



TRL2 Series Safety Door Lock



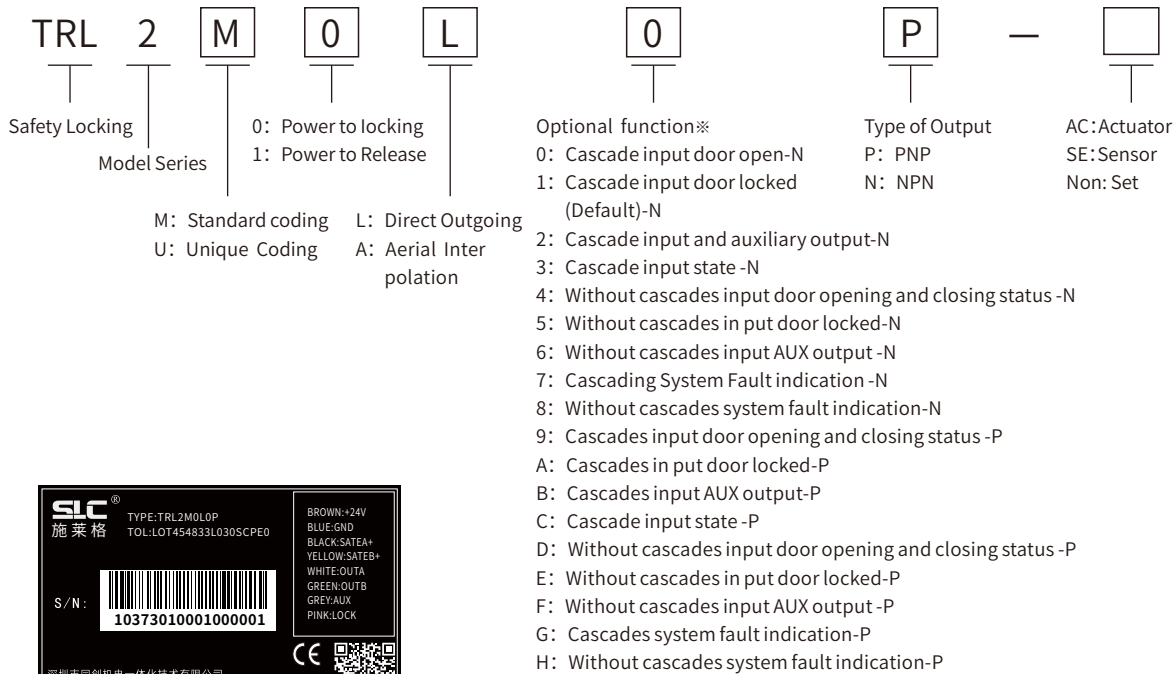
TRL2 Series safety lock features

The TRL2 series safety locks are based on RFID radio frequency induction coding technology and use a monitored stainless steel bolt lock structure for protective devices involving the safety of people or machines. Built-in powerful energy storage with bistable solenoid drive deadbolt, extremely low power consumption. Safety class SIL3 or PLe can be achieved with safety dual output technology, which can be used with safety latches.

TRL2 Technical parameters

Safety Level	
Standards	ISO 13849-1 IEC/EN60947-5-3
Safety classification	Class 4L switch/SIL3 dual interlock according to ISO 13849-1 is suitable for PLe/PLd
Certificate	CE CQC
Protect	
◇ Safety short-circuit protection	◇ Overheat protection stops and restarts
◇ Current limit	◇ Reverse polarity protection
◇ Overload protection	◇ Transient noise protection
◇ Over Voltage Protection	◇ Failure pulse protection
Output	
Security output	2 way Redundant PNP or NPN output (Self diagnostic test pulse)
AUX output	1 way PNP or NPN output (door close / door lock / auxiliary output fault indication)
Technical parameter	
Insertion depth of locking bolt	Min.: 5mm Max.: 10mm
Insertion deviation of locking bolt	Max.: 2mm
Locking Retention	1300N 或 7500N (可选)
Working Voltage	24VDC±15%
Output Current	Max.: 200mA
Operation Frequency	0.2Hz
Continuous lock or unlock interval	2.5s
Response Time	100ms
Risk time	100ms
Startup time	5s
Protection Level	IP67
Operating temperature	0...+55°C
Relative humidity	5...95%
Material	UL Listed thermoplastic housing and stainless steel mounting bracket
PFHd	<5.5x10 ⁻⁸
MTTFd	200 years

