



Protective retro-reflective photoelectric sensor SRK 96

Technical Description



© All rights reserved, especially the right of reproduction, distribution and translation. Copying or reproductions in any form require the written consent of the manufacturer.
Changes due to technical improvement may be made.

1	General Information	3
1. 1	Explanation of symbols	3
1. 2	Declaration of Conformity	3
1. 3	General information	3
1. 4	Definition of terms	4
1. 5	Selection of Optical Electronic Protective Devices	5
1. 6	Determination of the protected area	5
1. 7	Determination of the protective function	5
1. 8	Residual risks (EN 292-1)	5
2	Safety Notices	6
2. 1	Safety Standards	6
2. 2	Intended Use	6
2.2.1	Application requirements	6
2.2.2	Areas of application	7
2. 3	Working Safely	8
2. 4	Organisational measures	9
3	Function	10
3. 1	System description	10
3. 2	Description of functions SRK 96	10
3. 3	Testing SRK 96	11
3. 4	Function safety	11
4	Mounting and commissioning	12
4. 1	Components of the safety system	12
4. 2	Integration in the machine control system	12
4. 3	Display elements	12
4. 4	Mounting of the Safety System	13
4.4.1	Mounting of the protective retro-reflective photoelectric sensor SRK 96	13
4.4.2	Safety distance	15
4.4.3	Multi-axle installation	16
5	Electrical Installation	17
5. 1	Electrical connection	17
5.1.1	Electrical connection diagrams	17
6	Specifications	19
6. 1	Dimensioned drawings	20

Figure 2.1:	Attachment of the sticky labels with warning notices	9
Figure 4.1:	Arrangement of the reflector.....	13
Figure 4.2:	Mounting to or between plane-parallel surfaces.....	14
Figure 4.3:	Safety distance from the danger area	15
Table 4.1:	Protection heights and number of photoelectric sensors	16
Figure 5.1:	Electrical connection diagrams.....	17
Figure 5.2:	Connection SRK 96 with TNT 35	18
Figure 5.3:	Connection SRK 96 with TMC 66.....	18
Table 6.1:	Specifications	19
Figure 6.1:	Dimensioned drawing SRK 96	20
Figure 6.2:	Dimensioned drawings for PTKS... reflectors	21

1 General Information

1.1 Explanation of symbols

The symbols used in this technical description are explained below.



Attention!

This symbol appears before text passages that have to be observed by all means. Failure to heed this information may lead to injuries to personnel or damage to the equipment.



Attention Laser!

This symbol warns of possible danger through hazardous laser radiation.



Notice!

This symbol indicates text passages containing important information.

1.2 Declaration of Conformity

The protective retro-reflective photoelectric sensor SRK 96 has been developed and produced in accordance with the applicable European standards and directives.



Notice!

The corresponding declaration of conformity can be requested from the manufacturer.

The manufacturer of the product, Leuze electronic GmbH & Co KG in D-73277 Owen/Teck, possesses a certified quality assurance system in accordance with ISO 9001.



1.3 General information

An AOPD is part of the electrical equipment which has to be applied to those machines which contain the potential risk of bodily injury. It provides protection by causing the machine to move into a safe operating state before a person can get into a dangerous situation (EN 61496-1).

1.4 Definition of terms

Contactless active protective device (AOPD)

A combination of parts and/or components which functions together to provide access protection or presence detection and contains at least the following:

- a sensor unit,
- control/monitoring units,
- output switching elements.

AOPD Type 2

The EN 61496 describes two types of active optical electronic protective devices (AOPD) with respect to the requirements concerning safety relevant parts of control units (EN 954-1).

The AOPD type 2 fulfils the requirements of category 2 acc. to EN 954-1. A periodic function test has to detect malfunctions in the safety function. In case of a failure, the next machine cycle may not be released. A malfunction of the AOPD type 2 between the testings can cause the loss of the safety function. In normal function, at least one output switching element of the AOPD type 2 has to move into the OFF-position if the sensor reacts or if the power supply of the AOPD is interrupted.

Start disable

An equipment which disables the automatic machine start if the power supply of the contactless active protective device is switched on or if it had been interrupted and switched on again.

