

CSD-SL 200S XX

**Signal light, 24 V DC,
communication interface, safe diagnostics in accordance with safety standards**



Data sheet
108765_en_02

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1 Description

The signal light is designed for use in light signal systems (e.g., lock systems, movable bridges on inland waterways, etc.).

The use of safety-related autonomous monitoring functions ensures high availability.

Only components that conform to the industry standard are used for the monitoring functions.

The signal light is available in various standardized light colors.

You can manage the signal light from the application program with a controller from Phoenix Contact.

The communication interface provides you with a large amount of diagnostic and status information.

Due to safe 2-channel diagnostics, light signal systems up to Performance Level d and SIL 2 can be implemented.

2 Features

- Developed in accordance with EN 12966-1, IALA recommendation E200-1, EN ISO 13849, EN 62061, IEC 61508
- Fixed state in the event of interrupted communications
- 400 m connection to the control unit via fieldbus
- Diagnostics capability
- High light and color intensity
- Can be dimmed in 256 steps
- Application-specific programming supported
- Especially economical, thanks to energy-efficient LED technology and an LED service life of at least 50000 h
- LED technology
- Fieldbus communication
- 2-channel, safe diagnostics in accordance with safety standards



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This document is valid for the products listed in Section “Ordering data” on page 4.

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3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
Signal light, diameter: 174 mm, 24 V DC, white, emission angle: 7.5° x 7.5°, power supply and INTERBUS communication via M12 SPEEDCON hybrid connector, safe diagnostics in accordance with safety standards	CSD-SL 200S WH	1029564	1
Signal light, diameter: 174 mm, 24 V DC, green, emission angle: 7.5° x 7.5°, power supply and INTERBUS communication via M12 SPEEDCON hybrid connector, safe diagnostics in accordance with safety standards	CSD-SL 200S GN	2404768	1
Signal light, diameter: 174 mm, 24 V DC, yellow, emission angle: 7.5° x 7.5°, power supply and INTERBUS communication via M12 SPEEDCON hybrid connector, safe diagnostics in accordance with safety standards	CSD-SL 200S YE	1096101	1
Signal light, diameter: 174 mm, 24 V DC, red, emission angle: 7.5° x 7.5°, power supply and INTERBUS communication via M12 SPEEDCON hybrid connector, safe diagnostics in accordance with safety standards	CSD-SL 200S RD	2404767	1
Accessories	Type	Order No.	Pcs./Pkt.
Hybrid cable, Ethernet hybrid CAT5 (100 Mbps), 8-pos., PUR halogen-free, black RAL 9005, shielded, connector straight M12 SPEEDCON/IP67, coding: Y, on the free cable end, cable length: 1 m, Power with Ethernet (PWE)	NBC-MSY/ 1.0-94H SCO	1407487	1
Hybrid cable, Ethernet hybrid CAT5 (100 Mbps), 8-pos., PUR halogen-free, black RAL 9005, shielded, connector straight M12 SPEEDCON/IP67, coding: Y, on the free cable end, cable length: 2 m, Power with Ethernet (PWE)	NBC-MSY/ 2.0-94H SCO	1407488	1
Hybrid cable, Ethernet hybrid CAT5 (100 Mbps), 8-pos., PUR halogen-free, black RAL 9005, shielded, connector straight M12 SPEEDCON/IP67, coding: Y, on the free cable end, cable length: 5 m, Power with Ethernet (PWE)	NBC-MSY/ 5.0-94H SCO	1407489	1
Hybrid cable, Ethernet hybrid CAT5 (100 Mbps), 8-pos., PUR halogen-free, black RAL 9005, shielded, connector straight M12 SPEEDCON/IP67, coding: Y, on the free cable end, cable length: 10 m, Power with Ethernet (PWE)	NBC-MSY/10.0-94H SCO	1407490	1
Hybrid cable, Ethernet hybrid CAT5 (100 Mbps), 8-pos., variable cable type, shielded, connector straight M12 SPEEDCON/IP67, coding: Y, on the free cable end, cable length: freely selectable (0.2 m ... 40.0 m), Power with Ethernet (PWE)	NBC-MSY SCO-EH/.../...	1408642	1
Hybrid cable, Ethernet hybrid CAT5 (100 Mbps), 8-pos., PUR halogen-free, black RAL 9005, shielded, connector straight M12 SPEEDCON/IP67, coding: Y, to connector straight M12 SPEEDCON/IP67, coding: Y, cable length: 1 m, Power with Ethernet (PWE)	NBC-MSY/ 1.0-94H/MSY SCO	1407491	1

Accessories	Type	Order No.	Pcs./Pkt.
Hybrid cable, Ethernet hybrid CAT5 (100 Mbps), 8-pos., PUR halogen-free, black RAL 9005, shielded, connector straight M12 SPEEDCON/IP67, coding: Y, to connector straight M12 SPEEDCON/IP67, coding: Y, cable length: 2 m, Power with Ethernet (PWE)	NBC-MSY/ 2.0-94H/MSY SCO	1407492	1
Hybrid cable, Ethernet hybrid CAT5 (100 Mbps), 8-pos., PUR halogen-free, black RAL 9005, shielded, connector straight M12 SPEEDCON/IP67, coding: Y, to connector straight M12 SPEEDCON/IP67, coding: Y, cable length: 5 m, Power with Ethernet (PWE)	NBC-MSY/ 5.0-94H/MSY SCO	1407493	1
Hybrid cable, Ethernet hybrid CAT5 (100 Mbps), 8-pos., PUR halogen-free, black RAL 9005, shielded, connector straight M12 SPEEDCON/IP67, coding: Y, to connector straight M12 SPEEDCON/IP67, coding: Y, cable length: 10 m, Power with Ethernet (PWE)	NBC-MSY/10.0-94H/MSY SCO	1407494	1
Hybrid cable, Ethernet hybrid CAT5 (100 Mbps), 8-pos., variable cable type, shielded, connector straight M12 SPEEDCON/IP67, coding: Y, to connector straight M12 SPEEDCON/IP67, coding: Y, cable length: freely selectable (0.2 m ... 40.0 m), Power with Ethernet (PWE)	NBC-MSY-MSY SCO-EH/.../ ...	1408641	1
Sensor/actuator cable, 4-pos., PUR, halogen free, RAL 7021 (black gray), shielded, straight M12 connector, A-coded, to straight M12 socket, A-coded, cable length: 1.5 m	SAC-4P-M12MS/ 1.5-PUR/ M12FS SH	1500868	1
Sensor/actuator cable, 4-pos., PUR, halogen free, RAL 7021 (black gray), shielded, straight M12 connector, A-coded, to straight M12 socket, A-coded, cable length: 3 m	SAC-4P-M12MS/ 3.0-PUR/ M12FS SH	1500871	1
Sensor/actuator cable, 4-pos., PUR, variable cable type, shielded, straight M12 connector, A-coded, to straight M12 socket, A-coded, cable length: freely selectable (0.2 m ... 40.0 m)	SAC-4P-M12MS-M12FS SH/ .../...	1536081	1
Sensor/actuator cable, 4-pos., PUR, variable cable type, shielded, straight M12 SPEEDCON connector, A-coded, to straight M12 SPEEDCON socket, A-coded, cable length: freely selectable (0.2 m ... 40.0 m)	SAC-4P-MS-FS SH SCO/.../...	1523803	1
Connector, 4-pos., shielded, straight M12 connector, A-coded, push-in connection, knurl material: zinc die-cast, nickel-plated, outer cable diameter of 4 mm ... 8 mm	SACC-M12MS-4PL SH	1424666	1
Connector, 4-pos., shielded, straight M12 female connector, A-coded, push-in connection, knurl material: zinc die-cast, nickel-plated, outer cable diameter of 4 mm ... 8 mm	SACC-M12FS-4PL SH	1424668	1
Metal M12 sealing cap for unused M12 plugs of the sensor/actuator cable, flush-type connectors, and I/O devices in the field	PROT-M12 FS-M	1430488	1
M12 sealing cap for unused M12 plugs of the sensor/actuator cable, flush-type connectors, and I/O devices in the field	PROT-M12 FS	1560251	1