TRL2 Model number description



TRL2 Selection table type

Lock force	Type	Sensor	Actuator	Actuator+ Sensors	Order number(AC+SE)
Standard Coding	Power to Locking	TRL2M0L1P-SE	TRL2M0L1P-AC	TRL2M0L※1※P	LOT454833030SCPE
		TRL2M0L1N-SE	TRL2M0L1N-AC	TRL2M0L※1※N	LOT454833030SCNE
	Power to Release	TRL2M1L1P-SE	TRL2M1L1P-AC	TRL2M1L※1※P	LOT454833030SCPO
		TRL2M1L1N-SE	TRL2M1L1N-AC	TRL2M1L※1※N	LOT454833030SCNO
Unique Coding	Power to Locking	TRL2U0L1P-SE	TRL2U0L1P-AC	TRL2U0L※1※P	LOT454833030UCPE
		TRL2U0L1N-SE	TRL2U0L1N-AC	TRL2U0L※1※N	LOT454833030UCNE
	Power to Release	TRL2U1L1P-SE	TRL2U1L1P-AC	TRL2U1L※1※P	LOT454833030UCPO
		TRL2U1L1N-SE	TRL2U1L1N-AC	TRL2U1L※1※N	LOT454833030UCNO

TRL2 Series safety lock accessories selection table

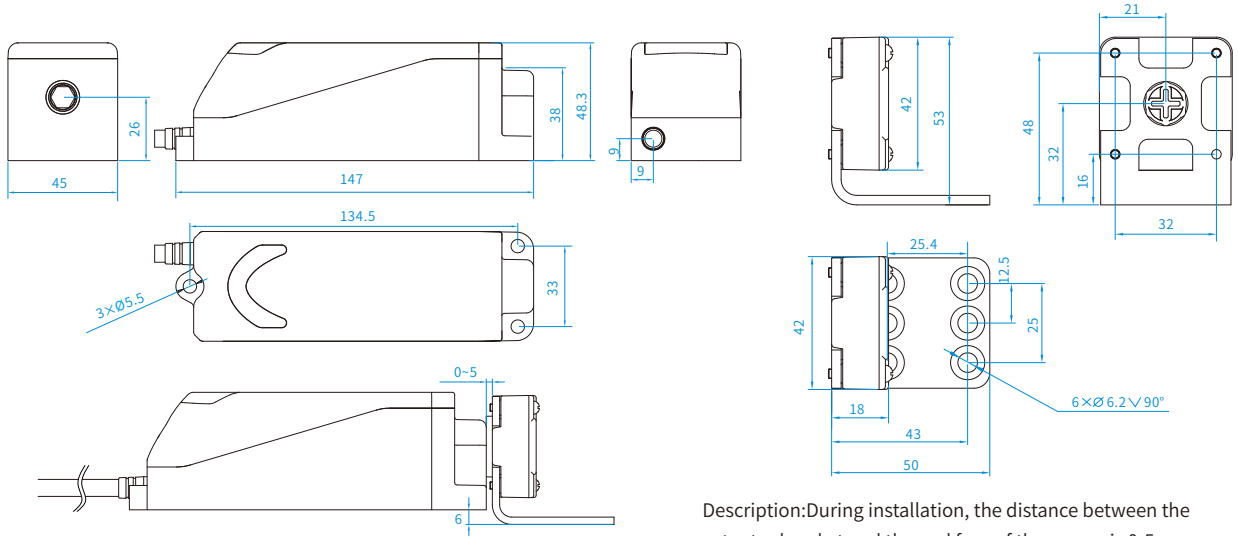
Type	Name	Model number	Order number
Mounting bracket	TRL2 No. 1 mounting bracket	TRL2-ZJ01	LOTTRL2-ZJ01
	TRL2 No. 2 mounting bracket	TRL2-ZJ02	LOTTRL2-ZJ02

※ Direct outlet or aviation plug outlet method;

※ TRL2 No. 2 mounting bracket, mainly used for supporting TSL1 safety bolts, detailed TSL2 product content;

※ The last digit of the model is an optional function .

TRL2 Series safety lock mounting dimensions



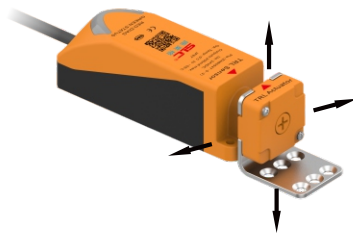
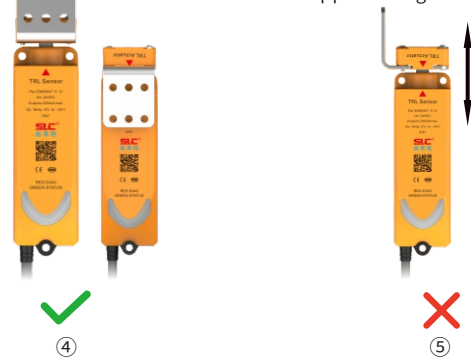
Description: During installation, the distance between the actuator bracket and the end face of the sensor is 0-5mm; when the actuator and the sensor are installed in the same direction, pay attention to the installation height difference between the sensor and the actuator bracket is 6mm.

