



TTS2 series mechanical safety switch



Functional features

The TTS2 safety switch uses a key, roller plunger, ball plunger, hinged trigger block installed at the opening of the switch body to detect the movement of the protective door. It has the characteristics of compact and light size, diversified contact configuration and diversified trigger structure.

TTS2 series safety switch model description

TTS2	A	—	2C
TTS2 series safety switch	Trigger mode A: Ballplunger B: Rollerplunger C08: Ø8mm hinge C10: Ø10mm hinge	D: Key E: Rocke F: Rollerrocker	Contactform 1C: 1N.C 2C: 2N.C 1C10: 1N.C/1N.O

Product selection guide

Trigger mode	Specification	Model	Ordernumber
Ball plunger	2NC	TTS2A-2C	LOT792529102
	1NC/1NO	TTS2A-1C10	LOT792529111
	1NC	TTS2A-1C	LOT792529101
Roller plunger	2NC	TTS2B-2C	LOT852529202
	1NC/1NO	TTS2B-1C10	LOT852529211
	1NC	TTS2B-1C	LOT852529201
Hinge	2NC	TTS2C08-2C	LOT872529382
		TTS2C10-2C	LOT872529482
	1NC/1NO	TTS2C08-1C10	LOT872529381
		TTS2C10-1C10	LOT872529481
	1NC	TTS2C08-1C	LOT872529301
TTS2C10-1C	LOT872529401		
key	2NC	TTS2D-2C	LOT862529502
	1NC/1NO	TTS2D-1C10	LOT862529511
	1NC	TTS2D-1C	LOT862529501
Rocker	2NC	TTS2E-2C	LOT862529602
	1NC/1NO	TTS2E-1C10	LOT862529611
	1NC	TTS2E-1C	LOT862529601
Roller rocker	2NC	TTS2F-2C	LOT862529702
	1NC/1NO	TTS2F-1C10	LOT862529711
	1NC	TTS2F-1C	LOT862529701
Accessories	Flexible key	TTS2-K1	LOT10205K1
	Straight key	TTS2-K2※	LOT10205K2
	Bend the key	TTS2-K3	LOT10205K3
	Hinge	TTS2-H1	LOT10205H1
	TTS2 guide	TTS2-G1	LOT10205G1
	M16×1.5 nylon waterproof joint	WJ-16015	LOTWJ16015

※TTS2D mechanical switch shipped with standard TTS2-K2 keys, other keys need to be purchased additional.

Technical parameters

Security level	
Standard	EN60947-5-1/GB/T14048.5
Security classification	The dual-channel E-lock is suitable for either Class 3 or Class 4 systems
B10D	A million times
Authentication	CE CCC(CQC)
Mechanical life	More than a million times
Electrical life	More than a million times
Electrical characteristics	
Rated insulation withstand voltage(Ui)	300V
Protection against electric shock	Class II (Double insulation)
Pollution degree (use environment)	3 (EN60947-5-1)
Impulse withstand voltage (EN60947-5-1)	2.5kV
Contact contact resistance	Below 25mΩ
Insulation resistance	More than 100mΩ
Rated open heating current (Ith)	10A
Conditional short-circuit current	100A
Contact spacing	2.5mm
Operating characteristics	
Minimum power	15N
Maximum execution speed	160mm/s

Maximum execution frequency	2 cycles/sec	
Minimum switching house current at a specific voltage	5mA@5VDC	
Contact type		
Safety contacts	2-way NC	1-wayNC
Auxiliary contacts	1-wayNO	-
Usage type		
Load category	AC-15	DC-13
Rated operating voltage	230V	24V
Rated operating current	4A	4A
Environment		
Enclosure rating	Ip67	
Operating temperature	-20~+80°C	
Usage environment	Below 95%	
Vibration resistant	10~55Hz unilateral amplitude 0.75mm	
Stamping resistant	300m/s ²	
Material		
weight	About 200g	
Housing material	UL certified thermoplastics	
Actuator material	SUS304	

Contact specification

2N.C



Off — 11
— 12 — On

Off — 21
— 22 — On

Trigger state
Free state

Freecontactposition



1N.C/1N.O



Off — 11
— 12 — On

On — 21
— 22 — Off

Trigger state
Free state

Freecontactposition



1N.C



Off — 11
— 12 — On

Off — 21
— 22 — On

Trigger state
Free state

Freecontactposition

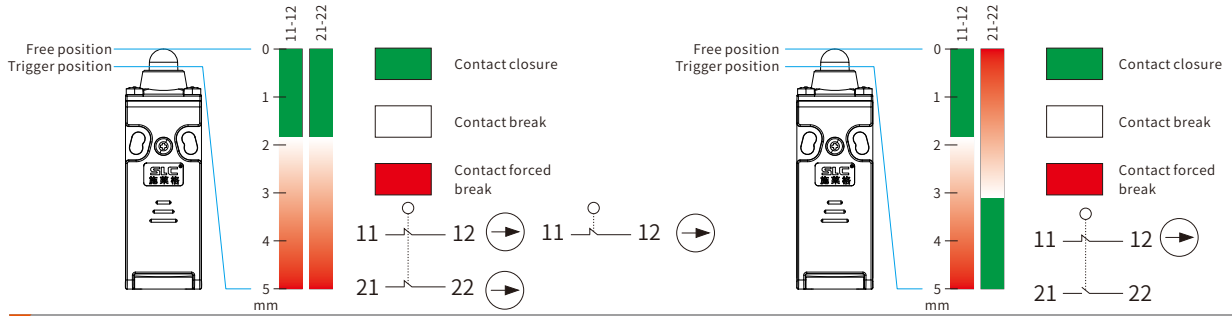


Force disconnect,force disconnect contact

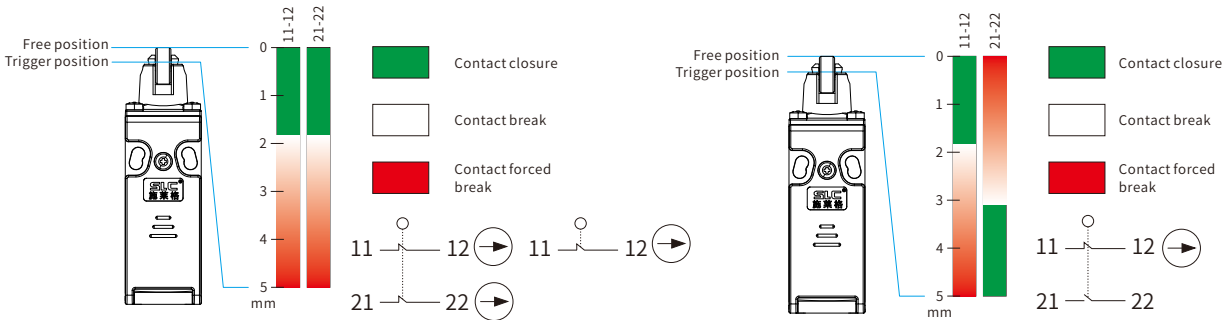
Forced disconnection means that contact separation is achieved through the forced movement of the executing element (trigger element). A switching contact with this switching characteristic is called a forced break contact. The forced break contact is normally closed contact, marked by the (⊕) symbol. In addition, switches with a forced disconnect function must meet the requirements of Appendix K of standard EN 60947-5-1.