Accessories	Type	Order No.	Pcs./Pkt.
Stainless steel M12 screw plug, for unoccupied M12 females of sensor/actuator cables, boxes, and flush-type connectors for the food industry (protective and sealing elements)	PROT-M12 FB	1555538	5
M12 screw plug for unoccupied M12 females of sensor/actuator cables, boxes, and flush-type connectors (protective and sealing elements)	PROT-M12	1680539	5
Nut for assembling sensor/actuator cables with M12 connector and M12 connectors for assembly, with knurl diameter 15 mm, for 4 mm hexagonal drive (tool)	SAC BIT M12-D15	1208432	1
Torque screwdriver, with preset torque of 0.4 Nm and 4 mm hexagonal drive for M12 connectors (tool)	TSD 04 SAC	1208429	1

4 Technical data

General data	
Housing color	Black (RAL 9005)
Weight	1680 g
Ambient temperature (operating)	-25°C ... 55°C
Ambient temperature (storage/transport)	-25°C ... 85°C
Air pressure (operation)	70 hPa ... 106 kPa (up to 3000 m above sea level)
Air pressure (storage/transport)	70 hPa ... 106 kPa (up to 3000 m above sea level)
Permissible humidity (storage/transport)	5% ... 95% (according to DIN EN 61131-2), without condensation
Degree of protection	IP65/IP67 if the screw connection is tightened
Protection class	III, IEC 61140, EN 61140, VDE 0140-1
Mounting position	Vertical
Material	Aluminum die-cast in accordance with DIN EN 1706
User interface	Seawater-resistant painting (hard coating)
Dimensions	
Closing frame diameter	174 mm
Depth	66 mm
Note on dimensions	Without attachments
Light properties	
Type of lighting	LED
Number of LEDs	8 (in accordance with IALA recommendation E200-1 and CIE 1931)
Burn time of LEDs	>50000 hours
Can be dimmed	Yes, in 256 steps
Emission angle (half-value angle of the full angle)	7.5° x 7.5°
Light color (in accordance with IALA recommendation E200-1 and CIE 1931)	White, optimum Green, optimum Red, optimum Yellow, optimum
Optical quality (in accordance with EN 12966)	
Luminance	L3
Color class	C3
Luminance ratio	R3
Phantom light class (in accordance with EN 12368)	5
Times	
Acceleration time	100 ms, typical
Response time	Max. 400 ms
Recovery time	Max. 800 ms

Supply to the module electronics

Connection method	M12 hybrid connectors with SPEEDCON interlock – Incoming INTERBUS: female – Outgoing INTERBUS: female
Number of positions	8: 2 mm ² x 0.6 mm ² for 24 V DC supply 5 mm ² x 0.15 mm ² for INTERBUS communication
Supply voltage	24 V DC (19.2 V DC ... 30 V DC)
Current consumption	
White LEDs	Max. 590 mA
Green LEDs	Max. 740 mA
Yellow LEDs	Max. 540 mA
Red LEDs	Max. 590 mA
Power consumption	
White LEDs	Typ. 12 W
Green LEDs	Typ. 14 W
Yellow LEDs	Typ. 11 W
Red LEDs	Typ. 12 W
Inrush current	Max. 12 A μ s pulse
Maximum length to the next INTERBUS device	400 m

Safe digital outputs

Quantity	2
Connection method	M12 hybrid connectors with SPEEDCON interlock
Number of positions	4x 0.6 mm ² for digital outputs for safe diagnostics
Output current	Max. 100 mA (per channel)
Output voltage range	17 V DC ... 31 V DC
Short-circuit current	Max. 5 A (peak short-circuit current)
Signal level when signal light switched on	
White LEDs	0
Green LEDs	0
Yellow LEDs	0
Red LEDs	1
Diagnostic functions	- Light test error (stuck at HIGH) - Dark test error (stuck at LOW) - Cross-circuit on output
Switching cycles, max.	Max. 70,000,000 (500,000 per year)

Status and error messages to the master management or control system

LED defective	Yes
Voltage monitoring	Yes
Device temperature indication	Yes
Temperature error	Yes
Luminous flux monitoring	Yes
Operating hours memory	Yes

Status and error messages to the master management or control system

Rating plate	Yes
Mains failure, communication failure	Yes
Safe diagnostics (up to SIL 2/PL d) in conjunction with safe modules (safety technology)	Yes

Mechanical tests

Vibration resistance in accordance with EN 60068-2-6/IEC 60068-2-6	5 g
Shock in accordance with EN 60068-2-27/IEC 60068-2-27	15 g

Safety characteristic data according to EN 61508 – high demand

Achievable SIL	SIL 3 (two-channel)
Probability of dangerous failure per hour (PFH)	$1.6 * 10^{-11}$ (RD); $3.4 * 10^{-11}$ (WH,GN,YE)
Hardware fault tolerance (HFT) of device	1
Duration of use	240 months (20 years)

Safety characteristic data according to EN 62061

Safety integrity level claim limit (SIL CL)	SIL CL 3 (two-channel)
Safe Failure Fraction (SFF)	99%
Probability of a dangerous failure per hour (PFH _D)	$1.6 * 10^{-11}$ (RD); $3.4 * 10^{-11}$ (WH,GN,YE)
Hardware fault tolerance (HFT) of device	1
Duration of use	240 months (20 years)

Safety characteristic data according to EN ISO 13849-1

Achievable performance level	PL e (two-channel)
Category	4 (two-channel)
Diagnostic coverage (DC _{avg})	99%
Duration of use	240 months (20 years)
Probability of a dangerous failure per hour (PFH _D)	$1.6 * 10^{-11}$ (RD); $3.4 * 10^{-11}$ (WH,GN,YE)

Conformance with EMC directive 2014/30/EU**Immunity test in accordance with EN 61000-6-2**

Electrostatic discharge (ESD) EN 61000-4-2/IEC 61000-4-2	Criterion B, 6 kV contact discharge, 8 kV air discharge, 6 kV indirect discharge
Electromagnetic fields EN 61000-4-3/IEC 61000-4-3	Criterion A, field strength: 10 V/m, 80 MHz ... 2000 MHz
Fast transients (burst) EN 61000-4-4/IEC 61000-4-4	Criterion B, 2 kV
Transient overvoltage (surge) EN 61000-4-5/IEC 61000-4-5	Criterion B, 2 kV

Noise emission test in accordance with EN 61000-6-4	Class A
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Approvals

For the latest approvals, please visit phoenixcontact.net/products.

5 Notes regarding documentation

5.1 Identification of warning notes



This symbol indicates hazards that could lead to personal injury.

There are three signal words indicating the severity of a potential injury.

DANGER Indicates a hazard with a high risk level. If this hazardous situation is not avoided, it will result in death or serious injury.

WARNING Indicates a hazard with a medium risk level. If this hazardous situation is not avoided, it could result in death or serious injury.

CAUTION Indicates a hazard with a low risk level. If this hazardous situation is not avoided, it could result in minor or moderate injury.



This symbol together with the NOTE signal word warns the reader of actions that might cause property damage or a malfunction.



Here you will find additional information or detailed sources of information.