TRL2 series safety lock installation and approach direction

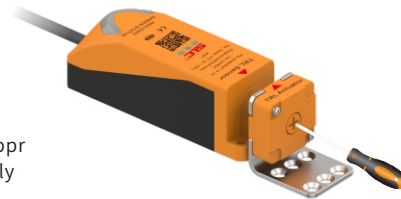
Actuator is installed correctly



Actuator error approaching direction



⑥ Actuator is approached correctly



⑦ Manual release

Description:

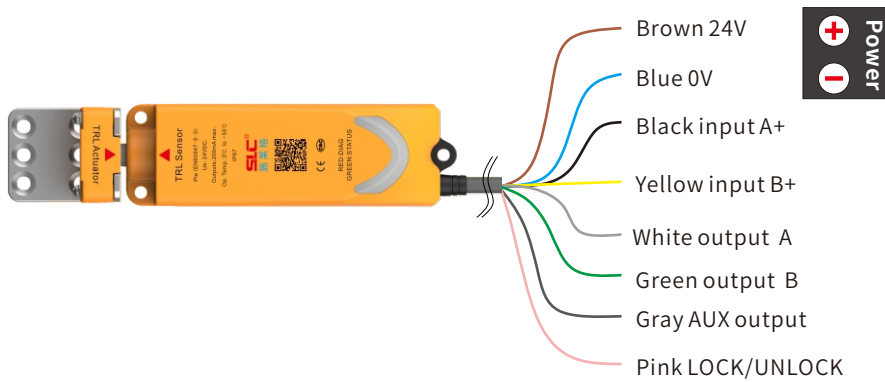
1. The safety lock can be installed in four ways (① ② ③ ④) as shown in the figure above. Note that the mounting bracket must be located between the sensor and the actuator. The actuator .
2. Can be accessed from all 4 directions (as shown in figure ⑥ below).
3. The movement direction of the actuator shall not be close to the same direction of the inductor axis, as shown in figure ⑤ above.
4. Under special circumstances, it may be necessary to manually unlock the safety lock. The unlocking method is as shown in figure ⑦ above: insert a screwdriver with a maximum diameter of 2.5mm into the actuator and press the locking pin into the safety lock; after unlocking, the function test must be carried out.
5. If more than one safety lock is installed on the machine at the same time, the adjacent safety locks shall be installed at least 200 mm away from each other.

TRL2 Series safety locks avoid interfering with each other



When multiple TRL2 safety locks are used, mutual interference may occur and TRL2 safety locks may malfunction. To prevent mutual interference, install the TRL2 safety lock as follows.

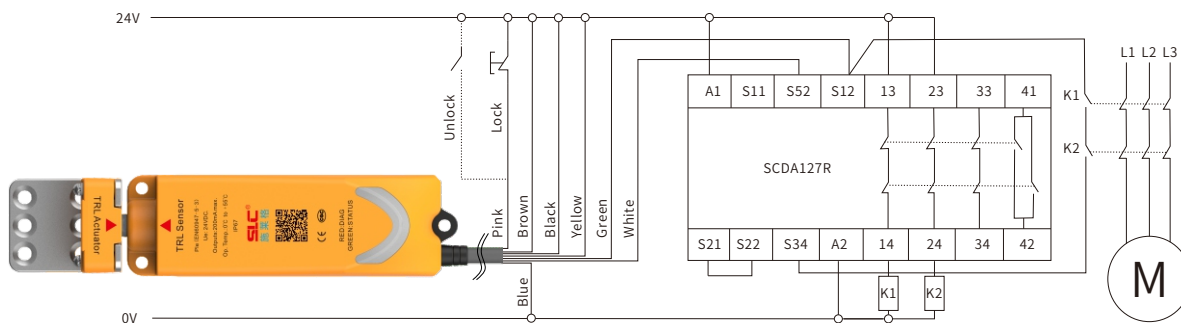
TRL2 series safety door lock without cascade function wiring diagram