Toggle state travel chart

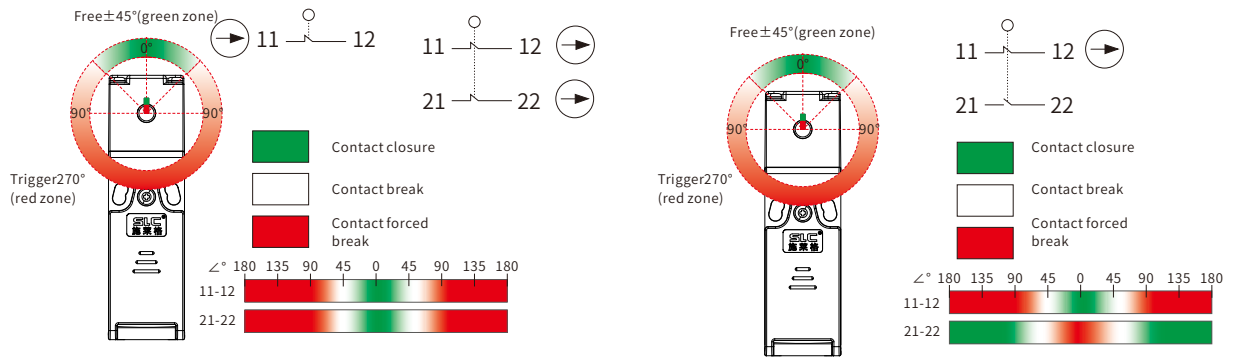
TTS2A (spherical plunger) contact travel diagram



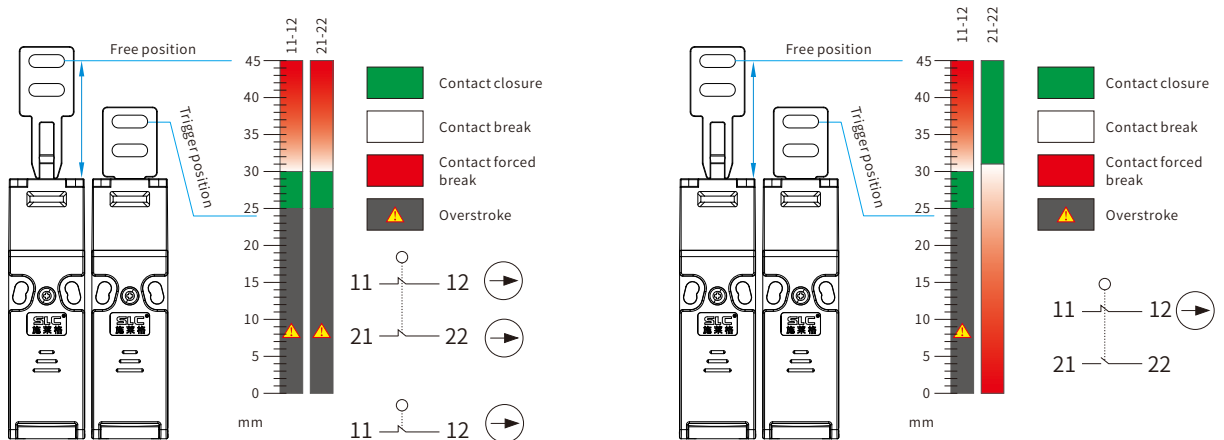
TTS2B (roller plunger) contact travel diagram



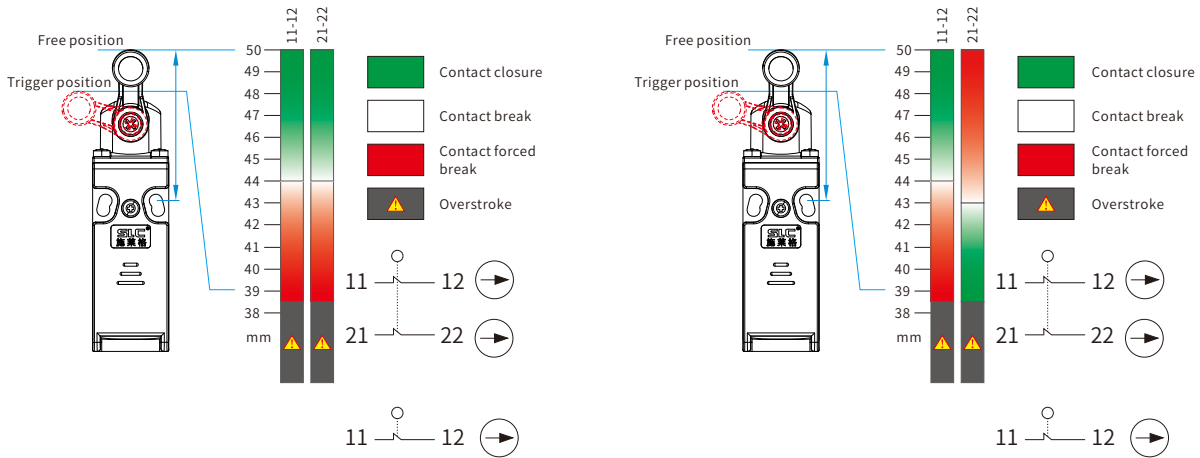
TTS2C (hinge) contact travel diagram



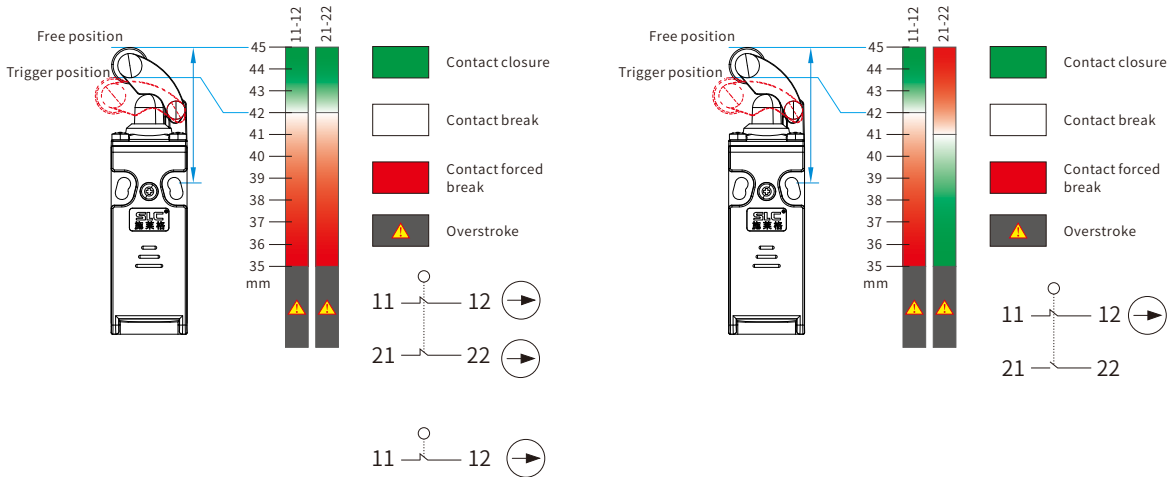
TTS2D (key) contact travel diagram



TTS2E (Rocker) contact travel diagram



TTS2F (roller remote sensing) contact travel diagram



> The status of the contact is closed or disconnected

For detailed switching status of the product, please refer to the status switching related content.

When the drive element (trigger element) is in a free position, the safety contact \ominus is closed ;

When the drive element (trigger element) is in the trigger position, the safety contact $\omin�$ is disconnected;

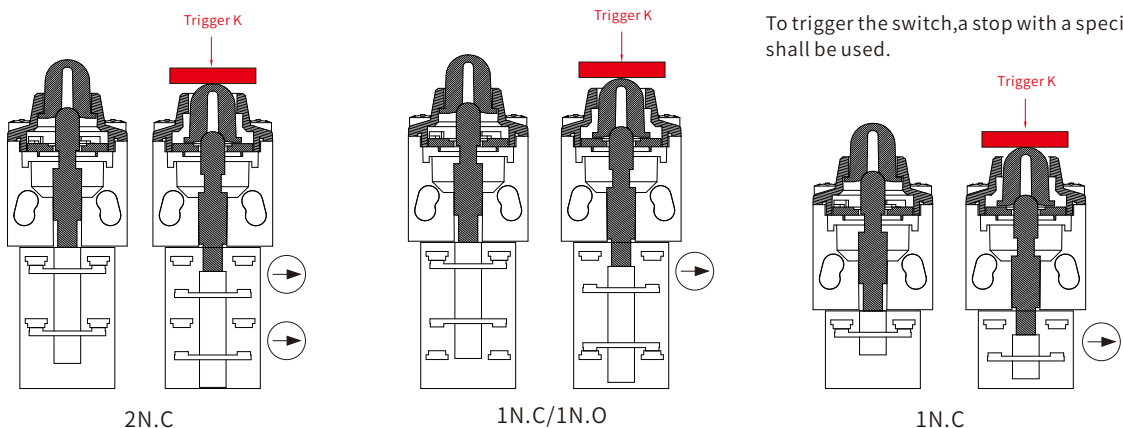
Feature description

The safety switch monitors the position of the movable safety guard.