5.2 Validity

This data sheet applies to signal lights CSD-SL 200S WH, CSD-SL 200S GN, CSD-SL 200S YE and CSD-SL 200S RD.

5.3 Target group

This data sheet is therefore aimed at:

- Qualified personnel who plan and design safety equipment for machines and systems and are familiar with regulations governing occupational safety and accident prevention.
- Qualified personnel who install and operate safety equipment in machines and systems.

Qualified personnel:

Qualified personnel are people who, because of their education, experience, and instruction and their knowledge of relevant standards, regulations, accident prevention, and service conditions, have been authorized by those responsible for the safety of the system to carry out any required operations and who are able to recognize and avoid any possible dangers.

Requirements:

Knowledge of the following topics is required:

- INTERBUS
- Standard control system used

6 Safety regulations and installation notes



WARNING: Risk of death, serious personal injury or damage to equipment.

Depending on the application, incorrect handling of the device may pose serious risks for the user or cause damage to equipment.

- Observe all the safety notes and warning instructions provided in this section and elsewhere in this document.

General

- Observe the safety regulations of electrical engineering and industrial safety and liability associations.

Disregarding these safety regulations may result in death, serious personal injury or damage to equipment.

- The safety functionality of the device is only available when used as intended.
- The safety of personnel and equipment can only be assured if used as intended.
- Only work on the device when the power is disconnected.
- The device may only be installed by qualified staff in accordance with the specifications in the corresponding documentation.
- Electrical work may only be carried out by electrically skilled persons.
- Carry out a validation every time you make a safety-related modification to the system/machine (see Section 19 "Validation").
- Take appropriate measures to ensure that your system/machine does not present any danger during validation.
- The module may only be started up by a person who is responsible for the safety of the system. Only this person is allowed to connect the supply voltage.
- Observe the necessary safety precautions when handling components that are vulnerable to electrostatic discharge (EN 61340-5-1, IEC 61340-5-1).
- Repairs to the device may only be carried out by Phoenix Contact.
- Keep the operating instructions in a safe place.
- The machine/system manufacturer and the operator are solely responsible for the safety of the machine or system and the implemented application in which the machine or system is used.
The Machinery Directive must therefore be observed.
- Observe the additional safety notes in Section 12 on page 19.

Direct/indirect contact

- Protection against direct and indirect contact according to VDE 0100 Part 410 must be ensured for all connected components.

In the event of an error, parasitic voltages must not occur (single-fault tolerance).

Power supply units for 24 V supply

The device is intended exclusively for operation with protective extra-low voltage (PELV) in acc. with EN 60204-1.

Only PELV in accordance with the listed standard may be used for the supply.

- Only use power supply units that meet EN 60204 with safe isolation and PELV according to EN 50178/VDE 0160 (PELV). This prevents short circuits between primary and secondary sides.
- Only use power supplies without fall-back characteristic curve. The power supply must be suitable for operation with capacitive loads.
- Ensure the power supply unit and fuse are compatible. The power supply unit must be able to temporarily provide the tripping current.

During operation

Magnetic fields can influence the device. The magnetic field strength of the environment must not exceed 30 A/m.

- Do **not** use the device in the vicinity of strong magnetic fields (e.g., caused by transformers or magnetic iron).

7 Intended use

The signal light is designed for use in light signal systems (e.g., lock systems, movable bridges on inland waterways, etc.).

The device is rated to protection class IP65/IP67 (when installed).

- Only use the signal light in accordance with the defined technical data and ambient conditions (see Section 4).
- Only use the signal light in applications in which the signal light meets safety requirements.

7.1 Reasonably foreseeable misuse

- Do **not** use the signal light in a 230 V environment.
- Do **not** operate the light outside the technical lighting specifications.

7.2 Modifications

Modifications to the device hardware are not permitted.

Incorrect operation or modifications to the device can endanger your safety or damage the device. Do not repair the device yourself.

- If the device is defective, please contact Phoenix Contact.

8 Applied directives and standards

- EN 12966-1
- IALA recommendation E200-1
- EN ISO 13849
- EN 62061
- IEC 61508

9 Transport and unpacking

9.1 Transport

The device is delivered in cardboard packaging.

- Only transport the device to its destination in its original packaging.
- Please note the instructions regarding handling, moisture, shock, tilt, and temperature indicators on the packaging.
- Observe the humidity specifications and the temperature range specified for transport (see Section 4).
- Protect the surfaces as necessary to prevent damage.
- When transporting the equipment or storing it temporarily, make sure that the surfaces are protected from the elements and any external influences, and that they are kept dry and clean.

9.2 Storage

The storage location must meet the following requirements:

- Dry
- Protected from unauthorized access
- Protected from harmful environmental influences
- Temperature range: -25°C ... +85°C
- Air pressure: 70 kPa ... 106 kPa (up to 3000 m above sea level)
- Permissible humidity: 5% ... 95% (in accordance with DIN EN 61131-2), non-condensing

9.3 Checking the delivery

- Check the delivery for transport damage.

Damaged packaging is an indicator of potential damage to the device that may have occurred during transport. This could result in a malfunction.

- Submit claims for any transport damage immediately, and inform Phoenix Contact or your supplier as well as the shipping company without delay.
- When submitting your claim, be sure to include photos that clearly document the damage to the packaging/delivery.
- Check the delivery note immediately upon delivery in order to check that the contents of the packaging are complete.
- Keep the box and packaging material in case you need to return the product.
- We strongly recommend using the original packaging to return the product.
- If the original packaging is no longer available, observe the following points:

- Observe the humidity specifications and the temperature range specified for transport (see Section 4).
- Use dehumidifying agents if necessary.
- Use suitable ESD packaging to protect components that are sensitive to electrostatic discharge.
- Make sure that the packaging you select is large enough and sufficiently thick.
- Only use plastic bubble wrap sheets as filler material.
- Attach warnings to the transport packaging so that they are clearly visible.
- Please ensure that the delivery note is placed inside the package if the package is to be shipped domestically. However, if the package is being shipped internationally, the delivery note must be placed inside a delivery note pocket and attached to the outside so that it is clearly visible.

Scope of supply

- Signal light CSD-SL 200S XX

9.4 Unpacking

The signal light is delivered in packaging together with original operating instructions (packing slip) that provide installation instructions.

- Please read the complete packing slip carefully before unpacking the signal light.

**NOTE: Electrostatic discharge**

The device contains components that can be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) in accordance with EN 61340-5-1 and IEC 61340-5-1.

**NOTE: Property damage due to noncompliance with ESD notes**

If the ESD notes are not observed during unpacking and packaging, the device may become damaged.

- Observe the ESD notes during unpacking and packaging.