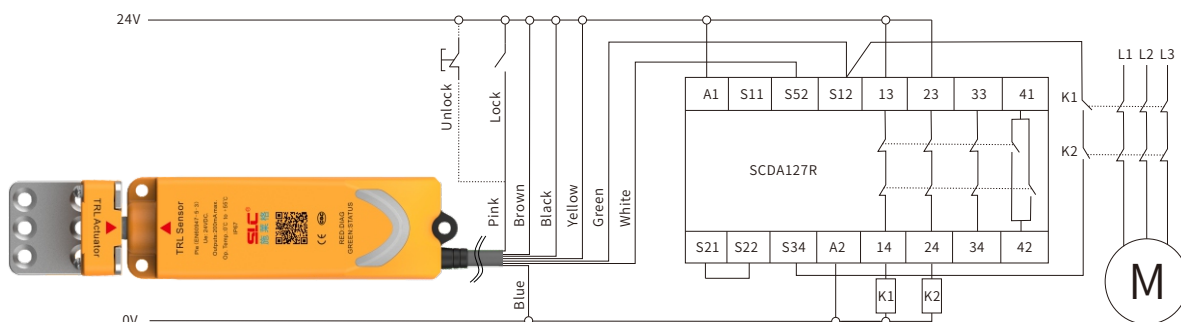
Signal definition	Colour	Description
24V	Brown	Power
0V	Blue	GND
Input A+	Black	Cascade input (Monitored)
Input B+	Yellow	
Output A	White	OSSD
Output B	Green	OSSD
AUX Output	Gray	Door/Lock/Output
LOCK/UNLOCK	Pink	LOCK/UNLOCK

TRL2 SERIES SAFETY DOOR LOCK

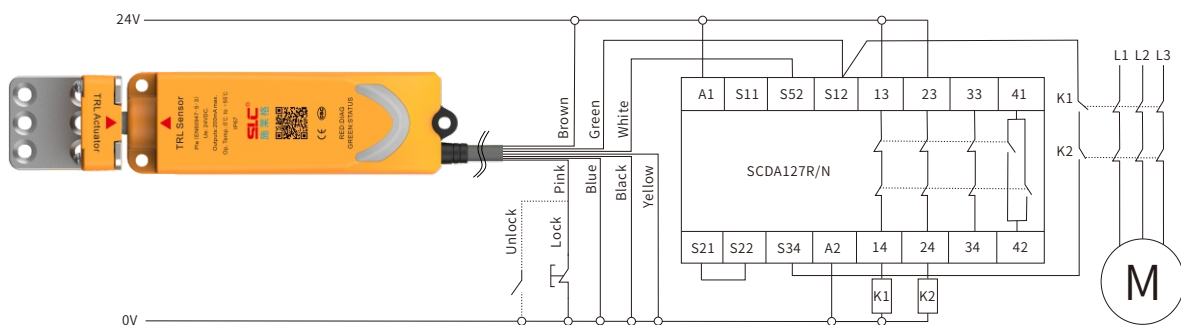
TRL2 Series (PNP) power-on locking safety lock and safety module application connection example



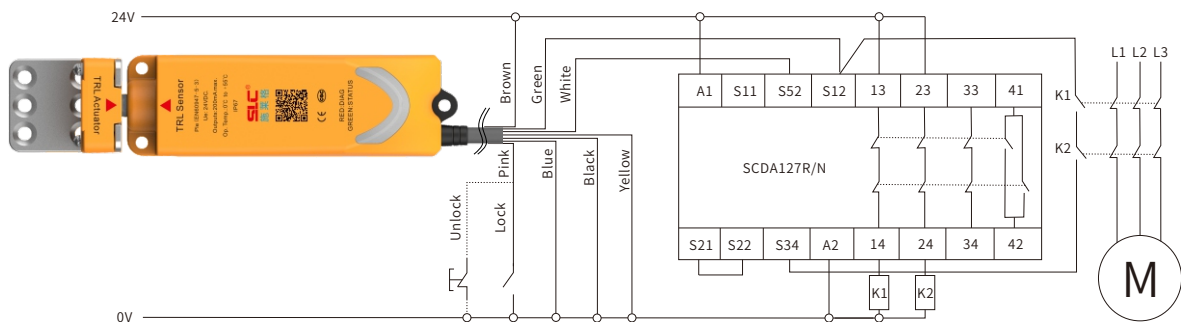
TRL2 Series (PNP) power-on release safety lock and safety module application connection example