When the drive element moves from the actuating position to the free position, the safety contact $\omin�$ is triggered. During this process, the safety contact has been completely disconnected.

※Keyplug type,contact closure and disconnection relationship is opposite to the above.

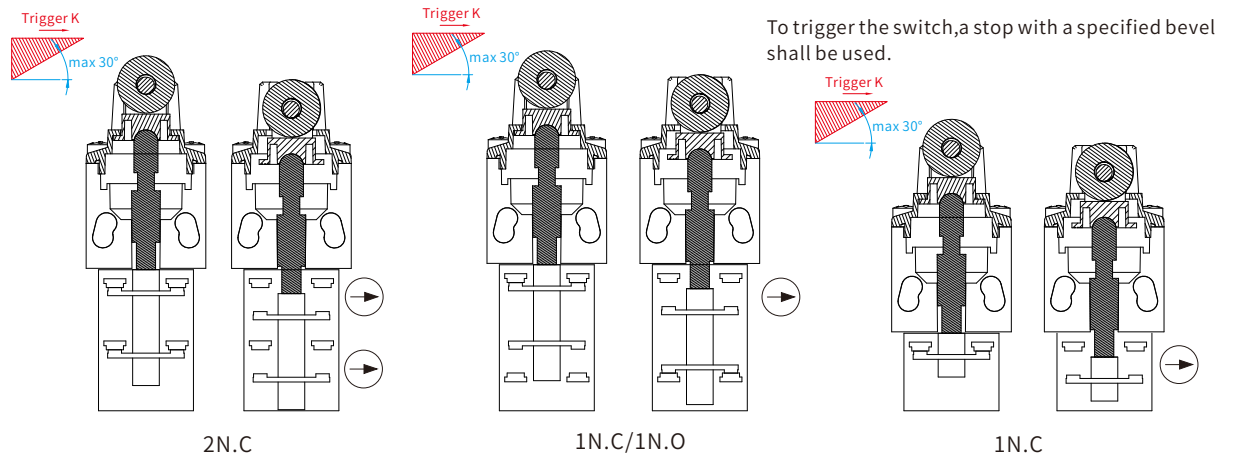
TTS2A (ball plunger) contact trigger



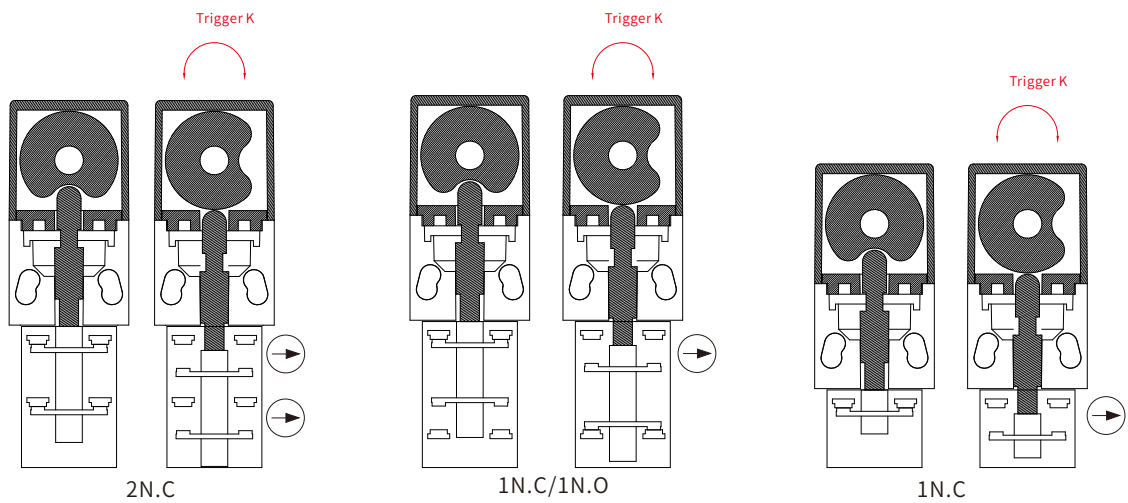
To trigger the switch,a stop with a specified bevel shall be used.