10 Emission angle and luminous intensity

Signal light	Half-value angle of the full angle (emission angle) [°]	Luminous intensity [cd] 0° at dim level 0	Luminous intensity [cd] 0° at dim level 255
CSD-SL 200S RD	7.5 x 7.5	200	3000
CSD-SL 200S GN	7.5 x 7.5	200	3000
CSD-SL 200S YE	7.5 x 7.5	200	3000
CSD-SL 200S WH	7.5 x 7.5	400	4500

11 Emission characteristics

11.1 CSD-SL 200S RD

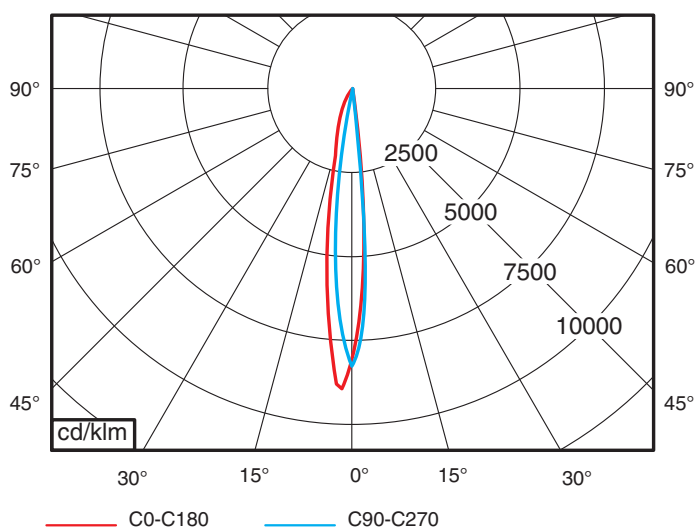


Figure 1 Luminous intensity distribution (LID)

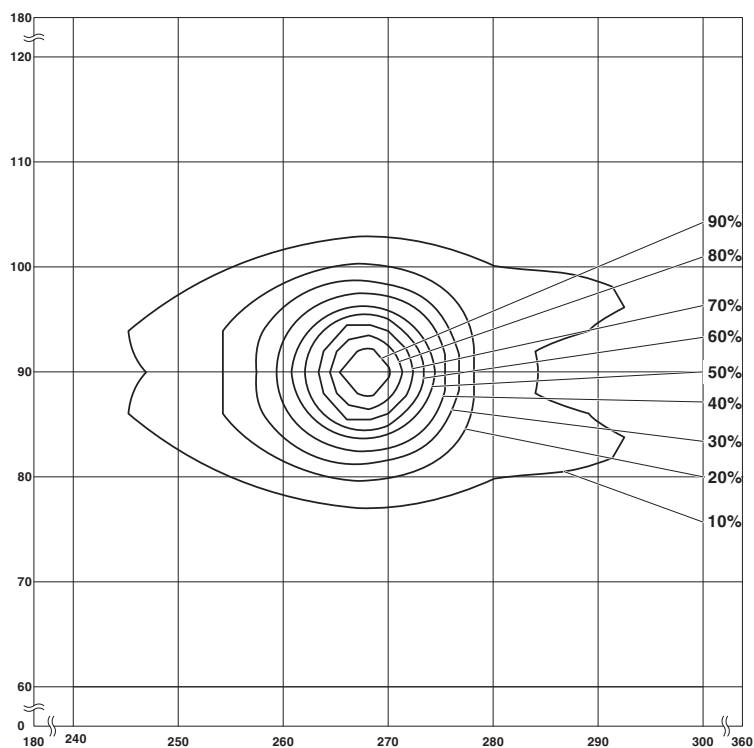


Figure 2 Light intensity distribution (isocandela)

11.2 CSD-SL 200S GN

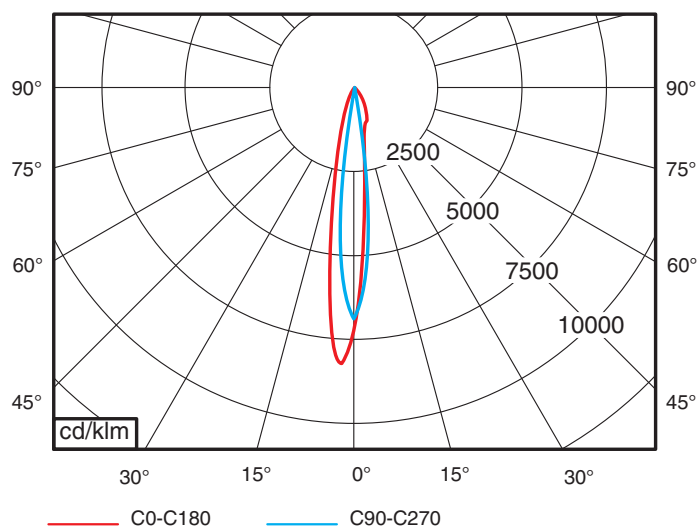


Figure 3 Luminous intensity distribution (LID)

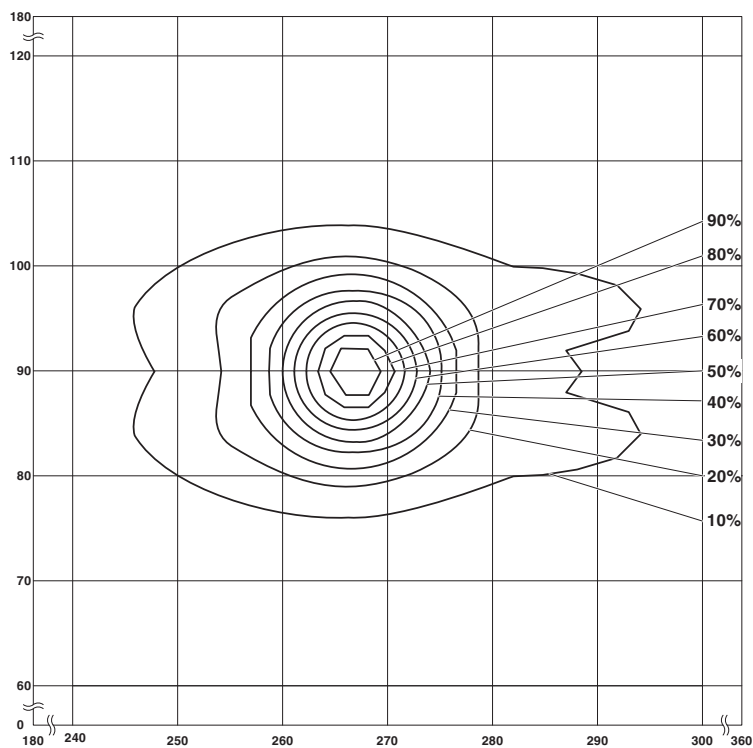


Figure 4 Light intensity distribution (isocandela)

11.3 CSD-SL 200S YE

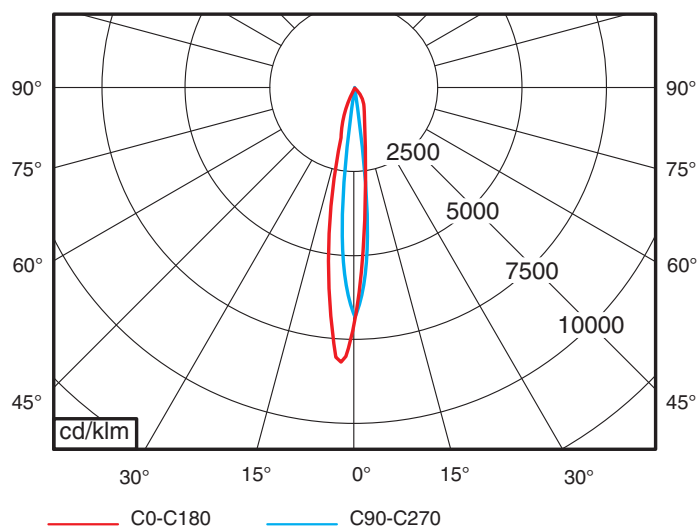


Figure 5 Luminous intensity distribution (LID)