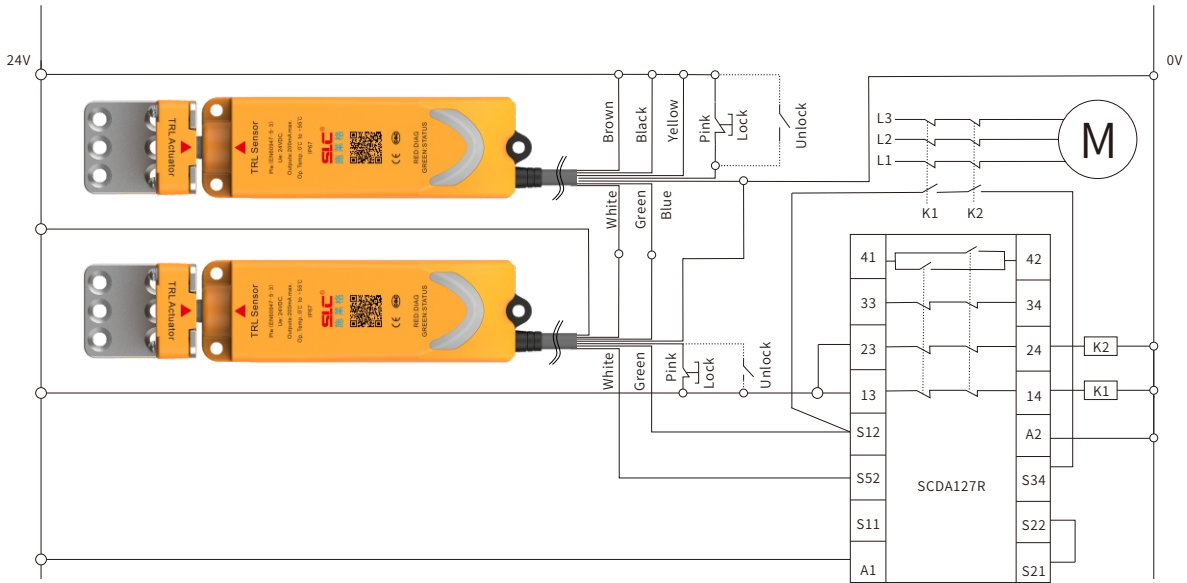
TRL2 Series (NPN) power-on locking safety lock and safety module application wiring example



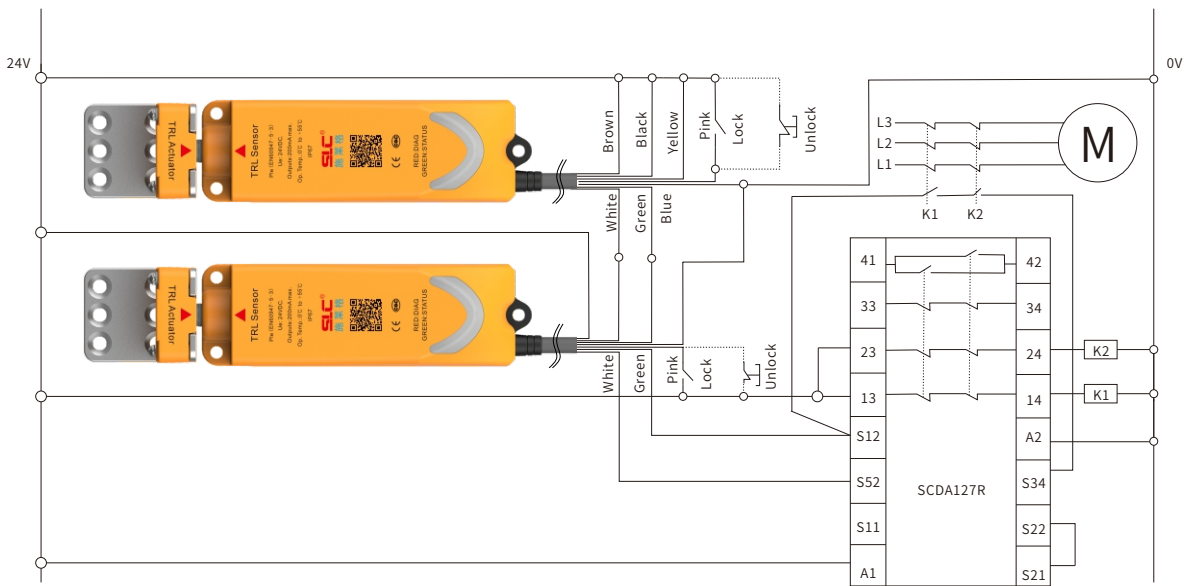
TRL2 Series (NPN) power-on release safety lock and safety module application wiring example



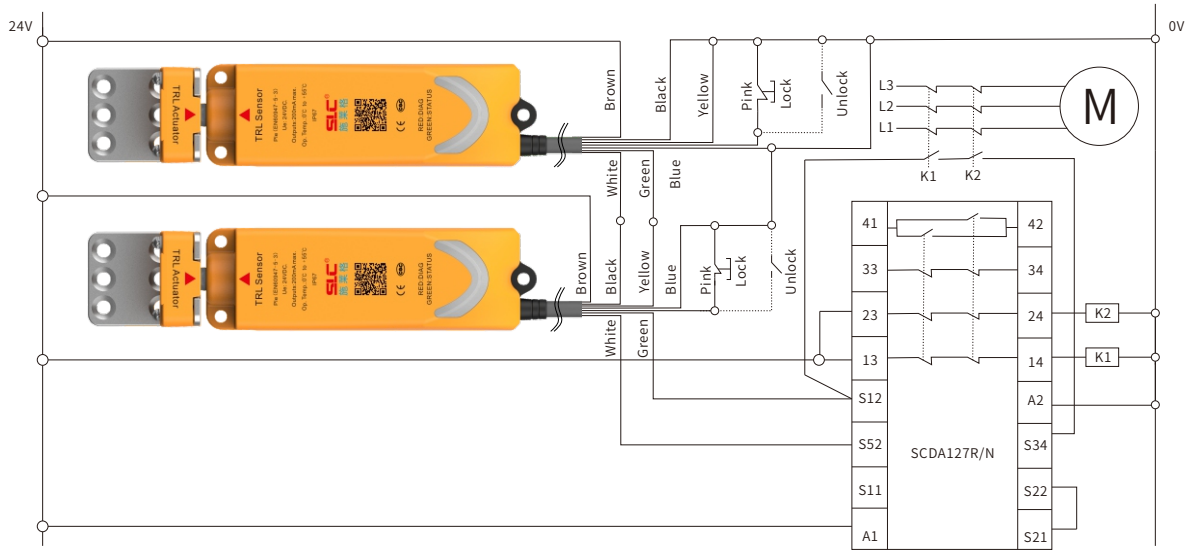
TRL2 series (PNP) power-on locking type safety lock multi-lock cascade and safety module wiring diagram



