

Touchless safety sensor with coding

1	About this operating instructions	4
2	Intended Use	4
3	Approvals	4
4	Safety Informations.....	4
5	Warnings against misuse	4
6	Disclaimer.....	4
7	Function	4
7.1	Coding variants.....	4
7.2	Safety outputs	4
7.3	Safety inputs.....	5
7.4	EDM-input	5
7.5	Diagnostic output	5
7.6	LED displays, flash codes and clocking diagnostic output	5
7.7	Boundary area monitoring.....	5
8	Assembly.....	5
9	Adjustment.....	5
10	Electrical Connection	5
10.1	Series connection	5
10.2	Information about power supply	5
10.3	Note for use in safety control systems	6
11	Commissioning.....	6
11.1	Teach-in variant "individual".....	6
12	Maintenance.....	6
13	Troubleshooting.....	6
14	Dismantling	6
15	Disposal.....	6
16	Information about production date.....	6
17	Technical Specifications.....	17
17.1	Circuit diagram and pin assignment.....	20
17.2	Dimensions.....	20
17.3	Operating directions.....	21
17.4	Connection Examples.....	22
18	CE declaration.....	24

1 About this operating instructions

The operating instructions is to be made available to the person who is installing the safety sensor. The operating instructions are to be kept in a legible condition and accessible at all times. Definition of symbols:

CAUTION

- Failure to comply can result in malfunctions or interference. Failure to comply can result in injury and/or damage to the machine.

NOTE

- Identifies available accessories and useful additional information.

2 Intended Use


The safety sensors STS 01xx ... and actuator STS 02xx ... may be used exclusively for monitoring movable, separating safety guards. This can be done in conjunction with a Wieland safety evaluation unit or comparable safety controller. The sensor can also be used without additional safety evaluation/controller, due to the integrated evaluation logic in the sensor as well as EDM input. The overall control concept in which the security sensor is incorporated is to be validated, for example, according to EN ISO 13849-2.


Number key actuator

E.g.: R1.400.XXXX.0


	R1 .	400.	X	X	X	X
Safety products						
Safety product group						
Secure transponder switch						
Delivery form 0 = Set						
Type						
1 = box-shaped, large switching distance STS 01xx						
2 = square-shaped, large switching distance STS 02xx						
Coding/Start						
1 = coded, automatic start						
2 = coded, manually monitored start						
3 = fully coded, automatic start						
4 = fully coded, manually monitored start						
5 = unique, automatic start						
6 = unique, manually monitored start						
Connection						
0 = Pigtail with M12-plug						
3 = cable 3m						
4 = cable 5m						
6 = cable 10m						

3 Approvals





[Proximity Switch]
E477003



**SLG Prüf- und
Zertifizierungs GmbH**
 (tested in accordance with ECOLAB
standard)

Test media:

- Distilled water
- P3 topax66
- P3 topactive 200
- P3 topax 52
- P3 topax 990

4 Safety Informations

CAUTION

- Make sure that the safety sensors are mounted only by specially trained, authorized and qualified personnel and put into service safely.
- Only install and commission the device if you have read and understood the operating instructions and are familiar with the applicable regulations on occupational safety and accident prevention.
- The safety sensor may only be operated exclusively by the actuator which is properly mounted on the guard. Actuation when not mounted on the guard is prohibited.
- Operate the safety sensors only if they are in undamaged condition.
- Make sure that the safety sensors are used exclusively to protect against hazards.
- Make sure that all applicable safety requirements for the respective machine are complied with.
- Make sure that all applicable laws and regulations are complied with.
- Residual risks are not known when the instructions in this manual are adhered to.

5 Warnings against misuse

CAUTION

- Inexpert or improper use or tampering in combination with the use of safety sensors can lead to hazards for personnel or damage to machine or system parts. Also observe the relevant notes relating to EN ISO 14119.
- Make sure that no external component causes current or voltage peaks which are higher than the specified electrical data of the safety evaluation. Current or voltage peaks are produced for example by capacitive or inductive loads.
- Exceeding the electrical data of the safety sensor (e.g. in case of faulty wiring or shorts) can damage it irreparably.
- Operation of the safety sensor is only allowed with the appropriate actuator and with the approved control options (see chapter 17 "Technical specifications").