Start testing

A manual or automatic test which is performed after the contactless active protective device has been switched on. It tests the complete safety-relevant control system before the normal machine operation is induced.

Restart-disable

A function which prevents an automatic restart of a machine after activation of the sensor unit during a potentially dangerous part of the machine cycle, after a change in the operating mode of the machine and a change in the actuation mode of the machine. Operating modes include:

- jog,
- single stroke,
- automatic.

Actuation modes include:

- foot control,
- two-handed control,
- single-cycle or two-cycle triggering by the sensor unit of the contactless active protection device.

1.5 Selection of Optical Electronic Protective Devices

The following strategy is to be applied (iterative process):

1. Determination of the protected area.
2. Determination of the protective function:
 - Finger or hand protection,
 - Access protection for persons,
 - Presence detection.
3. Determination of the control category.
4. Calculation of the safety distance.

1.6 Determination of the protected area

Through risk evaluation, the following has to be observed:

- the size of the protected field,
- the access points,
- the danger areas,
- bypassing possibilities.

1.7 Determination of the protective function

Finger and hand protection are necessary as the user is located close to the danger area. Access to the danger area is protected.

A danger area which is completely surrounded by permanently installed protective devices is monitored for presence of objects or access protection and presence detection are combined.

1.8 Residual risks (EN 292-1)

The wiring suggestions shown in this manual have been tested with utmost care. The relevant standards and regulations are adhered to when the shown components and appropriate wiring are used. Residual risks remain when:

- the proposed circuit concept is changed and the connected safety-relevant components or protective devices are possibly not or insufficiently included in the safety circuit.
- relevant safety regulations specified for the operation, adjustment and maintenance of the machine are not adhered to by the operator. Here, the inspection and maintenance intervals for the machine should be strictly adhered to.

2 Safety Notices

2.1 Safety Standards

The protective retro-reflective photoelectric sensor SRK 96 was designed in accordance with the applicable safety standards and has been presented for an EU type examination. The technical safety requirements acc. to EN 61496-1/-2 Type 2 are fulfilled for the SRK 96.

The SRK 96 is a Laser retro-reflective photoelectric sensor of laser safety class 2.



Attention!

Eye-protection is usually guaranteed through the eye lid closing reflex. The laser beam path should be closed at the end of its purpose-oriented way where this is practically and responsibly possible; furthermore, the laser should not be directed at persons (head level).

2.2 Intended Use

The SRK 96 protective retro-reflective photoelectric sensor is used in combination with a TNT 35 or TMC 66 (with integrated muting function) protective switching device for safeguarding danger areas.



Attention!

The protection of personnel and the device cannot be guaranteed if the device is operated in a manner not corresponding to its intended use.

2.2.1 Application requirements

Control of the machine or unit to be protected has to be controllable electrically. A switching signal generated by a downstream safety device (e.g. TMC 66) has to be followed by an immediate shut-down of the dangerous movement.

For application and installation of the protective photoelectric sensor, the current European guidelines and standards and/or the safety regulations of the employers' liability insurance association have to be observed.



Attention!

Access and changes to the device, except where expressly described in this operating manual, are not authorised.

The following uses are, in particular, not permitted:

- in rooms with explosive atmospheres
- operation for medical purposes

2.2.2 Areas of application

The protective retro-reflective photoelectric sensor SRK 96 may be used in connection with a test monitoring unit (TNT 35/TMC 66) as disconnecting protective device for the protection of danger areas on power-driven machines.

It is authorised for the following areas of application (extract):

- Edge, frame, star, and carcass presses in lumber industry acc. to prEN 691 resp. ZH 1/3.19
- Printing and paper processing machines acc. to prEN 1010,
- Power driven windows, doors, and gates acc. to ZH 1/494,
- Storage equipment and devices acc. to ZH 1/482 and DIN 15185 part 2,
- Textile machines acc. to VBG and DIN EN ISO 11111,
- Food processing equipment acc. to prEN 1672-1 resp. VBG 77
- Packaging machinery acc. to prEN 415-1 to -7 resp. VBG 76,
- Meat processing equipment acc. to prEN 12463 resp. VBG 79,
- Machines of the chemical, rubber, and plastic industry acc. to VBG 22.

2.3 Working Safely



Attention Laser Radiation!

