p>
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