6 Disclaimer

No liability can be accepted for damage or outages resulting from non-compliance with this instruction manual. For damage resulting from the use of spare parts or accessories unapproved by the manufacturer, any further liability of the manufacturer is excluded. Any unauthorized repairs, modifications and additions are not permitted for safety reasons and the manufacturer is also not liable for any resulting damage.

7 Function

Coded, electronic safety sensor, which is operated by a non-contact coded actuator.

7.1 Coding variants

The various versions of the safety sensors arise from the different encodings designated as type keys under chapter 2. Depending on the variant, a corresponding manipulation protection is achieved.

Coded

The safety sensor accepts any STS actuator.
 Type 4; low level coding level according to EN ISO 14119.

Individual

The safety sensor accepts a STS actuator. This actuator is configured individually to the STS. A non-matching actuator in the sensor range will result in an error. The process for teaching in a new actuator can be carried out unlimited times and is described in detail under chapter 11 "Commissioning": high level coding level according to EN ISO 14119.

Type 4; low level coding according to EN ISO 14119

Unique

The safety sensor only accepts the STS actuator supplied. The pair, consisting of sensor and actuator cannot be separated. If a component should be lost and is no longer functional, both components must be replaced.

Type 4; high level coding according to EN ISO 14119.

7.2 Safety outputs

The safety sensor has 2 short-circuit proof PNP safety outputs (OSSD), which have a max. load of 400 mA per channel. The safety outputs connect through under the following conditions:

- the correct actuator is detected in the operating range (safety guard closed)
- a high signal is present at both safety inputs
- the EDM input is set correctly
- there is no internal error detected

The safety sensors will switch themselves off under the following conditions:

- there is no actuator or the wrong actuator in the detection zone
- there is a low signal on one of the two inputs
- a fault has been detected

The two safety outputs can be connected under the following conditions to the inputs of a safety controller:

- the input must be appropriate (OSSD signals) for clocked safety signals; the controller must tolerate test pulses on the inputs (see chapter 17 "Technical specifications"). Please refer to the instructions of the controller manufacturer.

Wiring examples can be found in chapter 17.4 "Connection Examples".

Touchless safety sensor with coding

7.3 Safety inputs

The safety sensor has 2 safety inputs:

- Connect the safety inputs of +24 V DC for single use of the sensor.
- When using the sensor in a series circuit, the safety inputs of the first sensor can be connected to +24 V DC. The safety inputs of the following sensors are connected to the safety outputs of the previous sensor. Please also refer to chapter **10.1 "Series connection"**.
- Pulses with a duration of max. 900 µs are tolerated on the safety inputs.

Wiring examples can be found in chapter 17.4 "Connection Examples".

7.4 EDM-input

The EDM input can be configured as "automatic" or "monitored" (see number key). If the EDM input is not required, the "automatic" variant must be selected and connected to +24 V DC.

EDM-input: automatic

For contactor monitoring, the open contactors must be connected to the EDM input. For series connection of multiple sensors all EDM inputs must be connected to +24 V DC. The monitor for the contactors must be connected to the last sensor of the chain.

Wiring examples can be found in chapter 17.4 "Connection Examples".

EDM-input: monitors (start button)

Connect the EDM input to an external start button on your machine control. The EDM input is only then recognized as set properly if after pressing the sensor and after setting the safety inputs at least one valid start pulse is detected. The valid start pulse is detected when after a rising edge, a falling edge within the allowable start pulse duration between 30 ms and 5 s is detected.

Wiring examples can be found in chapter 17.4 "Connection Examples".

7.5 Diagnostic output

The diagnostic output is positive switching, short-circuit protected and transmits the various sensor states with different signals, for example, to a *sensorPRO STS*. The pulsed signals corresponding to the respective timing of the LED. The various symbols are described in more detail under chapter 7.6.

7.6 LED displays, flash codes and clocking diagnostic output

Sensor non-actuated	
LED green	off
LED red	off
LED yellow	on
Diagnostic output	0 V
Safety outputs OSSD	0 V
Note	Voltage is applied

Actuator in the detection area (sensor activated), all inputs correctly set	
LED green	on
LED red	off
LED yellow	off
Diagnostic output	24 V DC
Safety outputs OSSD	24 V
Note	Actuator in the detection area

Actuator in the detection area (sensor actuated), safety inputs not set (low level)	
LED green	flashes ⁽¹⁾
LED red	off
LED yellow	off
Diagnostic output	24 V DC
Safety outputs OSSD	0 V
Note	set safety inputs

