

天合光能 TS4 连接器安装手册

Trina Solar TS4 Connector Installation Manual



文件编号 File No: PS-M-0779

版本 Version: **G**

日期 Date: **2025.02.13**

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1. 安全说明 Safety Instruction

该产品只能由有相应资质的或经过专家培训的专业人员安装，安装过程中需要遵守所有安全规范。天合光能不承担对于因不遵守这些警告而产生的任何责任。

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

1.1 警告 Warning

1.1.1 仅可使用天合光能指定的零件和工具。对于自行装配，请务必遵守本文所述的准备和安装的说明，否则天合光能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。

Use only the components and tools specified by Trina Solar. Do not deviate from the preparation and assembly procedures described here, since in this event, in the situation 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.

1.1.2 必须与天合光能认可的连接器的连接，否则天合光能不承担任何责任。

Connector must be mated with connector qualified by Trina Solar, otherwise Trina Solar will disclaim any warranty responsibility.

1.1.3 不能在有负载的情况下插拔连接器。在带电情况下允许插拔，但一定要切断光伏系统端电源。Do Not Disconnect under Load. Plugging and unplugging when live is permitted, but the power at the PV system must be cut off.

1.2 通用安全 General Safety

1.2.1 确认终端产品有防电击功能并确认其使用者采取了防电击措施。

Protection from electric shock must be assured by the end product and its user.

1.2.2 为防止电击，在安装和拆卸连接器时必须断开电源。

To prevent electric shock, system must be disconnected from the power source when the connector is installed or disassembled.

1.2.3 连接器不能承受持续的机械拉伸，线缆应该由线缆扎带固定。

The plug connection must not be subjected to continuous mechanical tension. The cable should be fixed with cable ties, avoiding any pull on the connectors.

- 1.2.4** 不要将连接器直接放在屋顶表面。

Do not place the plug connectors directly on the roof membrane.

1.3 操作安全 Handling Safety

- 1.3.1** 该连接器仅适用于B类和C类多股铜导线（见NFPA NEC 70第9章，表10）。建议使用光伏专用线缆，镀锡铜芯，双层绝缘，绝缘材料为XLPE。不建议使用无镀锡线缆或PVC线缆，否则天合光能不承担任何责任。

The connector is only applicable to the B and C types of copper wires (see chapter-9 of NFPA NEC 70, table 10). It is recommended to use special photovoltaic cable, tin plated copper core, double insulation, and XLPE insulating material. Trina prohibits the use of untinned cable PVC cables, otherwise Trina Solar will disclaim any warranty responsibility.

- 1.3.2** 未插合状态的连接器必须使用防尘塞，以防止灰尘和水进入。被污染的公母插头不能插合。

Unmated plug connectors must be protected from moisture and dirt with a sealing cap. If soiled, the male and female connectors must not be plugged together.

- 1.3.3** 插合部件防水等级IP68。不能长久置于水下使用。

The plug connectors are watertight in accordance with IP68 protection class. However, they cannot be used for continuous operation underwater.

- 1.3.4** 连接器不得在含有烃、酚、酮、氨合物等与塑料有腐蚀的环境中使用。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。安装过程中，禁止在连接器里添加或涂抹任何油脂及润滑剂。

Do not use under hydrocarbon, phenol, Ammine and plastic corrosive environment. 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 other chemical substances that could negatively impact the materials used. During installation process, do not add any grease and lubricant in the connector.

- 1.3.5** 对产品有影响的常见化学品清单如下，对于表中未列明的化学品，需经天合确

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认无影响后再使用。

Below is the list of common chemicals that can affect the products. For other chemicals not listed in the table, please confirm with Trina Solar Technical Service BEFORE use (see Section#8).

序号 NO.	化学品名 Chemical Name
1	润滑油 Lubricating oil
2	防锈油 Rust-proof oil
3	冲压油 Stamping oil
4	黄油 Grease
5	机油 Engine oil
6	柴油 Diesel
7	食用油 Cooking oil
8	WD40
9	香蕉水 Banana oil
10	油性封孔 Oil sealing agent
11	乙酸乙酯 Ethyl acetate

1.3.6 储存运输，建议温度为-30°C~ +60°C，相对湿度低于70%，避光、防水、防尘。

不可与有影响的化学品存放在一起。未连接连接器建议在一年内安装使用。

We recommend TS4 connector storage and transportation temperature between be -30°C and +60°C and a relative humidity of less than 70%. Storage and transportation at normal temperature must avoid direct sunlight, moisture, and dust.