The protective retro-reflective photoelectric sensor SRK 96 operates with a red light laser of class 2 acc. to EN 60825-1 (2001/11). It also complies with the U.S. 21 CFR 1040 regulations for a class II product. If you look into the beam path over a longer time period, the retina of your eye may be damaged!

Never look directly into the beam path!

Do not point the laser beam of the SRK 96 at persons!

When mounting and aligning the SRK 96, take care to avoid reflections of the laser beam off reflective surfaces!

The use of operating and adjusting devices other than those specified in this technical description, carrying out of differing procedures, or improper use of the SRK 96 protective retro-reflective photoelectric sensor may lead to dangerous exposure to radiation!

The use of optical instruments or devices in combination with the device increases the danger of eye damage!

Adhere to the applicable legal and local regulations regarding protection from laser beams acc. to EN 60825-1 in its latest version.

The SRK 96 uses a laser diode with low power in the visible red light range with an emitted wavelength of about 670nm. The output power of the laser beam at the light exit is at most 1.2mW acc. to EN 60825-1 (2001/11).

The light exit is the only opening through which the laser radiation can escape from the device. The housing of the SRK 96 protective retro-reflective photoelectric sensor is sealed and has no parts that need to be adjusted or maintained by the user. The device must not be tampered with and must not be changed in any way!



Notice!

It is important that you attach the sticky labels supplied to the device (notice signs and laser emission symbol)! If the signs would be covered due to the installation situation of the SRK 96, attach them close to the SRK 96 such that reading the notices cannot lead to looking into the laser beam!

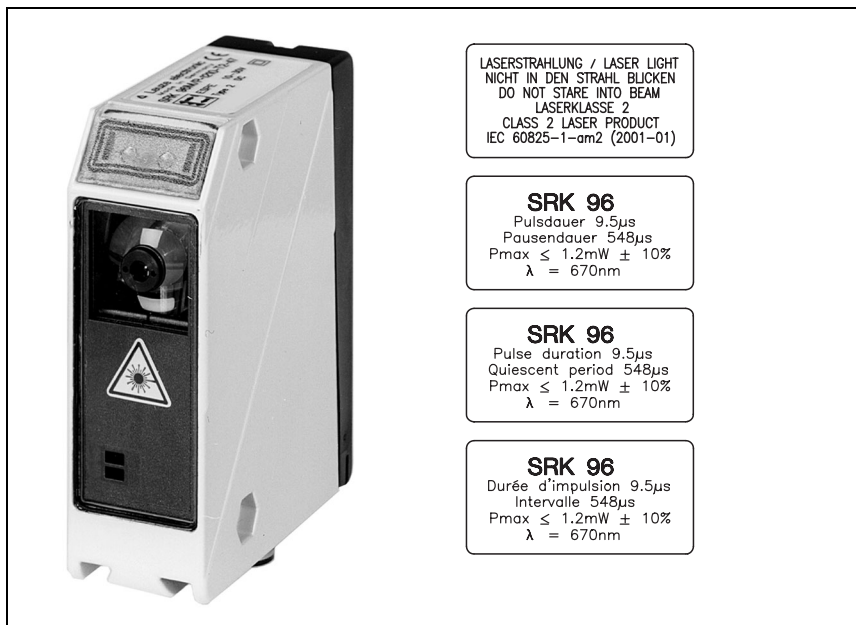


Figure 2.1: Attachment of the sticky labels with warning notices

2.4 Organisational measures

All entries in this technical description must be heeded, in particular those in the sections "Safety Notices" and "Commissioning".

Keep this technical description in a safe place. It should be accessible at all times.

Observe the locally applicable legal regulations and the rules of the employers' liability insurance association.

Mounting, commissioning and maintenance of the device must only be carried out by qualified personnel. Work on electrical installations may only be carried out by qualified electricians.

Adjustment and change of the safety field for the protection of persons may only be carried out by an authorised person.

Repairs, in particular the opening of the housing, may only be carried out by the manufacturer or a person authorised by the manufacturer.

3 Function

3.1 System description

The contactless active protective device (AOPD) of type 2 consists of the SRK 96 protective retro-reflective photoelectric sensor and a special reflector PTKS 20x40, PTKS 50x50 (preferred type) or PTKS 100x100.

Attention!