Actuator in the detection area (sensor actuated), safety inputs set (high level), waits for start pulse	
LED green	Rapid flashing ⁽²⁾
LED red	off
LED yellow	off
Diagnostic output	24 V DC
Safety output OSSD	0 V
Note	press start button

Actuator in the boundary area	
LED green	off
LED red	off
LED yellow	flashes ⁽¹⁾
Diagnostic output	24 V DC clocked
Safety outputs OSSD	Previous state
Note	Readjust sensor

Teach-in process	
LED green	off
LED red	off
LED yellow	Rapid flashing ⁽²⁾
Diagnostic output	24 V DC clocked
Safety outputs OSSD	0 V
Note	Disconnect voltage to complete teach-in

Fault condition	
LED green	off
LED red	flashes ⁽¹⁾
LED yellow	off
Diagnostic output	0 V
Safety outputs	0 V
Note	See chapter 13 "Troubleshooting"

⁽¹⁾ Flashing: The pulse interval (1 s) of the LED ratio is 1:1.

⁽²⁾ Rapid flashing: The pulse interval (0,25 s) of the LED ratio is 1:5.

7.7 Boundary area monitoring

If the actuator is in the boundary area of the switching distances with corresponding offset values of the sensor, it is transmitted to a *sensorPRO STS* or indicated by the LED (see chapter 7.6 "LED displays, flash codes and clocking diagnostic output").

8 Assembly

- Safety sensor and actuator
 - Do not use as a stopper
 - External fields can affect switching distances
- Installation of the safety sensor and the associated actuator is allowed only when de-energized.
- Make sure that the markings on the sensor and actuator face each other congruently.
- The mounting position is arbitrary. However, security sensor and actuator must be mounted parallel and opposite each other.
- Note the specified installation tolerances and the approved control options.

To ensure trouble-free operation and to avoid any impact on the operating distance, the following points should be noted:

- In order to guarantee the specified switching distance, the free zone (environment free of electrically and magnetically conductive materials) must be adhered to.

NOTE

- Matching space plates for mounting on metal parts are available under the order-Nb.
- R1.100.4100.0 Quader 8 mm
- R1.100.4101.0 Quader 10 mm
- R1.100.4200.0 Rechteck 8 mm
- R1.100.4201.0 Rechteck 10 mm
- Available at Wieland Electric GmbH

- The mounting distance between two systems of the safety sensor and actuator must be min. 15 cm.
- Attach safety sensor and actuator to the protective device so that they cannot be removed.
- Use only M4 screws with flat head (e.g. M4 cheese head screws ISO 4762) for installation of the safety sensor and actuator. Tightening torque max. 0,5 – 0,7 Nm. Use non-ferromagnetic material (e.g. brass) screws.

NOTE

- We recommend using the screw covers included to secure the mounting screws against easy disassembly.

- The safety sensor must be mounted on flat surfaces.
- The connecting cable of the safety sensor must be protected against mechanical damage.
- Consider the requirements of EN ISO 14119 during installation.
- Also consider the requirements of EN 60204-1, in particular regarding the proper laying of cable. It is recommended to lay the sensor cable so that it is covered.

9 Adjustment

The stated operating distances (see chapter 17 "Technical Specifications") are only valid for mounting on non-metallic material if the safety sensor and actuator are mounted in parallel opposite each other. Other arrangements may lead to different switching states.

10 Electrical Connection

CAUTION

- The electrical connection may only be carried out with the power off and by authorized personnel.

- Connect the safety sensor according to the specified wire colors and pin assignment (see chapter 17.1 "Circuit diagram and pin assignment").

CAUTION

- Both safety outputs must always be evaluated to ensure safety.
- Since the diagnostic output is not a safety output, it may not be used for safety-relevant information and monitoring functions.

- Make sure that the required minimum input voltage of the downstream safety evaluation unit is not undershot. Observe the voltage drop at the safety sensor and the connecting cable.

10.1 Series connection

The safety sensors enable a series circuit with up to 30 sensors while achieving PLe with correct wiring. For a series circuit it must be noted that the time delay accumulates for each additional sensor. The relevant technical specifications can be found in chapter 17 "Technical Data". Configuration EDM input see chapter "7.4 EDM input".

10.2 Information about power supply

- The sensor must be powered directly or indirectly with a SELV/PELV power supply.
- For use and applications as per the requirements⁽¹⁾, the power supply must be classified "for use in class 2 circuits".