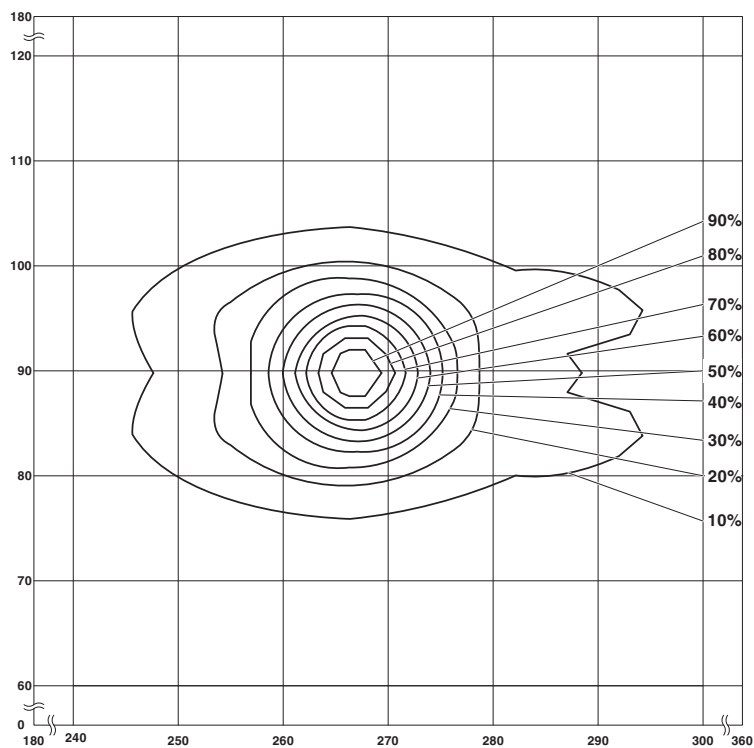


Figure 6 Light intensity distribution (isocandela)

11.4 CSD-SL 200S WH

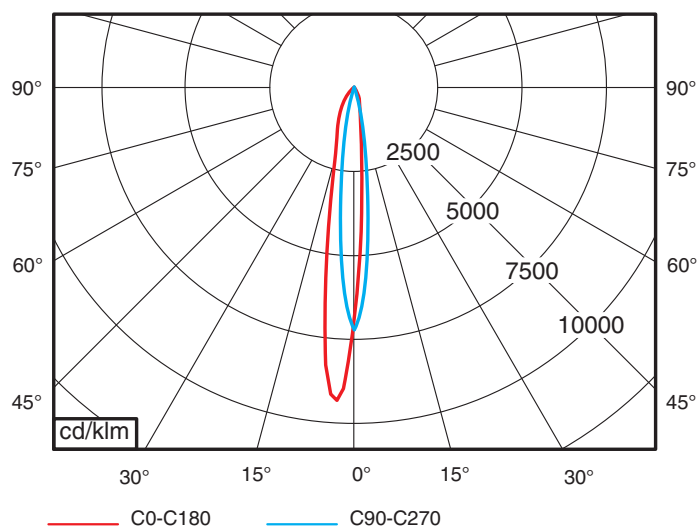


Figure 7 Luminous intensity distribution (LID)

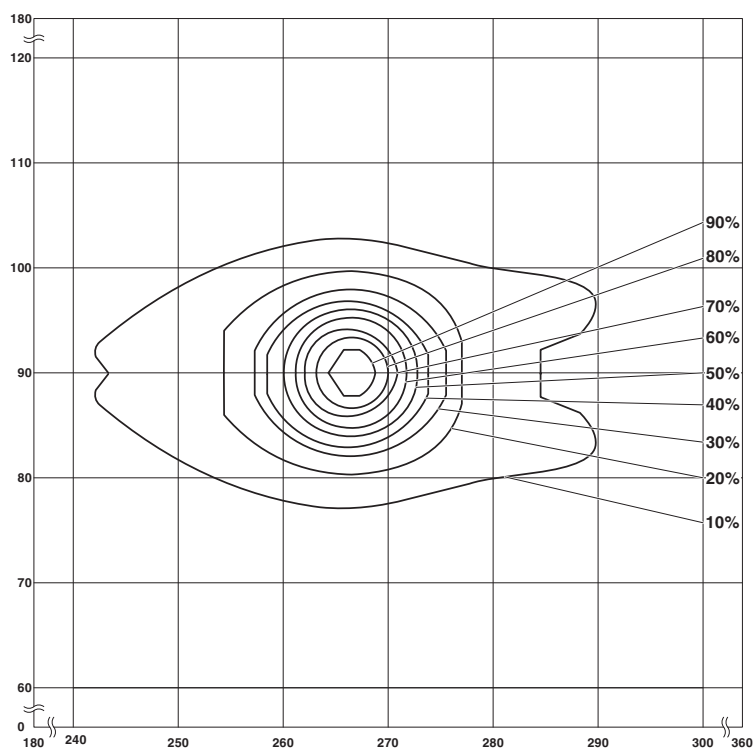


Figure 8 Light intensity distribution (isocandela)

12 Safety notes



WARNING: Loss of safety function due to feedback

Feedback of the actuator voltage can result in the loss of the safety function.

- When wiring all components in safety applications, ensure that errors are prevented in terms of feedback for:
 - All connected cables that supply the device with actuator voltage
 - The connecting cables of the actuators
- Please take all connected loads into consideration.
 - This means, for example, that separate sheathed cables must be used for the cabling.



WARNING: Loss of safety function due to parasitic voltages

Parasitic voltages can result in the loss of the safety function.

- The ground connection of the connected load must only be connected to the ground connection of the signal light. This means, for example, that a single-conductor connection is not permitted.



WARNING: Risk of injury due to heavy weight

A falling signal light may result in injuries due to its heavy weight.

- Ensure that the signal light cannot fall.



WARNING: Risk of injury due to insufficient light output

Dirt on the front cover affects the light output of the signal light. Large amounts of dirt may limit light output to such an extent that reliable signal operation is no longer possible.

- Clean the signal light as described in the Section [20.2 "Maintenance"](#).



CAUTION: Risk of injury due to heat generation

The signal light can become hot during operation. Touching the signal light while hot may result in burns.

- Ensure that the device has cooled down sufficiently before handling.
- Do not touch the device when it is in operation.



CAUTION: Risk of injury due to focused light beams

The focused light beams of the LEDs may cause eye injuries if not handled correctly.

- Do not look directly into the light source if you are less than 3 meters from the light source.



NOTE: Damage to electronics and LEDs

If the signal light becomes too hot (for example, due to exhaust flow from ships) the LEDs and electronics can be damaged.

- Operate the signal light only as intended.
- Only use the signal light within the permissible ambient temperatures (see Section [4](#)).
- Make sure that the maximum permitted ambient temperature is **not** exceeded due to additional heat sources.



NOTE: Measurement errors due to lack of internal calibration

The internal sensors of the signal light are affected if the signal light is illuminated by external light sources (e.g. sun, artificial light sources). To rule out measurement errors, an automatic calibration of the internal sensors must be performed at least once a day.

The automatic calibration of the internal sensors is triggered when the signal light is exposed to a luminance of less than 10 cd/m² for at least 30 minutes (for example, during dark periods of the day).

- Make sure that the signal light is exposed to a luminance of less than 10 cd/m² at least once a day for at least 30 minutes.

**NOTE: Danger of the front cover breaking**

Heavy or sharp objects may damage the front cover.

- Ensure that no heavy or sharp objects come into contact with the front cover.

**NOTE: Electromagnetic interference**

Electromagnetic interference can influence operation of the signal light and damage the signal light. Interference-free operation is only guaranteed if the signal light is connected to the functional ground.

- Connect the signal light to the functional ground as described in the Section [“Mounting the signal light”](#) on page 21.