It is not allowed to be stored with the affected chemicals. The plug connectors should be installed within one year of delivery by Trina Solar.

1.3.7 天合光能有权随时对本说明书中可能出现的打印错误，产品技术改进和创新等方面作修改，这些改动恕不另行通知。同时各语言版本翻译的不详之处，请以中文版为准。最终解释权归天合光能。

Trina Solar has the rights to make certain correction for the printing errors, improvements and innovation for the products, and there will be no prior notice when these changes happen. If there was any misunderstanding for the version in

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different language, please regard Chinese version as the right one. Final explanation right belongs to Trina Solar.

2. 技术参数 Product Specifications

连接器系统 Connector system	Φ4mm
额定电压 Rated voltage	IEC 1500V&UL 1500V
额定电流 Rated current @IEC (85°C)	41A (4.0mm ² / 12AWG) 46A (6.0mm ² / 10AWG) 55A (10.0mm ² / 8AWG)
额定脉冲电压 Rated impulse voltage	16KV
环境温度范围 Ambient temperature range	-40°C~+85°C
接触电阻 Contact resistance	≤0.5mΩ
应用等级 Application degree	Class A
防护类别 Protection class	Class II
污染等级 Pollution degree	2
防护等级 Degree of Protection	IP68 (1m, 1h), 已插合 mated IP2X, 未插合 unmated
阻燃等级 Flame class	UL94-V0
绝缘材料 Insulation material	m-PPE/PA
金属材料 Contact material	铜, 镀锡 Copper, Tin-plated
接线方式 Type of termination	铆接 Crimping
锁紧系统 Locking system(UL)	嵌入式 Locking type
TUV ,IEC62852	R50401767/R50385924/ R50508240
UL,UL6703	E486009

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3. 产品选型表 Product Selection Form

3.1 TS4 连接器 TS4 PV connector

型号 Type	料号 P/N 新包装 new package	料号 P/N	线缆 外径 Cable OD	导体截面积 Conductor Cross Section		工具料号 Tool P/N			
				mm	mm ²	AWG	剥线钳料 号 Wire Stripper P/N	压接工具 料号 Rivet Plier P/N	扳手料号 Spanner P/N
TS4-F1	/	7A000986	4.7-6.0	4.0/6.0	12/10	7A001039	7A001038	7A001040	
TS4-M1		7A000987							
TS4-F2		7A000982	5.6-6.8						
TS4-M2		7A000983							
TS4-F3		7A002404	6.0-6.6						
TS4-M3		7A002425							
TS4-F4	7A007866	7A000984	6.0-7.2	10.0	8	7A001037			
TS4-M4	7A007867	7A000985							
TS4-F5*	/	7A000992	7.2-8.7	10.0	8	7A001037	7A001036		
TS4-M5*		7A000981							
TS4-F6*	7A007868	7A000990	6.6-7.2	4.0/6.0	12/10	7A001039	7A001036		
TS4-M6*	7A007865	7A000991							
TS4-F7*	/	7A004375	6.6-7.2	4.0/6.0	12/10	7A001039	7A001036		
TS4-M7*		7A004378							
TS4-F8*		7A004377	5.6-6.6						
TS4-M8*		7A004376							
TS4-F9		7A002997	6.9-7.5				4.0/6.0	12/10	7A001038
TS4-M9		7A002996							

3.2 TS4 Plus 连接器 TS4 Plus PV connector

型号 Type	料号 P/N 新包装 new package	料号 P/N	线缆 外径 Cable OD	导体截面积 Conductor Cross Section		工具料号 Tool P/N		
				mm	mm ²	AWG	剥线钳 料号 Wire Stripper P/N	压接工具料 号 Rivet Plier P/N
TS4 Plus-F1	7A007804	7A004669	4.7-6.0	4.0/6.0	12/10	7A001039	7A001038	7A004541
TS4 Plus-M1	7A007805	7A004670						
TS4 Plus-F2	7A007806	7A004671	5.6-6.8					

TS4 Plus-M2	7A007807	7A004672	6.0-7.2					
TS4 Plus-F3	7A007808	7A004673						
TS4 Plus-M3	7A007803	7A004674						

注意 1: 选择与线缆匹配的连接器的料号，需保证导体截面积和线缆外径均在范围内。否则会影响使用，并产生安全风险。

Note 1: Select the connector specification and Part No. matched with the cable, and ensure that the cross-sectional area of the conductor and the OD of the cable are within the range. Otherwise, it will affect the use and create safety risks.