⁽¹⁾ Notice regarding the scope of the UL approval: The devices have been tested in accordance with the requirements of UL508 and CSA/C22.2 no. 14 (protection against electric shock and fire).

Touchless safety sensor with coding

10.3 Note for use in safety control systems

- Do not use controllers with test pulses or turn off the test pulses in your control system. The device generates its own test pulses to the safety outputs. A downstream control system must be able to tolerate these test pulses, which may have a length up to 300 µs. Depending on the inertia of the connected device (control, relay, etc.), this can lead to short switching processes.
- The inputs of a connected evaluation unit must be positive-switching, as the two outputs on the safety switch in the ON state deliver a level of +24 V DC.

11 Commissioning

During commissioning, you must make sure of the following points:

- safety sensor and actuator mounted in the correct position and firmly
- integrity of the supply line

After installation and any fault, a complete check of the safety function must be performed.

11.1 Teach-in variant "individual"

The first permitted actuator is detected immediately after the supply voltage is applied, if it is located in the detection range of the sensor. Each additional teach-in process must be done as described in the following:

- Apply the supply voltage to the safety sensor.
- Bring an allowable actuator into the detection range of the sensor.
- Actuator is detected, red LED flashes six times.
- After 10 s the LED switches to yellow flashing.
- Switch off power supply within the next 2 min.
- Re-apply power supply, the programming procedure is finished and the actuator will be accepted.
- If an actuator is re-taught, the safety sensor disables the code of the previous process, so this is no longer permitted.
- Do not remove the actuator during the process, as long as it is located in the detection area.

If the teach-in procedure is terminated, the supply voltage must be switched off and the process restarted. The teaching-in of actuators to a security sensor can be undertaken an unlimited number of times, as long as the code of the actuator is not locked in the sensor.

12 Maintenance


If the safety sensor correctly installed and used as intended, no maintenance measures are required. We recommend periodically carrying out a visual and functional test:

- Check the safety sensor and actuator for tightness.
- Check the connection cable for damage.


CAUTION

- Damaged or faulty equipment must be replaced with original spare parts! In variant "unique", the safety sensor and actuator must be replaced. For the "individual" variant, a teach-in process must be performed after replacement of the safety sensor OR the actuator.


13 Troubleshooting**Safety output faults**

Flash code	
Cause	Short circuit between safety outputs to ground or to +24 V DC. Wire breakage
Remedy	<ul style="list-style-type: none"> Switch off supply voltage. Eliminate short/wire break at the output. Re-apply supply voltage.


Safety input faults

Flash code	
Cause	Short circuit between safety inputs, to ground or to +24 V DC. Wire breakage
Remedy	<ul style="list-style-type: none"> Switch off supply voltage. Eliminate short/wire break at the output. Re-apply supply voltage.


Safety output faults

Flash code	
Cause	<ul style="list-style-type: none"> EDM automatic: Error on connected safety relay. EDM manual: Start pulse does not take place in the defined area. All variants: Wire breakage.
Remedy	<ul style="list-style-type: none"> Switch off supply voltage. Check safety relay or set start pulse correctly, check for broken wire. Re-apply supply voltage.


Error overvoltage or undervoltage

Flash code	
Cause	The supply voltage has not been applied in the defined region.
Remedy	<ul style="list-style-type: none"> Switch off supply voltage. Ensure correct supply voltage and reconnect it.

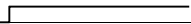
Temperature outside the acceptable range

Flash code	
Cause	The defined temperature range has been exceeded or under-shot.
Remedy	<ul style="list-style-type: none"> Switch off supply voltage. Ensuring proper ambient temperature. Re-apply supply voltage.

Incorrect actuator

Flash code	
Cause	Incorrect actuator in the detection range of the sensor.
Remedy	Use correct actuator.

Internal device error

Flash code	
Cause	Internal device error.
Remedy	Switch off power supply and re-connect.

If the errors described cannot be resolved, the device must be replaced to ensure the safety function.

14 Dismantling

Dismantle the safety sensor in a powered down state.

15 Disposal

Dispose of packaging and used parts according to the regulations of the country in which the device is installed.

16 Information about production date**NOTE**

- The date of manufacture can be seen on the safety sensor housing in the format "calendar week/year", e.g.: "37/15" = week 37, year 2015