TTS2 SERIES MECHANICAL SAFETY SWITCH

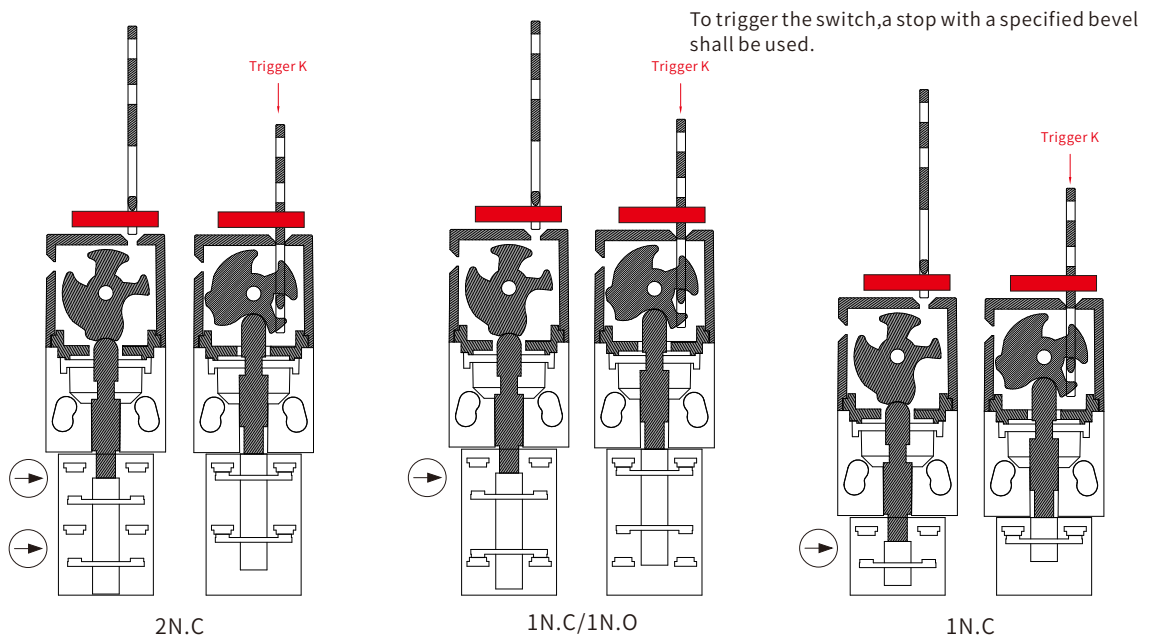
TTS2B (roller plunger) contact trigger



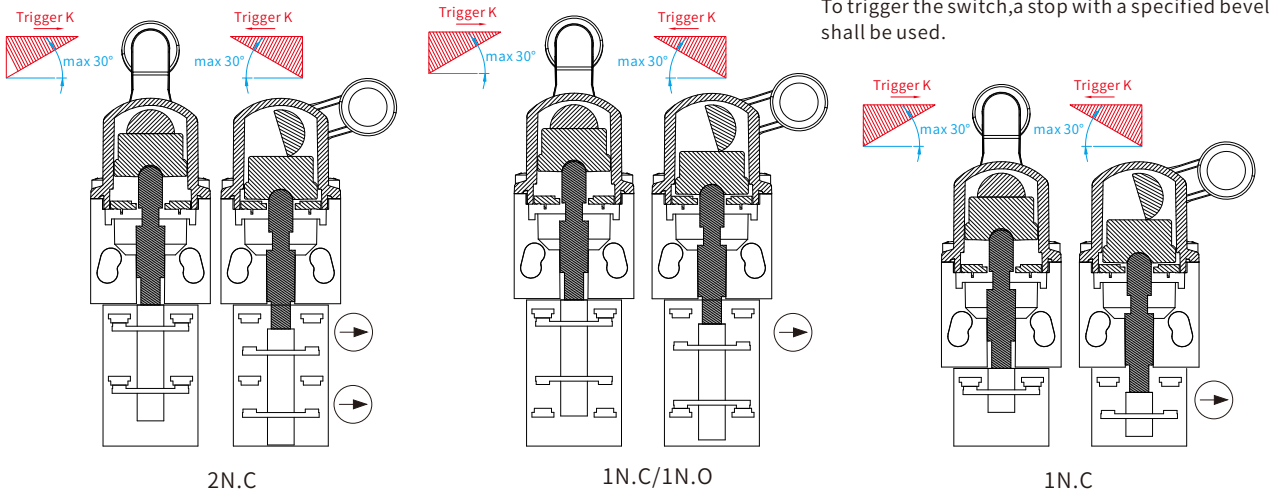
TTS2C (hinge) contact trigger



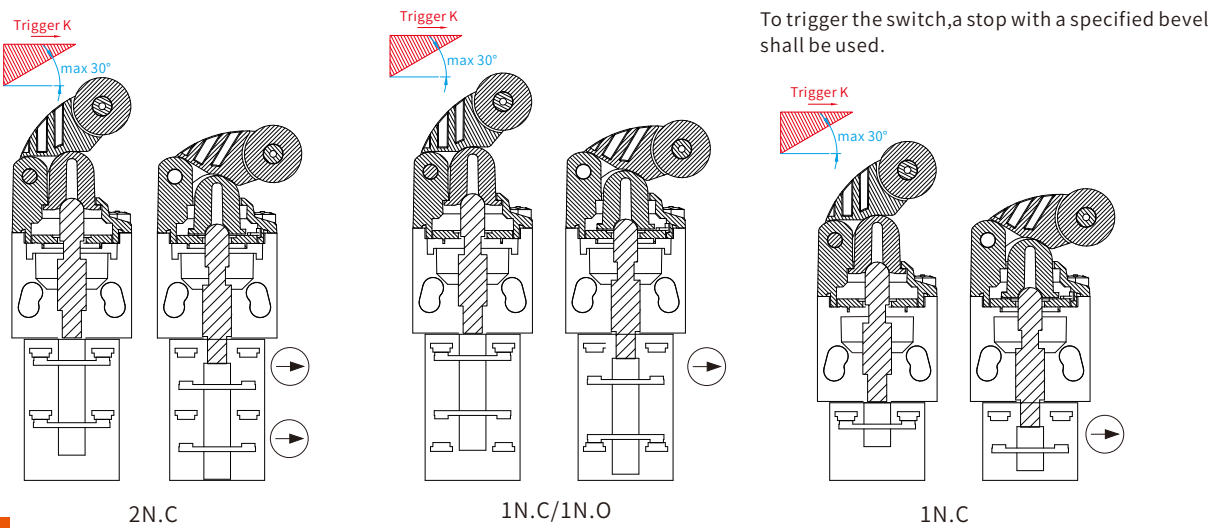
TTS2D (key) contact trigger



TTS2E (Rocker) contact trigger

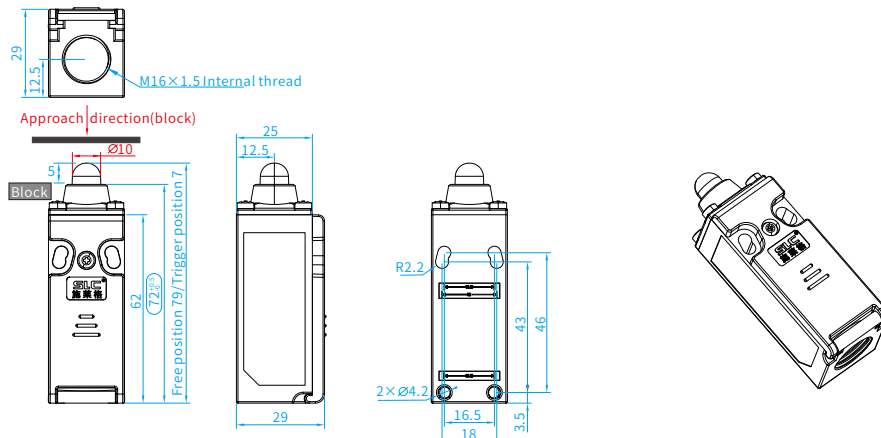


TTS2F (roller Rocker) contact trigger



Product sizedrawing (mm)