注意 2: 带 * 的规格为 O 型金属端子的连接器。

Note 2: The specification of connector with * is O-type metal terminal.

注意 3: 以上连接器均属于 TS4 系列产品，天合承诺可互配对插。

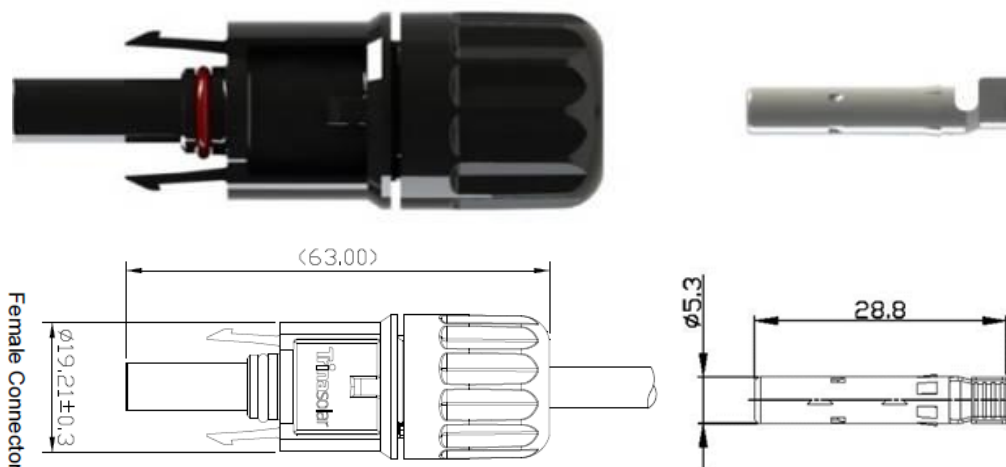
Note 3: The above connectors belong to the TS4 series products, Trinasolar promises that the TS4 series connectors are compatible with each other.

4. 连接器外观尺寸图 Connector Appearance Size Drawing

4.1 TS4 连接器 TS4 PV connector

4.1.1 正极连接器 Positive Connector

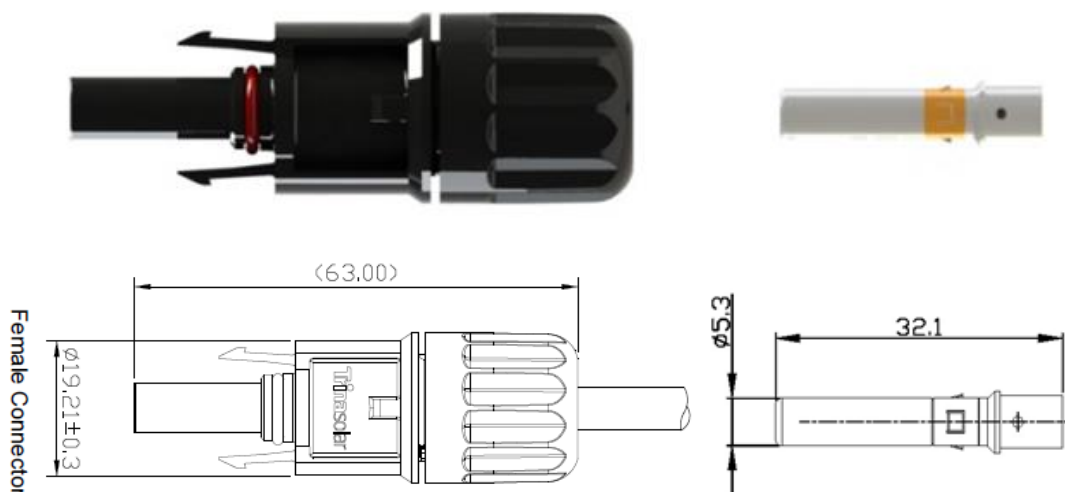
TS4-F1、TS4-F2、TS4-F3、TS4-F4、TS4-F9:



TS4-F5、TS4-F6、TS4-F7、TS4-F8:

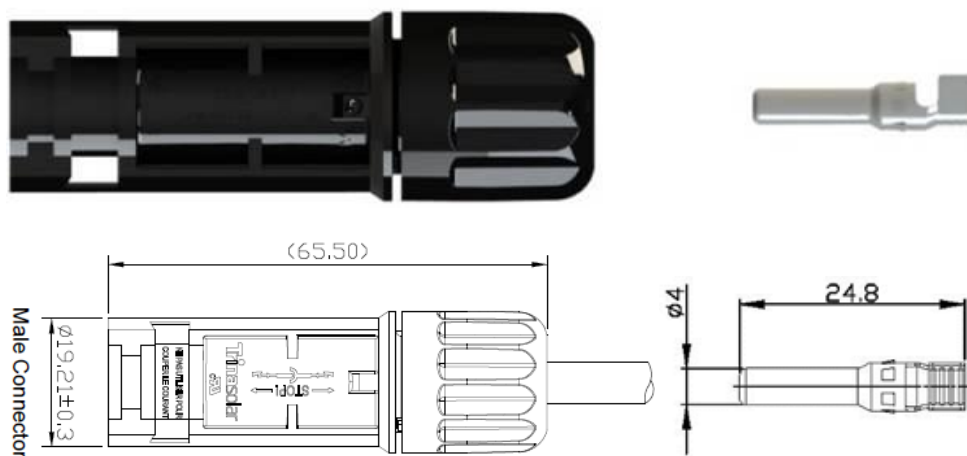
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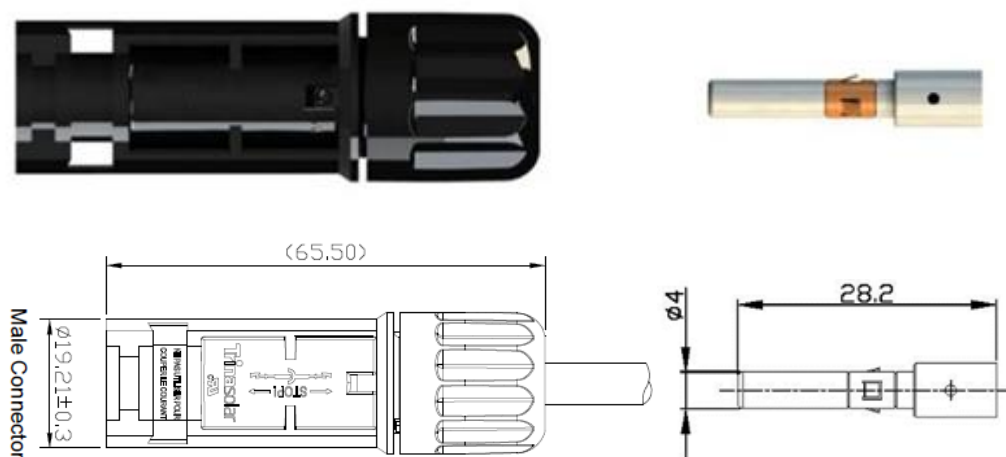


4.1.2 负极连接器 Negative Connector

TS4-M1、TS4-M2、TS4-M3 、TS4-M4、TS4-M9:



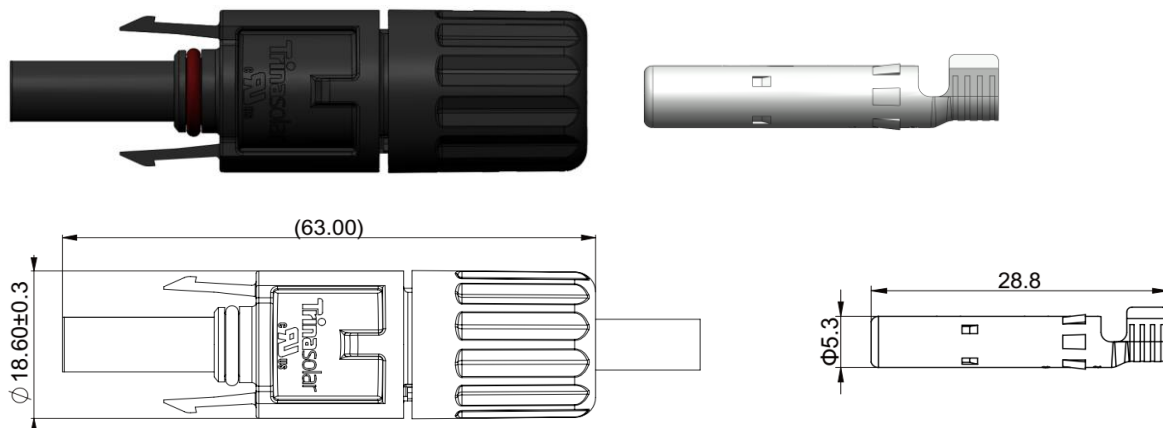
TS4-M5、TS4-M6、TS4-M7、TS4-M8:



4.2 TS4 Plus 连接器 TS4 Plus PV connector

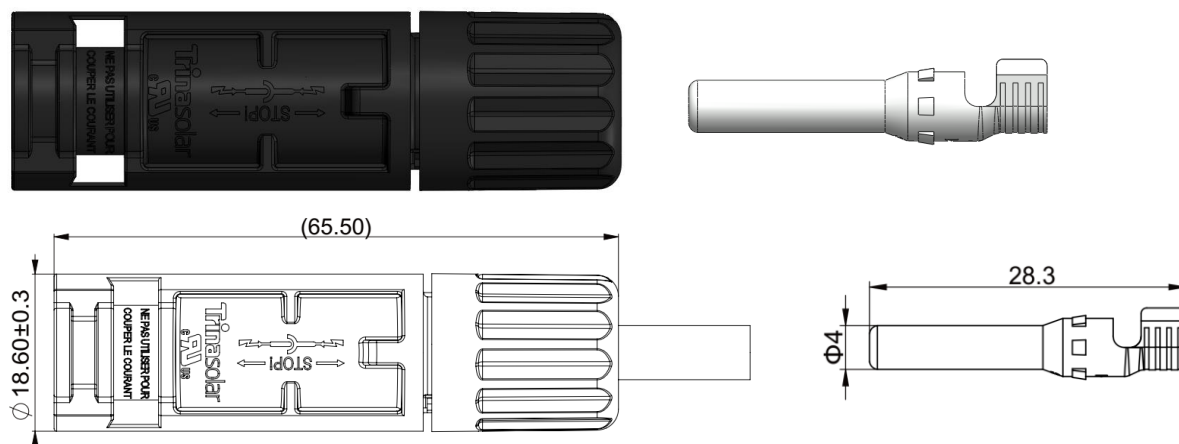
4.2.1 正极连接器 Positive Connector

TS4 Plus-F1、TS4 Plus-F2、TS4 Plus-F3



4.2.2 负极连接器 Negative Connector

TS4 Plus-M1、TS4 Plus-M2、TS4 Plus-M3



5. 安装 Installation

5.1 工具要求 Tools Requirements

5.1.1 剥线钳 Wire Stripper



7A001039



7A001037

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7A001039



7A001037

料号 P/N	钳口 Jaw	剥线范围 Crimping Range	
		7A001039	中间 Middle
	右边 Right side	6.0mm ²	10AWG
7A001037	右边 Right side	10.0mm ²	8AWG

5.1.2 铆接钳 Rivet Plier



7A001038




7A001036

料号 P/N	钳口 Jaw	铆接范围 Riveting Range		图片 Picture
		7A001038	中间 Middle	
	右边 Right side	6.0mm ²	10AWG	

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7A001036	可调	4	4.0mm ²	12AWG	
	Adjustable	6	6.0mm ²	10AWG	
		8	10.0mm ²	8AWG	


5.1.3 塑料扳手 Plastic Unlocking Spanner



1 套 set =2 片 pc, TS4 扳手料号 P/N: 7A001040, TS4 Plus 扳手料号 P/N: 7A004541

5.1.4 工具箱 Tool Box

对于 TS4 连接器 For TS4 Connector:


料号 P/N	剥线钳 Wire Stripper		铆接钳 Rivet Plier		TS4 塑料扳手 Unlocking Spanner	图片 Picture
	7A001039 数量 Qty.	7A001037 数量 Qty.	7A001038 数量 Qty.	7A001036 数量 Qty.	7A001040 数 量 Qty.	
7A001035	1pc	None	1pc	None	2pcs	
7A001034	None	1pc	None	1pc		
7A004329	1pc	None	None	1pc		

对于 TS4 Plus 连接器 For TS4 Plus Connector:

料号 P/N	剥线钳 Wire Stripper	铆接钳 Rivet Plier	TS4 Plus 塑料 扳手 Unlocking	图片 Picture

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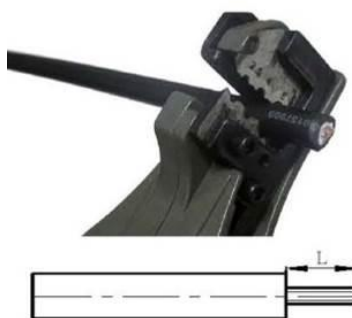
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					Spanner	
	7A001039 数量 Qty.	7A001037 数量 Qty.	7A001038 数量 Qty.	7A001036 数量 Qty.	7A004541 数 量 Qty.	
7A004675	1pc	None	1pc	None	2pcs	

5.2 组装步骤 Assembly Steps

组装连接器时，环境温度建议为-15~+35°C。For assembling of components we recommend an ambient temperature between -15~+35°C.

5.2.1 剥线 Stripping



剥离线缆塑料绝缘层。L=6±0.5mm。Strip the plastic insulating layer of cable. L=6±0.5mm.

注意： 不要切断和损坏线缆绝缘塑料下的铜丝线芯。**Note:** Please pay attention and do NOT cut off and damage the copper wire core under the cable insulating plastic.

5.2.2 放入插针插套 Inserting pin and socket



7A001038



7A001036

将金属端子（插针或插套）放在铆接工具孔内，铆接孔朝外，使金属端子的最外侧边缘

与铆接口齐平。钳口选择参照 5.1.2 章节。

Place the metal terminal (pin or socket) in the hole of the riveting tool. The riveting hole is facing out. The most outer edge of the metal terminal is flat with the riveting interface. Refer to chapter 5.1.2 for jaw selection.

5.2.3 铆接插针插套 Crimping pin and socket



将剥好线的线芯插入金属端子铆接孔内，需确保所有芯线都在孔内。保证金属件和线缆线的同轴度。最后按下铆接工具手柄，一直按到底，完成铆接。铜丝都要被包扎。

Insert stripped cable into the rivet hole of the metal terminal, and make sure all the individual strands are in the hole. Ensure the coaxially of metal parts and cables. Finally, press the riveting tool handle all the way and press it to the end to complete the riveting. All individual strands should be crimped.

对于 O 型金属端子使用的铆接钳（7A001036），需根据不同规格线缆，先调节钳口到相应的档位，调节旋钮高度使得金属端子的最外侧边缘与铆接口齐平。如下图。

For the crimping pliers (7A001036) used for O-type metal terminals, adjust the jaw to the corresponding gear according to different specifications of cables, and adjust the height of the knob so that the outermost edge of the metal terminal is flush with the riveting interface. See Below.