The system does not function with commercially available standard reflectors.

For the use acc. to EN 61496-1 type 2, the system must be connected to an appropriate test monitoring unit (for example TNT 35/TMC 66).

3.2 Description of functions SRK 96

The SRK 96 protective retro-reflective photoelectric sensor is a single-lens, laser photoelectric sensor.

The light beams transmitted by the transmitter are incident on a reflector unit which is mounted stationary at the opposing side of the area being monitored. The light beams reflected from there are correspondingly evaluated by the receiver unit.

The unique feature of the reflector unit is that a polarisation filter is positioned in front of a triple reflector. This ensures that only linearly polarised light can be reflected.

A comparison of the constituent linearly polarised light and unpolarised light components is performed by a corresponding evaluation system in the receiver unit.

If the beam path is interrupted by a diffusely reflecting object or a standard reflector (unpolarised), it is possible to clearly identify a change in the polarisation ratio.

3.3 Testing SRK 96

The test function is initiated by dropping the input voltage at the activation input below 2V. The switching output of the SRK 96 is deactivated approx. 8.5ms after the test is initiated and reactivated after a maximum subsequent 2.7ms.

This state is internally evaluated upon connection of a TNT 35/TMC 66 test monitoring unit. The output safety circuits of the test monitoring unit are not affected by the test function.

3.4 Function safety

Device malfunctions are detected through monitoring and by internal/external testing and put the system into a safe state.

There are various options available for the external testing and monitoring of the SRK 96. A suitable test and monitoring circuit can be assembled using conventional controls (contactor technology) or programmable logic controls (PLC). Here, ensure that the test/monitoring circuit is assembled in accordance with the specifications of the corresponding safety class. Only then does the contactless active protective device meet type 2 acc. to EN 61496-1.

For this reason, it is recommended in all cases to use a test monitoring unit of type TNT 35 or TMC 66 (with integrated muting controller). These have been confirmed by an EU type examination acc. to type 2 (EN 61496-1).

4 Mounting and commissioning

4.1 Components of the safety system

The complete safety system consists of one or more SRK 96 protective retro-reflective photoelectric sensors with corresponding number of reflectors of type PTKS 20x40, PTKS 50x50 (preferred type) or PTKS 100x100 and the corresponding test-monitoring circuit / device (for example TNT 35 or TMC 66).

4.2 Integration in the machine control system

The electrical integration into the control has to be performed acc. to the set safety category acc. to EN 954-1. The voltage free safety relay outputs of a test monitoring unit (e.g. TNT 35) can be directly used for shutdown of the dangerous movement.

The advantage of using the TNT 35 and TMC 66 test/monitoring unit is that an EU type examination is available for both parts of the contactless active protective device (SRK 96 and TNT 35 or TMC 66).

This means that, in this combination, validation acc. to EN 61496-1 is no longer necessary as this has already been performed by the manufacturer and the testing agency.

Depending on the type of integration, the use of a contactor control or a start- and restart-disable may be necessary. These functions are already integrated in the TNT 35 and TMC 66 devices.

4.3 Display elements

The protective retro-reflective photoelectric sensor SRK 96 features two integrated LEDs.

The LEDs indicate the following operating states:

- LED green Ready (supply voltage is present),
- LED yellow Light path free (output activated),
- LED yellow flashing Light path free, no performance reserve.

4.4 Mounting of the Safety System

4.4.1 Mounting of the protective retro-reflective photoelectric sensor SRK 96

When mounting the SRK 96, take particular care that the PTKS 20x40, PTKS 50x50 (preferred type) or PTKS 100x100 reflectors, used specially for this configuration, are mounted in the correct position. The reflector must be mounted in such a way that the reflector mounting surface (back wall) is perpendicular to the optical axis.

To ensure high availability of the system, when installing the SRK 96 make certain that there are no strongly radiating light sources in the beam path. If necessary, swap positions of the SRK 96 and the PTKS... reflector or mount them in such a way that the light source is not directly in the beam path. When mounting, ensure that there are no strongly reflective surfaces or standard reflectors in the immediate vicinity of the PTKS... reflector.