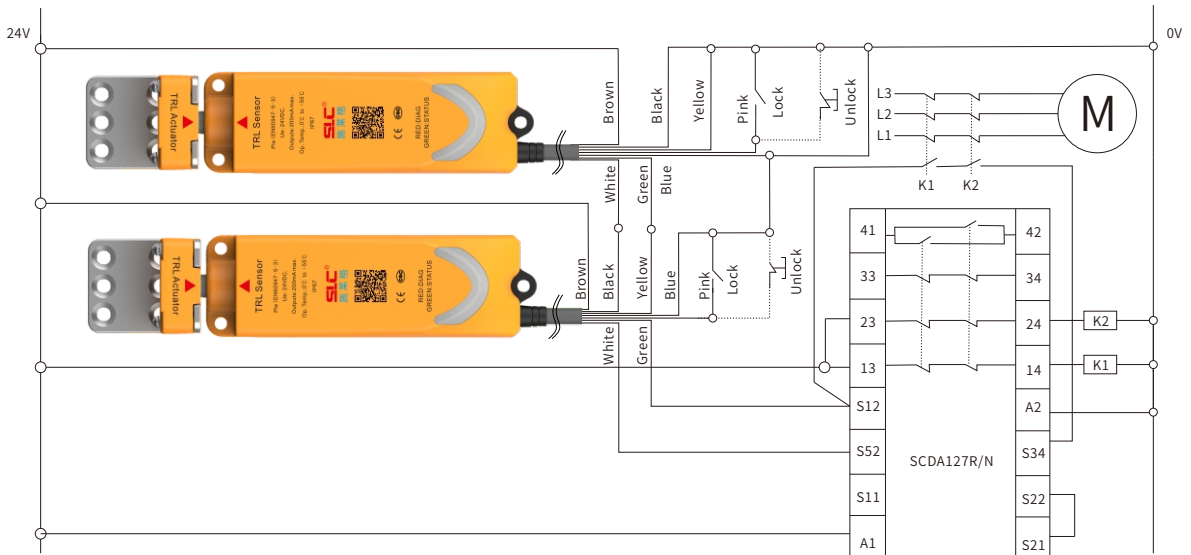
TRL2 series (PNP) power-on release type safety lock multi-lock cascade and safety module wiring diagram



TRL2 series (NPN) power-on locking type safety lock multi-lock cascade and safety module wiring diagram



TRL2 series (NPN) power-on release type safety lock multi-lock cascade and safety module wiring diagram













TRL2 Series Safety Lock LED Status









Power-On Lock (PNP) type													LED indicator status									
Actuator alignment status	Lock the control signal (pink)	OSSD input (black/yellow)	Lock status	OSSD output (white/green)	Auxiliary indication, 0-H optional function (gray line)																	
					0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H
Misaligned	Low level	Low level	Unlock	0V	24V	24V	24V	24V	24V	24V	24V	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Red on
	High level	High level	Unlock	0V	24V	24V	24V	24V	24V	24V	24V	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Red on
	Low level	High level	Unlock	0V	24V	24V	24V	24V	24V	24V	24V	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Green 4Hz flash
Aligned	Low level	Low level	Unlock	0V	24V	24V	24V	24V	24V	24V	24V	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Red on
	High level	High level	lock	0V	0V	24V	24V	24V	24V	24V	24V	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Red on
	High level	High level	lock	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Green 1Hz flash