13 Signal light components

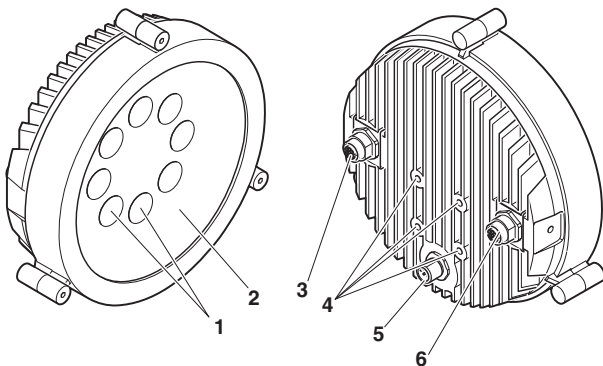


Figure 9 Signal light components

- 1 LEDs
- 2 Front cover
- 3 M12 SPEEDCON female for the incoming INTERBUS
- 4 Mounting holes
- 5 M12 SPEEDCON connector for safe signal diagnostics
- 6 M12 SPEEDCON female for the outgoing INTERBUS

14 Dimensions

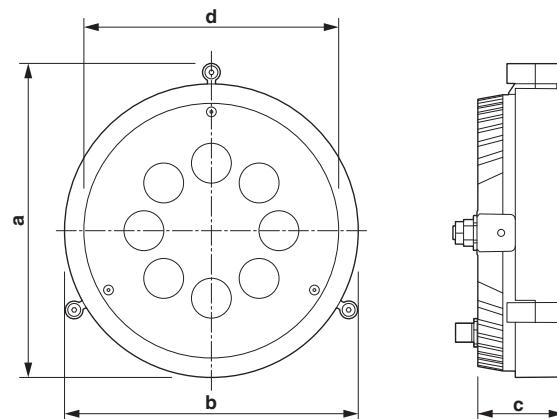


Figure 10 Signal light dimensions

Position	Length (with connections and attachments)	Dimension (in mm)
a	Height	189
b	Width	174
c	Depth	66
d	LED light emission opening	144

15 Mounting the signal light

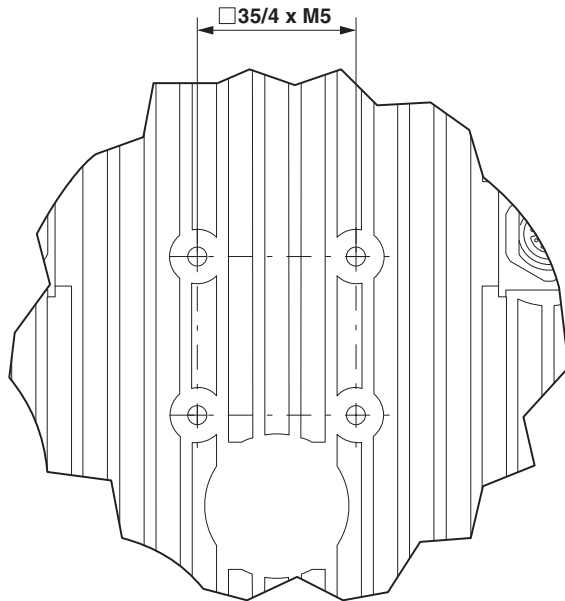


Figure 11 Position of the mounting holes

- Position a toothed lock washer on the mounting hole of the selected M5 screw on the signal light housing.
 - Position the ring cable lug on the toothed lock washer.
 - Position the signal light on the mounting plate so that the screws can be inserted through the drill holes. Use lifting gear to raise the signal light into position if required.
 - Tighten the screws (max. torque: 40 Nm) to secure the signal light and to connect the functional ground.
 - Align the signal light in accordance with your application.
 - Ensure that the M12 SPEEDCON connections are screwed tight so that the degree of protection can be guaranteed.
- Drill four holes for the M5 screws in the mounting plate (hole depth: 14 mm) to which the signal light is to be secured.
 - Ensure that the drill holes are correctly positioned and spaced.
 - Remove any burrs where necessary.
 - Connect the functional ground to one of the four M5 screws:



Please note:

Connection of the functional ground requires a grounding cable, a ring cable lug, and a toothed lock washer.

The required conductor cross section of the grounding cable depends on the length of the grounding cable. At a cable length of <2 m, the conductor cross section must be at least 4 mm². If you use a grounding cable that is >2 m in length, the grounding cable must have a correspondingly larger conductor cross section.

- Select the grounding cable, ring cable lug, and toothed lock washer in accordance with the environmental requirements.

- Attach a ring cable lug to the grounding cable.

16 Connection assignment

16.1 Supply line and bus line

The signal light is connected to the supply line and the bus line using two M12 SPEEDCON connectors. The M12 SPEEDCON connectors each have a 5-pos. INTERBUS connection and a 2-pos. connection for the power supply.

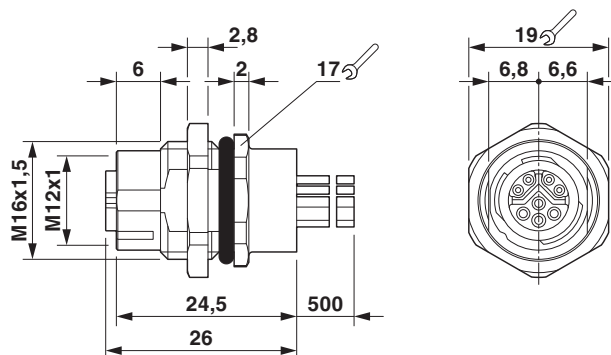


Figure 12 SPEEDCON connector

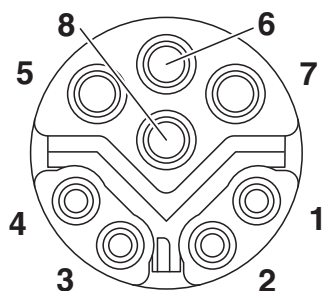


Figure 13 Connection assignment of the M12 SPEEDCON female for the incoming and outgoing INTERBUS

Pin	Assignment	Wire color
1	DO	White-orange
2	/DO	Orange
3	DI	White-green
4	/DI	Green
5	24 V DC supply GND	Blue
6	n. c.	–
7	INTERBUS GND	Brown
8	24 V DC supply	Black

16.2 Digital outputs for safe diagnostics

The signal light has an M12 SPEEDCON connector. The M12 SPEEDCON connector has two digital outputs for safe signal diagnostics.

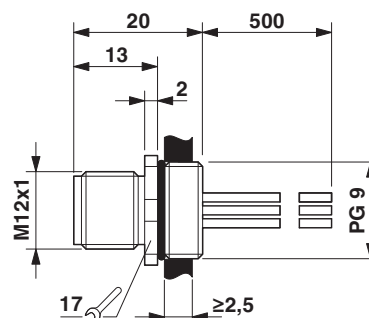


Figure 14 SPEEDCON connector

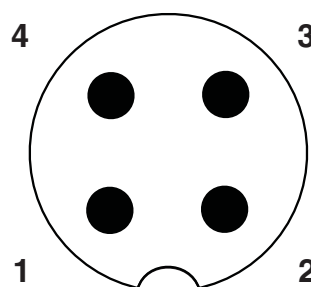


Figure 15 Connection assignment of the M12 SPEEDCON male for safe signal diagnostics

Pin	Assignment	Wire color
1	GND	Brown
2	Digital output 2	White
3	GND	Black
4	Digital output 1	Blue

On the safe outputs, the signal light generates test pulses (light and dark tests). The pulse duration is < 1 ms and the pulses are staggered on the two channels. The repetition rate per output is approximately 30 s. The safety function of downstream devices must not be affected.

At a current of 2 mA, downstream devices shall not detect a HIGH signal (active) at the outputs. According to EN 61131-2, only type 2 inputs are therefore permissible.

The outputs comply with ZVEI classification type D, class 1.