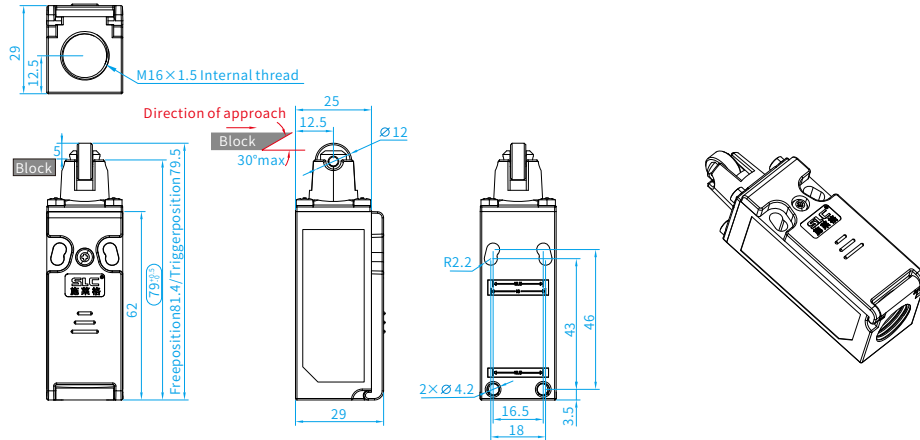
TTS2A (Ball plunger) Safety switch Size



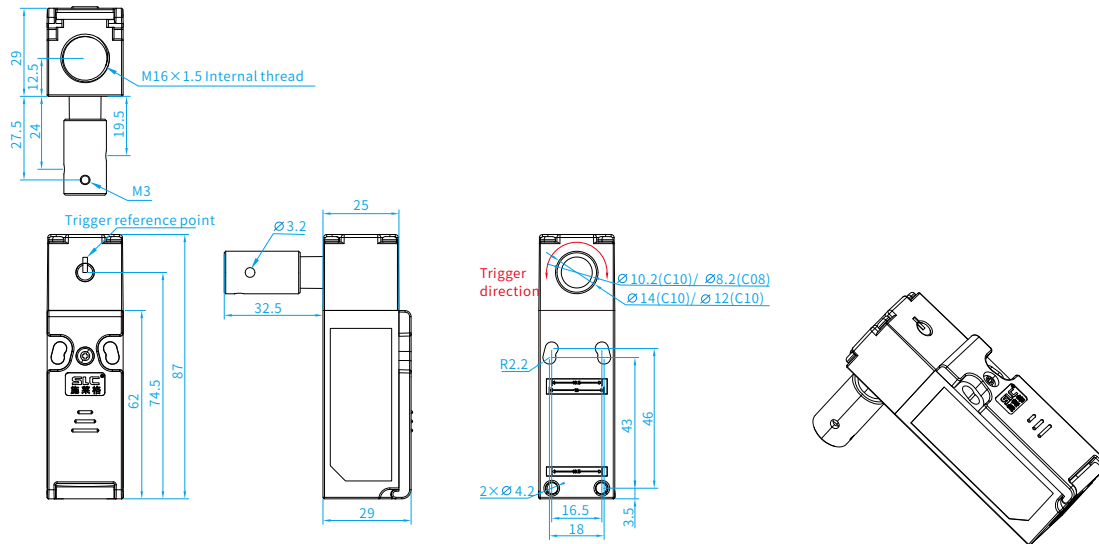
※When the rubber buffer is used as the block of the protective door, the permanent pressure of the rubber buffer squeezed together can be reduced. Thus, the load on the opening juncture and the mechanical structure of the door can be relieved.
 ※Subject to product configuration and manufacturing process, the actual size and weight of the product may be different. Please refer to the actual product.

TTS2 SERIES MECHANICAL SAFETY SWITCH

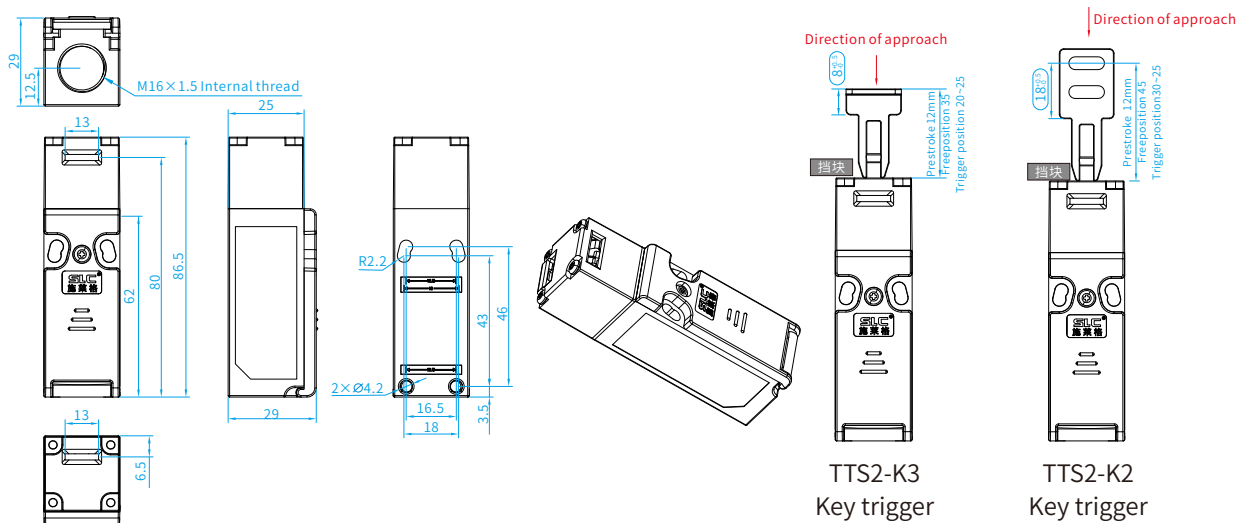
TTS2B (Roller Plunger) Safety switch Size



TTS2C (Hinge) Safety switch Size

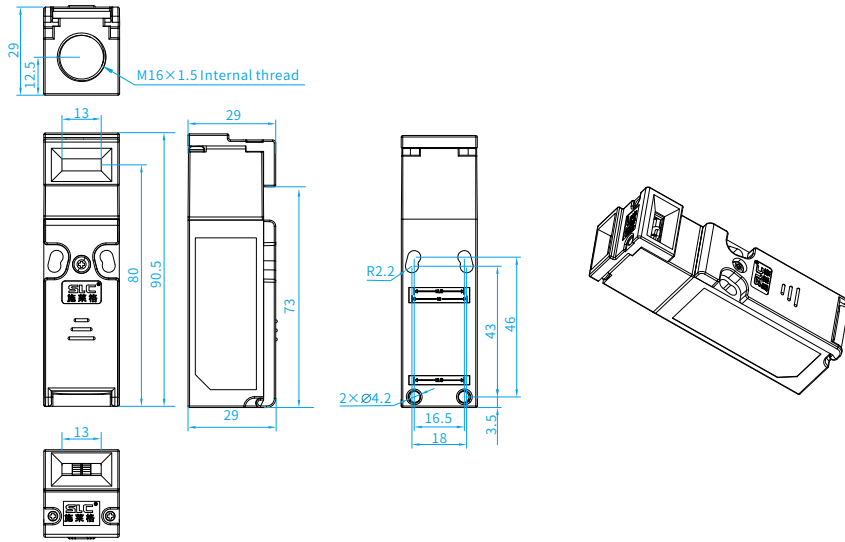


TTS2D (Key) Safety switch Size (NoGuide)

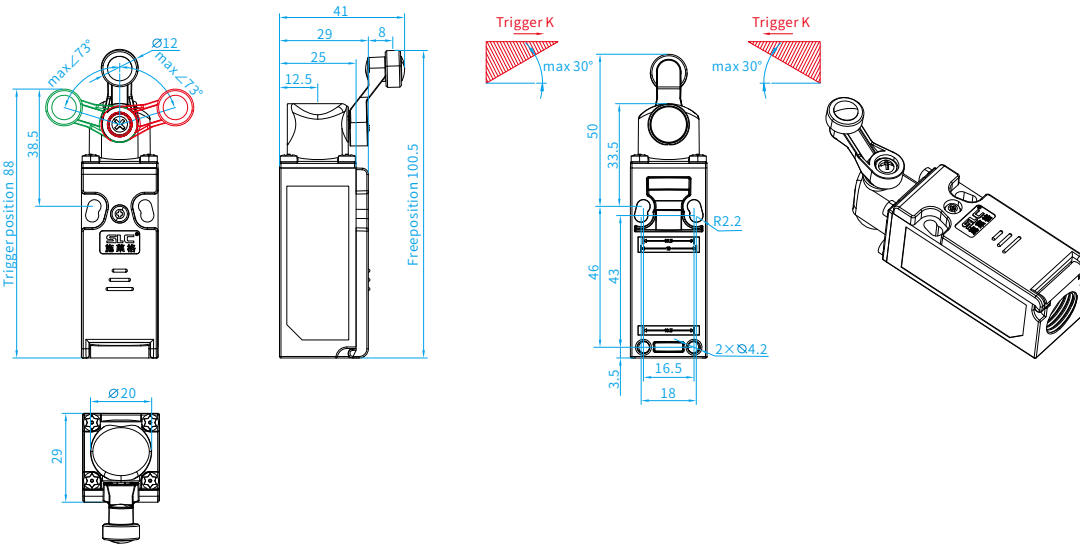


※When the rubber buffer is used as the block of the protective door, the permanent pressure of the rubber buffer squeezed together can be reduced. Thus, the load on the opening juncture and the mechanical structure of the door can be relieved.
 ※Subject to product configuration and manufacturing process, the actual size and weight of the product may be different. Please refer to the actual product.