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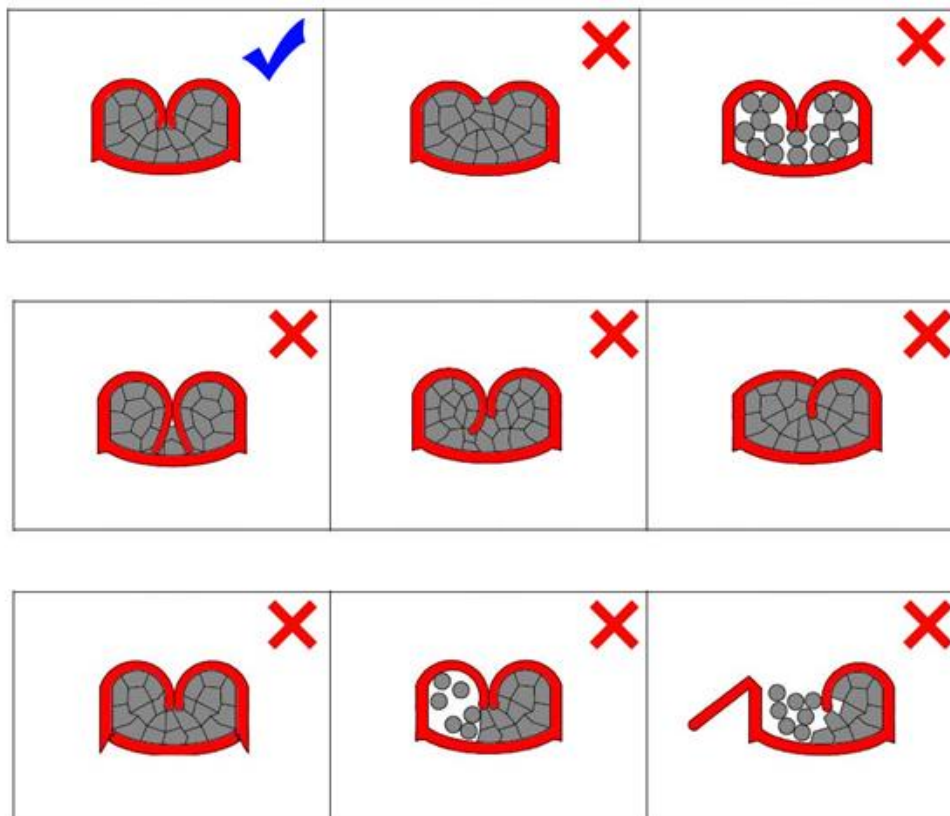


金属端子
Metal terminal

档位 Gear	线缆规格 Cable spec	连接器规格 Connector type
4	4.0mm ² /12AWG	TS4-F5/F7/F8
6	6.0mm ² /10AWG	TS4-M5/M7/M8
8	10.0mm ² /8AWG	TS4-F6 TS4-M6

铆接质量应满足 IEC62852 及以下要求。操作人员应使用符合要求的工具和方法进行铆接，不合格的铆接质量可能影响产品使用寿命。

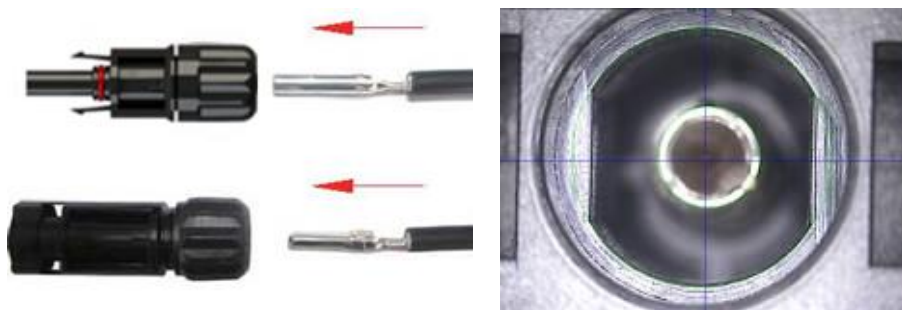
Qualified crimping samples must meet IEC 62852 and the following criteria. **Operators should use tools and methods that meet the requirements for riveting, as unqualified riveting quality may affect the products' service life.**



下方图例为铆接好的插针插套。The picture below are riveted pins and sockets.



5.2.4 插入 Pushing



将铆接好的金属端子插入正极或负极的塑料本体中，直至其啮合。轻轻拉动线缆，检查金属件是否啮合牢固。确认负极 pin 针和负极本体同轴。

Insert the riveted metal terminal into the plastic body of the positive or negative until it

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engages. Gently pull the cable to check whether the metal terminals are firmly engaged. Confirm that the negative pin is coaxial with the negative body.

注意: 在线缆及金属端子插入塑料本体前, 请勿拧开螺帽, 防止内部的密封件掉落或者方向装反。

Note: Before inserting the cable and metal terminal into the plastic body, do NOT unscrew the nut to prevent the internal seal from falling or installing in the opposite direction.