17 INTERBUS process data

17.1 Diagnostic data register

	Word 0															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	ON/ OFF	FS	DTR	W	MAP				DV, bit 0	DV, bit 1	DV, bit 2	DV, bit 3	DV, bit 4	DV, bit 5	DV, bit 6	DV, bit 7
IN	ON/ OFF	FS	TE	W	MAP				SV, bit 0	SV, bit 1	SV, bit 2	SV, bit 3	SV, bit 4	SV, bit 5	SV, bit 6	SV, bit 7

	Word 1															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	-			-				-				-				
IN	LS 1, bit 0	LS 1, bit 1	LS 1, bit 2	LS 1, bit 3	LS 1, bit 4	LS 1, bit 5	LS 1, bit 6	LS 1, bit 7	LS 2, bit 0	LS 2, bit 1	LS 2, bit 2	LS 2, bit 3	LS 2, bit 4	LS 2, bit 5	LS 2, bit 6	LS 2, bit 7

	Word 2															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	-			-				-				-				
IN	IT, bit 0	IT, bit 1	IT, bit 2	IT, bit 3	IT, bit 4	IT, bit 5	IT, bit 6	IT, bit 7	Group 1				Group 2			

	Word 3															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	-			-				-				-				
IN	Group 3				Group 4				Group 5				Group 6			

	Word 4															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	-			-				-				-				
IN	Group 7				Group 8				Group 9				Group 10			

	Word 5															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	-			-				-				-				
IN	Group 11				Group 12				Group 13				Group 14			

Key:

FS:	Fixed state
DTR:	Disconnect temperature regulation
DV:	Dimming value
TE:	Temperature error
SV:	Signal light supply voltage
LS 1/2:	Light intensity of sensor 1 or sensor 2
IT:	Internal temperature of the signal light
Group 1 ... 2:	Group bits
Bit 0 set:	One LED defective
Bit 1 set:	Two LEDs defective
Bits 0 ... 1 set:	More than two LEDs defective
Bit 2 set:	Error in current control
Bit 3 set:	Temperature control active
Group 3 ... 14:	For future use
MAP:	Switch between the different registers
0 _{hex} :	Diagnostic data register
4 _{hex} :	Signal information register
8 _{hex} :	Operating hours register
W:	Bit for writing the operating hours register

17.2 Signal information register

	Word 0															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	ON/ OFF	FS	DTR	W	MAP				DV, bit 0	DV, bit 1	DV, bit 2	DV, bit 3	DV, bit 4	DV, bit 5	DV, bit 6	DV, bit 7
IN	ON/ OFF	FS	TE	W	MAP				-	-	-	-	-	-	-	-

	Word 1															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	SN, bit 0	SN, bit 1	SN, bit 2	SN, bit 3	SN, bit 4	SN, bit 5	SN, bit 6	SN, bit 7	SN, bit 8	SN, bit 9	SN, bit 10	SN, bit 11	SN, bit 12	SN, bit 13	SN, bit 14	SN, bit 15
IN	SN, bit 0	SN, bit 1	SN, bit 2	SN, bit 3	SN, bit 4	SN, bit 5	SN, bit 6	SN, bit 7	SN, bit 8	SN, bit 9	SN, bit 10	SN, bit 11	SN, bit 12	SN, bit 13	SN, bit 14	SN, bit 15

	Word 2															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	SN, bit 16	SN, bit 17	SN, bit 18	SN, bit 19	SN, bit 20	SN, bit 21	SN, bit 22	SN, bit 23	SN, bit 24	SN, bit 25	SN, bit 26	SN, bit 27	SN, bit 28	SN, bit 29	SN, bit 30	SN, bit 31
IN	SN, bit 16	SN, bit 17	SN, bit 18	SN, bit 19	SN, bit 20	SN, bit 21	SN, bit 22	SN, bit 23	SN, bit 24	SN, bit 25	SN, bit 26	SN, bit 27	SN, bit 28	SN, bit 29	SN, bit 30	SN, bit 31

	Word 3															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	SN, bit 32	SN, bit 33	SN, bit 34	SN, bit 35	SN, bit 36	SN, bit 37	SN, bit 38	SN, bit 39	SD, bit 0	SD, bit 1	SD, bit 2	SD, bit 3	CL, bit 0	CL, bit 1	CL, bit 2	CL, bit 3
IN	SN, bit 32	SN, bit 33	SN, bit 34	SN, bit 35	SN, bit 36	SN, bit 37	SN, bit 38	SN, bit 39	SD, bit 0	SD, bit 1	SD, bit 2	SD, bit 3	CL, bit 0	CL, bit 1	CL, bit 2	CL, bit 3

	Word 4															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	LH, bit 0	LH, bit 1	LH, bit 2	LH, bit 3	LH, bit 4	LH, bit 5	LH, bit 6	LH, bit 7	LV, bit 0	LV, bit 1	LV, bit 2	LV, bit 3	LV, bit 4	LV, bit 5	LV, bit 6	LV, bit 7
IN	LH, bit 0	LH, bit 1	LH, bit 2	LH, bit 3	LH, bit 4	LH, bit 5	LH, bit 6	LH, bit 7	LV, bit 0	LV, bit 1	LV, bit 2	LV, bit 3	LV, bit 4	LV, bit 5	LV, bit 6	LV, bit 7

	Word 5															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	PS, bit 0	PS, bit 1	PS, bit 2	PS, bit 3	PS, bit 4	PS, bit 5	PS, bit 6	PS, bit 7	VN, bit 0	VN, bit 1	VN, bit 2	VN, bit 3	VN, bit 4	VN, bit 5	VN, bit 6	VN, bit 7
IN	PS, bit 0	PS, bit 1	PS, bit 2	PS, bit 3	PS, bit 4	PS, bit 5	PS, bit 6	PS, bit 7	VN, bit 0	VN, bit 1	VN, bit 2	VN, bit 3	VN, bit 4	VN, bit 5	VN, bit 6	VN, bit 7

Key:

FS:	Fixed state
DTR:	Disconnect temperature regulation
DV:	Dimming value
TE:	Temperature error
VN:	Hardware/firmware version of the signal light
SN:	Serial number of the signal light
SD:	Housing dimension
CL:	Light color
LH:	Lens horizontal
LV:	Lens vertical
PS:	Register for programming sequence
MAP:	Switch between the different registers
0 _{hex} :	Diagnostic data register
4 _{hex} :	Signal information register
8 _{hex} :	Operating hours register
W:	Bit for writing the operating hours register

17.3 Operating hours register

	Word 0															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	ON/OFF	FS	DTR	W	MAP				DV, bit 0	DV, bit 1	DV, bit 2	DV, bit 3	DV, bit 4	DV, bit 5	DV, bit 6	DV, bit 7
IN	ON/OFF	FS	TE	W	MAP				-	-	-	-	-	-	-	-

	Word 1															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	TOH, bit 0	TOH, bit 1	TOH, bit 2	TOH, bit 3	TOH, bit 4	TOH, bit 5	TOH, bit 6	TOH, bit 7	TOH, bit 8	TOH, bit 9	TOH, bit 10	TOH, bit 11	TOH, bit 12	TOH, bit 13	TOH, bit 14	TOH, bit 15
IN	TOH, bit 0	TOH, bit 1	TOH, bit 2	TOH, bit 3	TOH, bit 4	TOH, bit 5	TOH, bit 6	TOH, bit 7	TOH, bit 8	TOH, bit 9	TOH, bit 10	TOH, bit 11	TOH, bit 12	TOH, bit 13	TOH, bit 14	TOH, bit 15