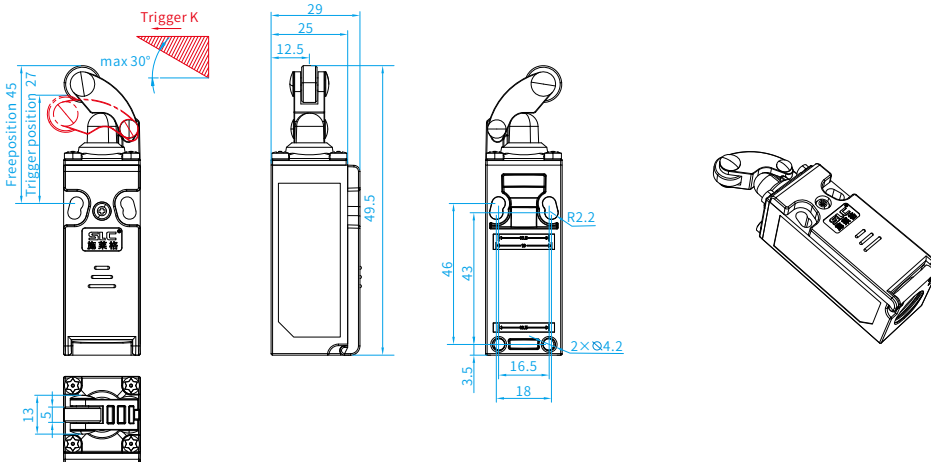
TTS2D(key)safety switch size (with guide)



TTS2E(rocker)safety switch dimensions



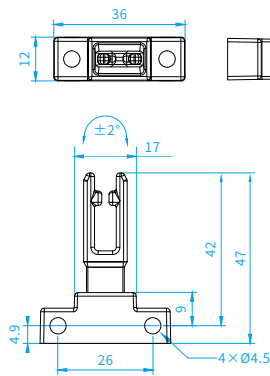
TTS2F(roller rocker)safety switch size



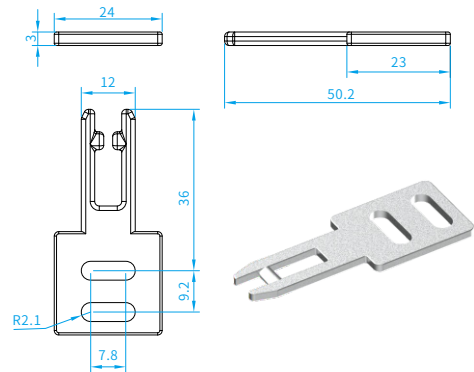
※When the rubber buffer is used as the block of the protective door,the permanent pressure of the rubber buffer squeezed together can be reduced.Thus,the load on the opening juncture and the mechanical structure of the door can be relieved.

※Subject to product configuration and manufacturing process,the actual size and weight of the product may be different.Please refer to the actual product.

TTS2-K1 key dimensions

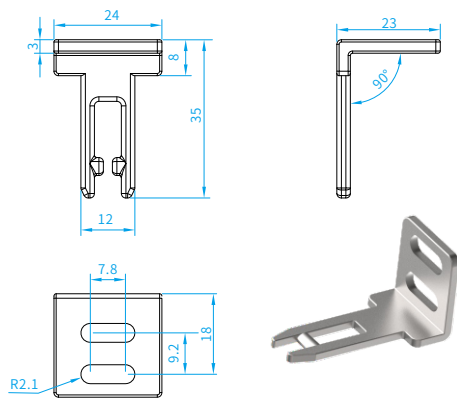


TTS2-K2 key dimensions

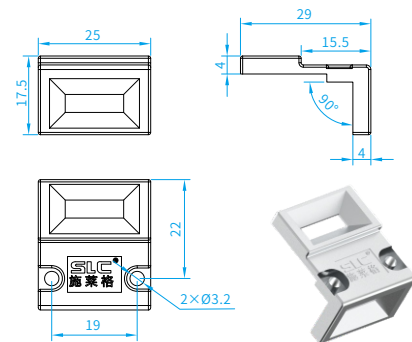


※Only the TTS2D mechanical opening model needs to be used with TTS2-K1 and TTS2-K2 keys.

TTS2-K3 key dimensions



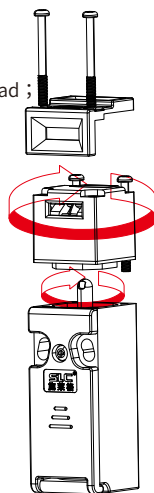
TTS2-G1 guide dimensions



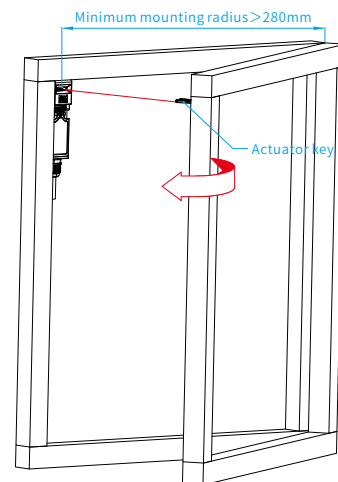
※Only the TTS2D mechanical opening model needs to be used with TTS2-G1 guide.

TTS2-G1 guide installation procedure

1. Remove the four screws from the operating head ;
2. Set rotation operation head direction ;
3. Fix the screw removed in the first step to two positions behind the executing head and tighten the screw to a torque of 0.6Nm;
4. Fix the guide to the actuator head with the two screws of the guide fittings and tighten the screws to a torque of 0.6Nm;



Revolving door installation dimensions

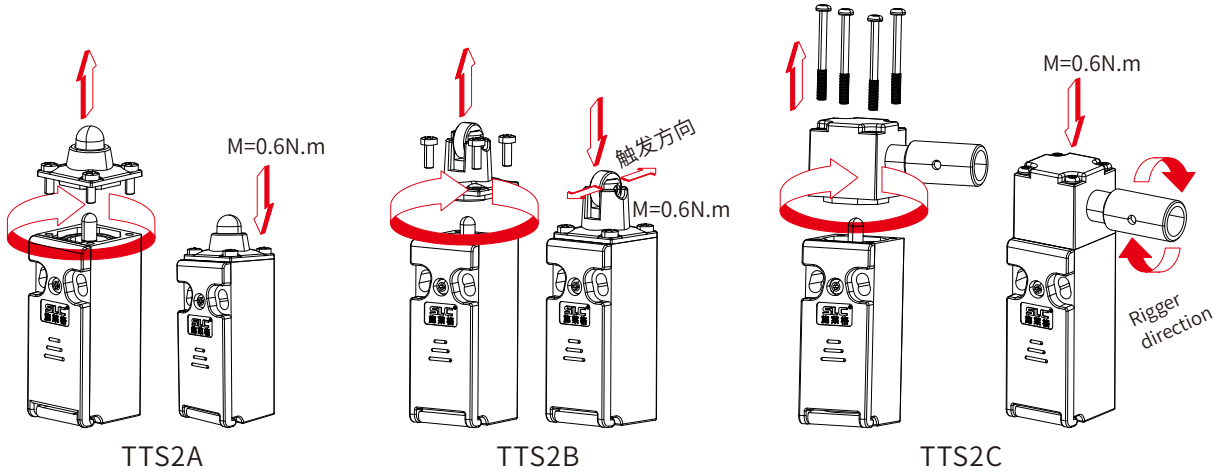


The minimum installation radius is measured from the center of the actuator (actuation key) insert of the safety switch (safety interlock) to the center of the revolving door rotary axis.