Power-on release (PNP) type													LED indicator status									
Actuator alignment status	Lock the control signal (pink)	OSSD input (black/yellow)	Lock status	OSSD output (white/green)	Auxiliary indication, 0-H optional function (gray line)																	
					0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H
Misaligned	Low level	Low level	Unlock	0V	24V	24V	24V	24V	24V	24V	24V	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Green 4Hz flash
	High level	Low level	Unlock	0V	24V	24V	24V	24V	24V	24V	24V	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Green 4Hz flash
	High level	High level	Unlock	0V	24V	24V	24V	24V	24V	24V	24V	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Red on
Aligned	High level	Low level	Unlock	0V	24V	24V	24V	24V	24V	24V	24V	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Red on
	High level	High level	Unlock	0V	0V	24V	24V	24V	24V	24V	24V	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Red on
	Low level	Low level	lock	0V	0V	24V	24V	24V	24V	24V	24V	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Green 1Hz flash

Power-On Lock (NPN) type													LED indicator status									
Actuator alignment status	Lock the control signal (pink)	OSSD input (black/yellow)	Lock status	OSSD output (white/green)	Auxiliary indication, 0-H optional function (gray line)																	
					0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H
Misaligned	High level	High level	Unlock	24V	0V	0V	0V	0V	0V	0V	0V	0V	24V	24V	24V	24V	24V	24V	24V	24V	24V	Red on
	High level	Low level	Unlock	24V	0V	0V	0V	24V	0V	0V	0V	0V	24V	24V	24V	24V	24V	24V	24V	24V	24V	Red on
	Low level	High level	Unlock	24V	0V	0V	0V	0V	0V	0V	0V	0V	24V	24V	24V	24V	24V	24V	24V	24V	24V	Green 4Hz flash
Aligned	High level	Low level	Unlock	24V	0V	0V	0V	0V	24V	0V	0V	0V	24V	24V	24V	24V	24V	24V	24V	24V	24V	Red on
	High level	High level	lock	24V	0V	0V	0V	0V	0V	0V	0V	0V	24V	24V	24V	24V	24V	24V	24V	24V	24V	Red on
	Low level	Low level	lock	0V	24V	24V	24V	24V	24V	24V	24V	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Green 1Hz flash

Power-on release (NPN) type													LED indicator status									
Actuator alignment status	Lock the control signal (pink)	OSSD input (black/yellow)	Lock status	OSSD output (white/green)	Auxiliary indication, 0-H optional function (gray line)																	
					0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G	H
Misaligned	High level	High level	Unlock	24V	0V	0V	0V	0V	0V	0V	0V	0V	24V	24V	24V	24V	24V	24V	24V	24V	24V	Green 4Hz flash
	High level	Low level	Unlock	24V	0V	0V	0V	24V	0V	0V	0V	0V	24V	24V	24V	24V	24V	24V	24V	24V	24V	Green 4Hz flash
	Low level	High level	Unlock	24V	0V	0V	0V	0V	0V	0V	0V	0V	24V	24V	24V	24V	24V	24V	24V	24V	24V	Red on
Aligned	Low level	High level	Unlock	24V	0V	0V	0V	0V	24V	0V	0V	0V	24V	24V	24V	24V	24V	24V	24V	24V	24V	Red on
	Low level	Low level	lock	24V	0V	0V	0V	0V	0V	0V	0V	0V	24V	24V	24V	24V	24V	24V	24V	24V	24V	Red on
	High level	High level	lock	0V	24V	24V	24V	24V	24V	24V	24V	24V	0V	0V	0V	0V	0V	0V	0V	0V	0V	Green 1Hz flash

LED status during normal operation			
Red	Green	Product status	Output status
Off 	On 	Lock signal, cascade input normal	Output open
Off 	4Hz flash 	Lock signal, RFID signal not detected (not closed)	Output close
Off 	1Hz flash 	Lock signal, locked , no cascade input signal	Output close
On 	Off 	Unlocked (Standard Coding)	Output close
Double off 	Off 	Unlocked (unique coding)	Output close

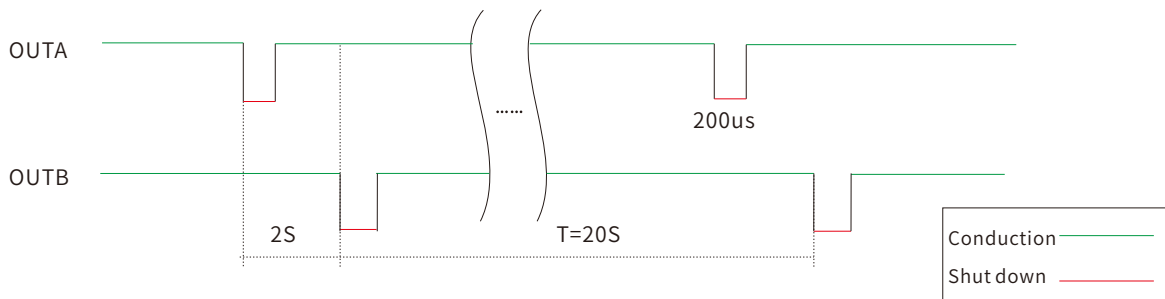
LED status during fault			
Red	Green	Product status	Output status
3green 1red alternately flash 		Lock failed, try to lock. Detect if the label is aligned	Output close
3red 1green alternately flash 		Unlock failed, try to unlock. Check if the actuator is stuck with the actuator and other reasons.	Output close
1Hz flash 	Off 	OSSD Output failure	Output close
4Hz flash 	Off 	Hardware failure and cannot be recovered	Output close