	Word 2															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	LAH, bit 0	LAH, bit 1	LAH, bit 2	LAH, bit 3	LAH, bit 4	LAH, bit 5	LAH, bit 6	LAH, bit 7	LAH, bit 8	LAH, bit 9	LAH, bit 10	LAH, bit 11	LAH, bit 12	LAH, bit 13	LAH, bit 14	LAH, bit 15
IN	LAH, bit 0	LAH, bit 1	LAH, bit 2	LAH, bit 3	LAH, bit 4	LAH, bit 5	LAH, bit 6	LAH, bit 7	LAH, bit 8	LAH, bit 9	LAH, bit 10	LAH, bit 11	LAH, bit 12	LAH, bit 13	LAH, bit 14	LAH, bit 15

	Word 3															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	RES															
IN	RES															

	Word 4															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	RES															
IN	RES															

	Word 5															
	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12	Bit 13	Bit 14	Bit 15
OUT	PS, bit 0	PS, bit 1	PS, bit 2	PS, bit 3	PS, bit 4	PS, bit 5	PS, bit 6	PS, bit 7	RES							
IN	PS, bit 0	PS, bit 1	PS, bit 2	PS, bit 3	PS, bit 4	PS, bit 5	PS, bit 6	PS, bit 7	RES							

Key:

FS:	Fixed state
DTR:	Disconnect temperature regulation
DV:	Dimming value
TE:	Temperature error
TOH:	Total operating hours
LAH:	Active operating hours of the LEDs
RES:	Reserved
PS:	Programming sequence
MAP:	Switch between the different registers
0 _{hex} :	Diagnostic data register
4 _{hex} :	Signal information register
8 _{hex} :	Operating hours register
W:	Bit for writing the operating hours register

18 Writing the operating hours register

You can manage the signal light from the application program using a controller from Phoenix Contact. To write the operating hours of the signal light to the operating hours register and to transfer them to the controller, a corresponding programming sequence must be created in the application program.

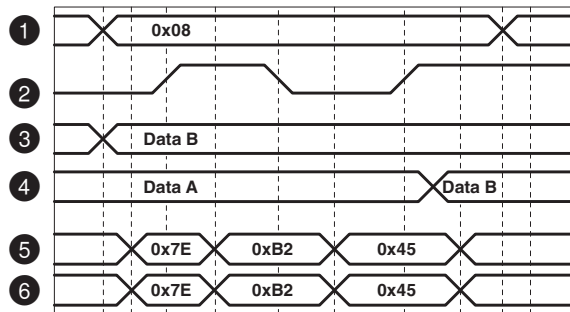


Figure 16 Writing the operating hours register: sequence diagram

Key:

- 1 MAP OUT
- 2 Write bit (W) OUT
- 3 Operating hours OUT
- 4 Operating hours IN
- 5 Programming sequence OUT
- 6 Programming sequence IN

- Create a programming sequence that maps the following:
 - Switching to the operating hours register:
The controller writes value 8_{hex} to word 0, bit 4 ... bit 7 (MAP OUT).
 - Starting the programming sequence:
The controller writes the new operating hours values (TOH and LAH) to word 1, bit 0 ... bit 15, and word 2, bit 0 ... bit 15 (always the two registers).



Please note:

The operating hours values remain unchanged during the entire programming sequence.

The controller writes value $7E_{\text{hex}}$ to word 5, bit 0 ... bit 7 (programming sequence OUT).

The controller sets the write bit (word 0, bit 3) to 1.

- Waiting for feedback from the signal light:
The controller reads the value in word 5, bit 0 ... bit 7 (programming sequence IN).
Value $\langle \rangle 7E_{\text{hex}}$:
Waiting for feedback from the signal light
Value = $7E_{\text{hex}}$:
Preparing to save the operating hours
- Preparing to save the operating hour:
The controller writes value $B2_{\text{hex}}$ to word 5, bit 0 ... bit 7 (programming sequence OUT).
The controller sets the write bit (word 0, bit 3) to 0.
- Waiting for feedback from the signal light:
The controller reads the value in word 5, bit 0 ... bit 7 (programming sequence IN).
Value $\langle \rangle B2_{\text{hex}}$:
Waiting for feedback from the signal light
Value = $B2_{\text{hex}}$:
Saving the operating hours
- Saving the operating hours
The controller writes value 45_{hex} to word 5, bit 0 ... bit 7 (programming sequence OUT).
The controller sets the write bit (word 0, bit 3) to 1.
- Waiting for feedback from the signal light:
The controller reads the value in word 5, bit 0 ... bit 7 (programming sequence IN).
Value $\langle \rangle 45_{\text{hex}}$:
Waiting for feedback from the signal light
Value = 45_{hex} :
The operating hours values (TOH and LAH) have been saved and can be read by the controller.

19 Validation

- Check your overall safety application.
- Perform a function test and error simulation.



- Carry out a new validation every time you make a safety-related modification.

20 Maintenance and care

20.1 Maintenance

PL d, SIL 2 and PL e, SIL 3:

To ensure trouble-free operation, you must switch the signal off and on **at least** once every six months:

- Switch off the signal light.
- Keep the signal light switched off for more than two seconds.
- Switch on the signal light.
- Keep the signal light switched on for more than two seconds.

20.2 Maintenance

Dirt on the front cover affects the luminous intensity of the signal light.

Recommended:

- Clean the front cover of the signal light every six months and before luminosity loss exceeds 10%.
- Do not use corrosive or harsh cleaning agents as they may damage the front cover.
- Check whether the signal light fulfills the following requirements:
 - The front cover is clean.
 - The front cover is not fogged up.
 - The front cover is not damaged.
 - The housing of the signal light and the connectors are not damaged.
- If the front cover fogs up or the signal light is damaged, contact Phoenix Contact.

21 Removing the signal light

- Disconnect the signal light from the power source.
- Remove the M12 SPEEDCON connector from the signal light.
- Remove the M5 screws.
- Remove the signal light from the mounting plate.
Use lifting gear to raise the signal light into position if required.

22 After use

22.1 Device replacement

The signal light can also be replaced, if necessary.

If you want to replace a signal light, follow the steps in Sections [21 "Removing the signal light"](#) and [15 "Mounting the signal light"](#).

The new signal light must meet the following requirements:

- Same device type
- Carry out a validation and perform a function test after replacing the device.

22.2 Device failure and repair

Repairs may only be carried out by Phoenix Contact.

- Send faulty devices back to Phoenix Contact for repairs or to receive a replacement device.
- We strongly recommend using the original packaging to return the product.
- Include a note in the packaging indicating that the contents are returned goods.
- If the original packaging is no longer available, observe the following points:
 - Observe the humidity specifications and the temperature range specified for transport (see Section [4 "Technical data"](#)).
 - Use dehumidifying agents if necessary.
 - Use suitable ESD packaging to protect components that are sensitive to electrostatic discharge.
 - Secure any loose parts.
 - Make sure that the packaging you select is large enough and sufficiently thick.
 - Only use plastic bubble wrap sheets as filler material.
 - Attach warnings to the transport packaging so that they are clearly visible.
 - Please ensure that the delivery note is placed inside the package if the package is to be shipped domestically. However, if the package is being shipped internationally, the delivery note must be placed inside a delivery note pocket and attached to the outside so that it is clearly visible.

22.3 Disposal



- Do not dispose of the device with household waste; it should instead be disposed of in accordance with the currently applicable national regulations.

- Dispose of packaging materials that are no longer needed (cardboard packaging, paper, bubble wrap sheets, etc.) with household waste in accordance with the currently applicable national regulations.
- Make sure that the device can never be reused.

22.4 Return for disposal

As an alternative to disposal, you can return the device to Phoenix Contact.

- Include a note in the packaging indicating that the device should be disposed of.



Please note:

The device must not show evidence of being contaminated by oils, greases, etc.

23 Revision history

Revision	Date	Contents
01	2019-03-13	First publication
02	2019-05-14	Additions to Section 16.2