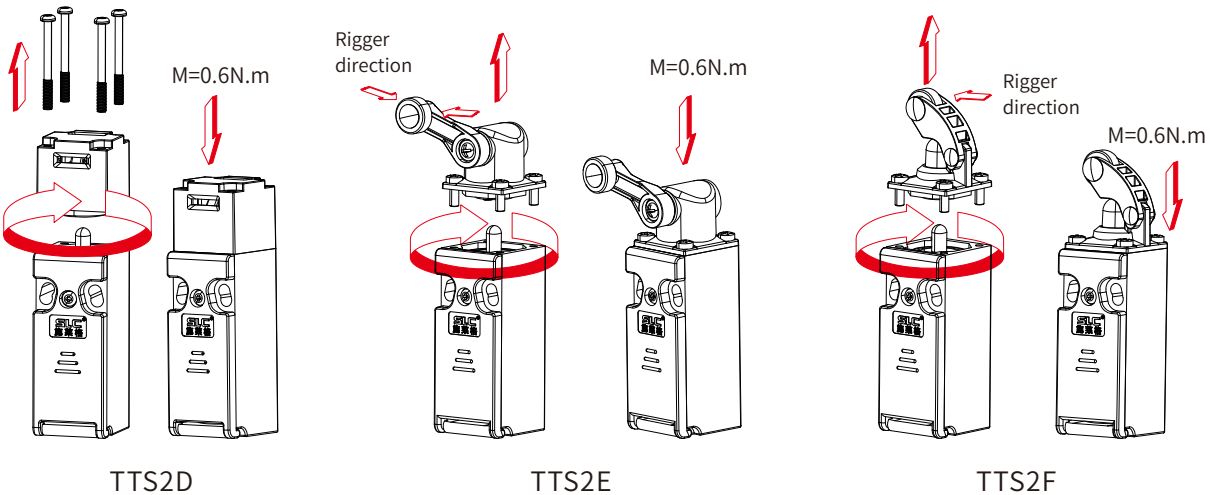
Installation and use

Installation electrical connection, and setup must be performed by authorized personnel with expertise in handling safety components.

Change direction of operation

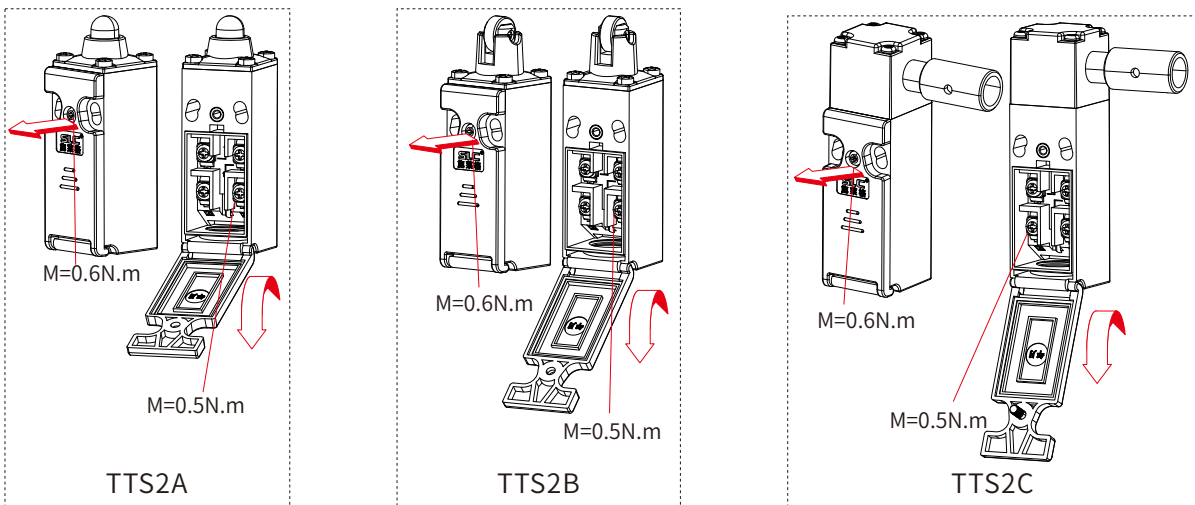


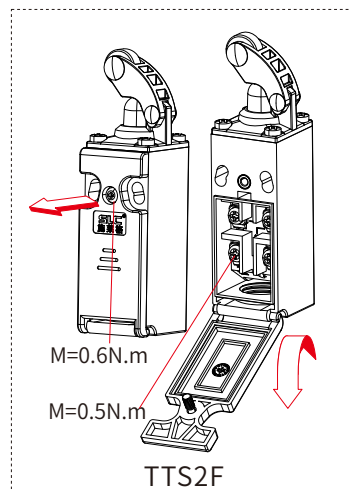
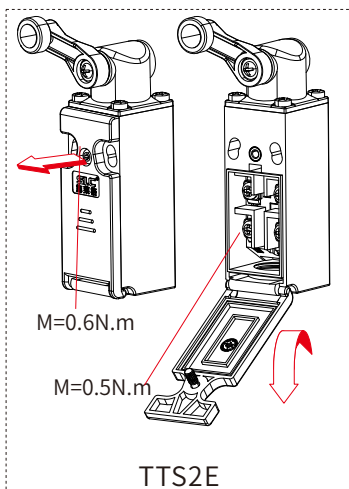
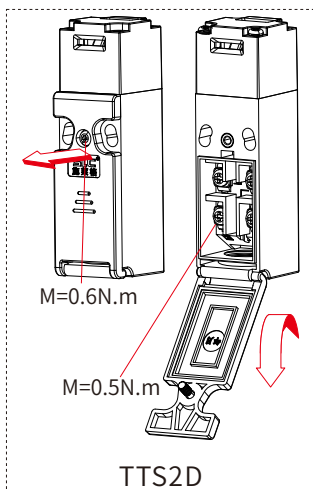
1. Removed from the operating head screw, adjust the operating direction; 2. Screw down the screws, torque is 0.6 Nm.




1. Remove the screws from the operating head and adjust the direction of operation;
 2. Set the rotating operating head and set the required direction (TTS2D key Safety switch push rod synchronous rotation);
 3. Tighten the screws to a torque of 0.6Nm.



Electrical connection



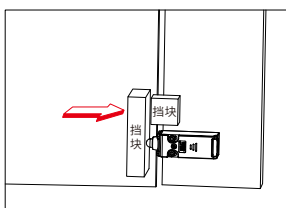


The following information applies only to products with cable entry:

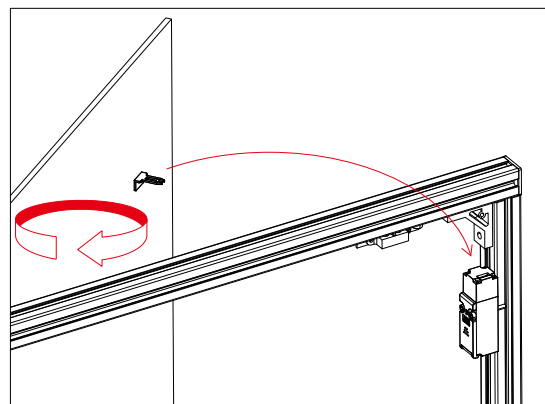
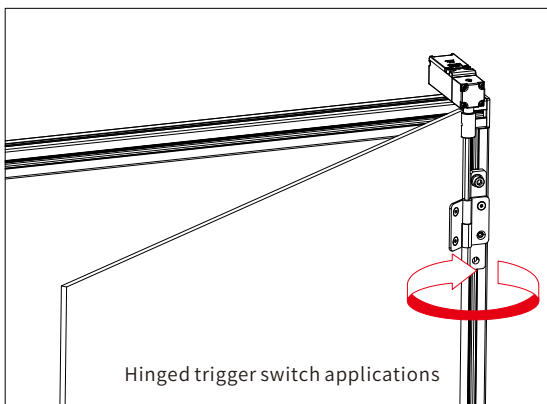
1. Open the Safety switch shell;
2. When the Safety switch is used as the interlock device for personnel protection, at least one safety contact () must be used. Please refer to the contact description for safety terminal distribution;
3. With 0.5 Nm torque connection and screw down the screw terminal
4. Check whether the cable inlet is sealed;
5. Close the switch cover and screw in place (tightening torque 0.6Nm);