Red and green indicators

TRL2 series safety lock OSSD output

The TRL2 safety lock has an output self-diagnostic function. During the TRL2 safety lock output on, the TRL2 safety lock internal control sequencing control unit periodically and actively turns off the OSSDA and OSSDB outputs in turn. During the short shutdown of OSSDA or OSSDB, the TRL2 safety lock internal timing control unit detects whether OSSDA or OSSDB is indeed closed, if it is indeed closed, the corresponding OSSD switch is in normal working state, if OSSD is not detected to shut down, the corresponding OSSD fails, the system will immediately shut down the two OSSDs, at this time TRL2 safety lock red indicator flashes to ensure functional safety. Therefore, when the safety lock connection load is PLC or a fast smart device with MCU control, the self-test pulse needs to be filtered out in the program, and the following figure is the TRL2 safety lock self-diagnosis output waveform timing diagram.



Caution

- ◆ This product should not be used in an environment with more metal iron filings and metal powders, otherwise it will cause failure.
- ◆ Please clean the sensor and actuator locking shaft and locking hole of this product regularly (recommended once every 7 days) to keep free of iron chip powder adsorption.

Unique encoding actuators use matching

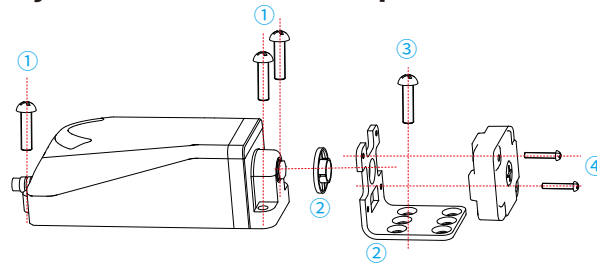
Unique encoding sensor initialization

When the unique code sensor is powered on for the first time, there is no corresponding unique code (Red and green indicators 4Hz flashes alternately), and the unique code needs to be initialized.

- ① Before powering on, take the unpaired unique coded actuator close to the unique coded sensor;
- ② Power on, wait for the product initialization to pass, the Red and green indicators 4Hz flashes alternately;
- ③ The sensor first learns the first code of the actuator (this process takes about 5s), and the sensor will push out the actuator after successful learning;
- ④ The sensor learns the second code of the actuator (this process takes about 5s), and if the learning is successful, the sensor will pull back the pusher;
- ⑤ The sensor reads the first code again and confirms that the code learned for the first time is the same;
- ⑥ The Red and green indicators stops flashing alternately 4Hz and starts working normally;
- ⑦ Power cycle up.



※It is forbidden to pair multiple unique coded sensors with the same unique coded actuator.

Tral Series Safety Lock Installation Steps



Installation steps:

- ① Fix the TRL Sensor end securely with 3 M5 screws.
- ② Install the positioning tab and mounting bracket to the center of the TRL Sensor latch in turn to ensure a tight fit.
- ③ Make a mark on the position of the mounting hole of the mounting bracket, remove the mounting positioning piece, and fix the mounting bracket in the marked position with 6 KM6 screws.
- ④ Secure the TRL Actuator to the mounting bracket with the screws in the fitting (ensure that the red arrow is aligned with the TRL Sensor red arrow).

 Danger	<ul style="list-style-type: none"> ◆ To reduce the probability of invalidation, install the TRL2 safety lock in a location that is not easily accessible (e.g., install it in an unreachable position, install a physical shield or railing, install it in a hidden location). Or secure it in a non-removable manner to prevent the TRL2 safety lock from being removed or moved. ◆ For more information on minimizing the probability of invalidation, please refer to ISO14119. ◆ Actuators, inductors and other mounting brackets should be fixed according to the installation size requirements. ◆ During installation, please apply medium strength thread glue to the fixing screws to prevent the screws of the TRL2 safety lock sensor and actuator mounting bracket from loosening. ◆ If the special mounting bracket is not suitable for installation, please consult our product sales staff.
 Caution	<ul style="list-style-type: none"> ◆ When installing the rotating machine, please make sure that the rotation radius is greater than 200mm. ◆ When replacing actuators or sensors, please follow the same steps to replace them. ◆ Please prepare the screws (M6) to secure the actuator, sensor, mounting bracket to the device.