5.2.5 安装螺帽 Install the nut



先用手预拧紧, 再用塑料扳手旋紧线缆螺帽。First screw the nut by hands, then lock tightly by plastic spanner.

对于 TS4 连接器 For TS4 Connector:

型号 Type	线缆外径范围 Cable OD range	管控间隙 Control gap	参考扭力 Reference torque
TS4-F1/M1	4.7-6.0mm	0 < X < 1.0mm	3 ± 0.5 N*m
TS4-F2/M2	5.6-6.8mm		
TS4-F3/M3	6.0-6.6mm		
TS4-F4/M4	6.0-7.2mm		
TS4-F5/M5	7.2-8.7mm	1.0 < X ≤ 1.8mm	< 5 N*m
TS4-F6/M6			
TS4-F7/M7	6.6-7.2mm	0 < X ≤ 1.0mm	3 ± 0.5 N*m
TS4-F8/M8	5.6-6.6mm	0 < X < 1.0mm	
TS4-F9/M9	6.9-7.5mm	0 < X ≤ 1.0mm	

对于 TS4 Plus 连接器 For TS4 Plus Connector:

型号 Type	线缆外径范围 Cable OD range	管控间隙 Control gap	参考扭力 Reference torque

TS4 Plus-F1/M1	4.7-6.0mm	0<X<1.0mm	3±0.5 N*m
TS4 Plus-F2/M2	5.6-6.8mm		
TS4 Plus-F3/M4	6.0-7.2mm		

管控间隙示意参照下图。

Refer to the following figure for the Control gap.



注意 1: 锁紧螺帽时，需保证线缆线与螺帽同心。

Note 1: Ensure the concentricity of cable and cable nut when you screw cable nut.

注意 2: 须确认负极 pin 针和负极本体同轴，再锁紧螺帽。

Note 2: Make sure the negative pin and the negative body are coaxial and then lock the nut.

注意 3: 螺帽锁紧时需严格控制间隙 X 值。当线缆的外径偏向下限时，管控间隙应偏向控制值下限；反之，则偏向控制值上限。

Note 3: When the nut is locked, the clearance X value shall be strictly controlled. When the OD of the cable deviates to the lower limit, the control gap shall deviate to the lower limit of the control value; On the contrary, it is biased to the upper limit of the control value.

6. 连接器对插及解锁 Connecting and Disconnecting

6.1 连接器对插 Connecting



将连接器正负极对插，直到啮合。轻轻拉动，以检查是否啮合牢固。。

Plug the coupling together until they engage. And pull lightly to check correct engagement.

6.2 连接器解锁 Disconnecting



连接器正负极对插连接后，只能使用TS4塑料板手(7A001040)或TS4 Plus塑料板手(7A004541)解锁。

The negative and positive terminals of the connectors must be unlocked with the TS4 plastic spanner (part# 7A001040) or TS4 Plus plastic spanner (part# 7A004541).

7. 线缆 Cable

7.1 线缆接线 Connection of Cable

线缆根部建议保留至少 20mm 未折弯长度，以免因线缆折弯产生的外力引起连接器密封件变形。

In order to avoid deformation of the cable sealing element from that a force generated by the bending the wires, the cable should have at least 20mm straight length nearest to the connector.

See figures below.



Wrong way for the cable



Right way for the cable

注意： 请参考线缆生产商的最小弯曲半径的详细要求。

Note: Please refer to the detailed instructions on the minimum bend radius specified by the cable manufacturer.

7.2 接合状态 Connection Status

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8. 天合光能服务网点 Trina Solar Service Point

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可以在 <http://www.trinasolar.com/cn/>上查看、下载和打印相应的说明书。

Please visit the Trina Solar site for viewing, downloading, and printing these instructions at

<http://www.trinasolar.com>

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变更履历		
版本	变更内容	受控日期
A	初版	2019.05.21
B	更新描述	2019.07.03
C	更新描述	2019.09.06
D	更新料号及英文说明	2020.04.20
E	增加料号及工具使用说明	2021.08.10
F	增加 TS4 Plus	2021.09.16
G	增加 TS4 Plus 新包装	2024.06.24