 Warn	<ul style="list-style-type: none"> ◆ Incorrect connections can result in loss of security feature ◆ Safe contact () only Provides secure connection functions
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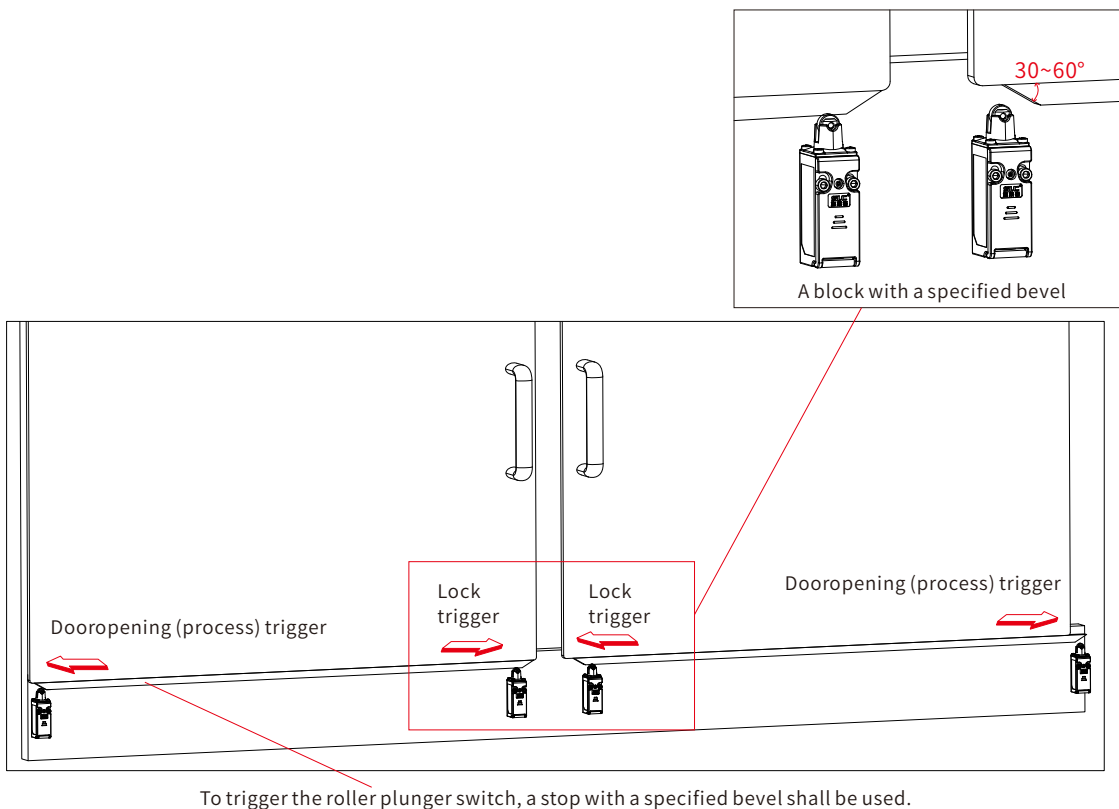
Typical application example



In order to trigger the spherical plunger switch, a stop or CAM limit should be used, and the lock body cannot replace the stop.



When the key is inserted and removed, the stop block or CAM limit should be used. The lock body cannot replace the stop block.



To trigger the roller plunger switch, a stop with a specified bevel shall be used.

The above installation requires mechanical fixation and must avoid self-release. In addition, you must ensure that the cams and stoppers are only installed in the correct position. To prevent changes to the switch, Safety screws can also be used when installing the Safety switch and stoppers.

Correct use

TTS2 Series Safety switch is an interlocking device with unprotected locking (with safety function). The actuator is not coded (e.g. electronic dog, RFID, etc.). Used in conjunction with removable safety guards and machine controls, this safety part prevents dangerous machine functions when the safety guards are opened. If the safety guard is opened during the hazardous machine function, the stop command is triggered.

This means that:

- ▶ Start commands that cause dangerous host functions can only be started when the safety guard is turned off.
- ▶ Opening the safety guard will trigger the stop command.
- ▶ Closing the safety guard shall not result in automatic activation of the dangerous machine function. A separate startup command must be issued. About the exceptions, please see EN ISO 12100 or equivalent C standard.
- ▶ TTS2 series products can be used as secure position encoders.

Before using TTS2 series products, the following standards must be met for risk assessment of the machine:

- ▶ EN ISO 13849-1, Safety of machinery - Safety-related components of control systems – Part 1: General principles for design;
- ▶ EN ISO 12100, Safety of machinery – General principles of design – Risk assessment and risk reduction;
- ▶ EC62061, Safety of machinery – Safety – Functional safety of safety-related electrical, electronic and programmable electronic control systems.

Proper use includes compliance with the relevant requirements for installation and operation, especially based on the following standards:

- ▶ EN ISO 13849-1, Safety of machinery - Safety-related components of control systems – Part 1: General principles for design.
- ▶ EN ISO 14119, Mechanical safety. Interlocking devices associated with protective devices. Design and selection principles.
- ▶ EN 60204-1, Safety of machinery – mechanical and electrical equipment.

Important note:

- ▶ The user is responsible for properly integrating the device into a secure overall system. Therefore, you must verify the whole system, such as in accordance with the requirements of EN ISO 13849-2 set electronic dog.
- ▶ If you use EN ISO 13849-1:2015 simplified methods to determine the performance levels of section 6.3 (PL), if multiple devices in series, the PL may be reduced.
- ▶ In some cases, the logical series of safety contacts can reach PLd. For more information on this issue, please see the ISO TR 24119.
- ▶ If a product data sheet is shipped with the product, the information on the data sheet applies to situations that are inconsistent with the operating instructions.

Functional test

After installation and after each failure, check that the device is functioning correctly.

Follow these steps:


▶ Mechanical function test

The actuator must be easy to move and close the safety guard several times to check the function.

▶ Electrical function test

1. Turn on the power supply;
2. Turn off all safety protection devices. The machine must not start automatically;
3. Enable machine functions;
4. Open the safety protection device. The machine must be turned off. As long as the safety guard is on, the machine cannot start.


Repeat steps 2 to 4 for each safety guard.

 Warn	<ul style="list-style-type: none"> ◆ A fault may cause fatal injuries during a function test. Before performing a function test, ensure that no one is in the danger zone. ◆ Please follow effective accident prevention rules.
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Inspection and maintenance


The following must be checked to ensure long-term trouble-free operation:

- ▶ Correct switching function;
- ▶ Correct installation;
- ▶ All parts are free from damage, serious pollution and dirt;
- ▶ Cable inlet is worn and sealed;
- ▶ The cable connection is moved or the plug connector is loose.

 Warn	<p>Loss of safety features, risk of serious injury</p> <ul style="list-style-type: none"> ◆ If damage or wear is found, the entire switch must be replaced. Replacement of individual parts or assemblies is not allowed. ◆ After each failure, periodically check whether the equipment is working properly. <p>Please refer to the relevant inspection frequency EN ISO14119:2013, section 8.2.</p>
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Installation precautions

- ▶ Improper installation and improper environment may cause device damage.
- ▶ Safety switch and actuator must not be used as end stop.
- ▶ Information on Fastening Safety switch and brakes, please comply EN ISO14119: 2013 Sections 5.2 and 5.3.
- ▶ Please comply EN ISO14119:2013 section 7, learn information about bypass interlocking reduction possibility.
- ▶ Protect the opening and prevent damage.
- ▶ The stopper (end stop) must be installed in size $\varnothing 79^{+0.5}$

 Warn	<p>Life-threatening due to improper installation or bypass (tampering).</p> <ul style="list-style-type: none"> ◆ Safety components have personal protection functions. Safety components may not be circumvented, turned off, removed or otherwise rendered invalid. ◆ A special reminder about this content, please refer to EN ISO 14119:2013 Section 7 Measures to reduce the possibility of bypass.
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