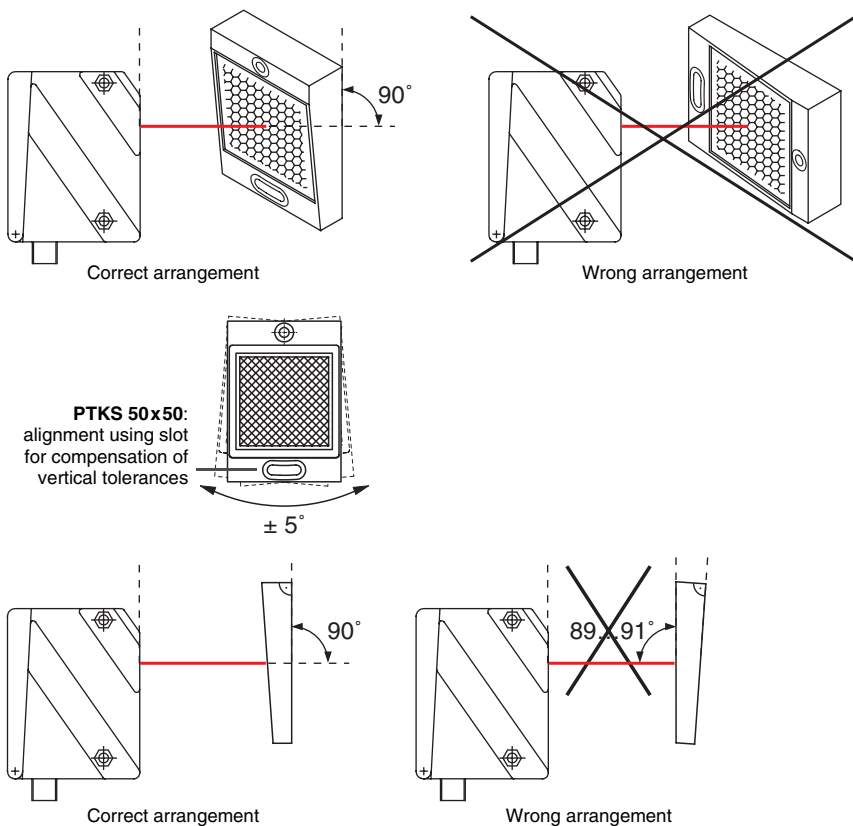


Figure 4.1: Arrangement of the reflector



Attention!

If the reflector is mounted in the wrong position, the system will not function.

Install the SRK 96 in such a way that the front cover is not subject to any mechanical tension. It is recommended that the photoelectric sensor be screwed down only at the fastening holes provided for this purpose. When mounting to or between plane-parallel surfaces, it is recommended that distance sleeves be used (see figure 4.2).

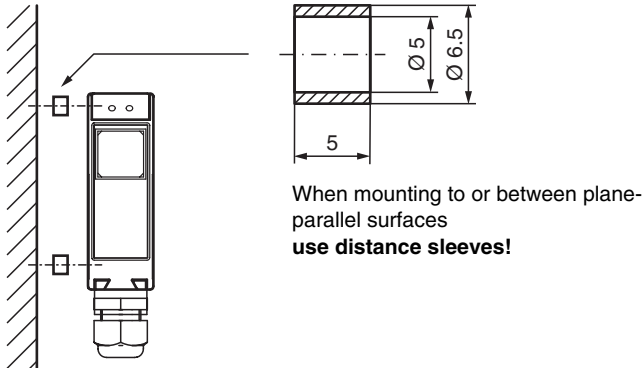


Figure 4.2: Mounting to or between plane-parallel surfaces



Attention!

After aligning the SRK 96 to the PTKS... reflector (yellow LED on the SRK 96 illuminates), check the horizontal pitch of the light axis. The reflector mounting surface should be perpendicular to the light axis (see figure 4.1).

It is absolutely mandatory that the valid guidelines and standards are observed when mounting protective photoelectric sensors.



Notice!

The mounting instructions in this chapter have to be heeded for fault-free functioning of the whole safety system.

4.4.2 Safety distance

Safety distance

A certain time delay applies between the interruption of the light beam of the protective photoelectric sensors and the stand-still of the machine. The photoelectric sensors have to be installed in such a way that the dangerous area can not be reached within this time delay. The minimum distance for safeguarding the danger area is 850mm.

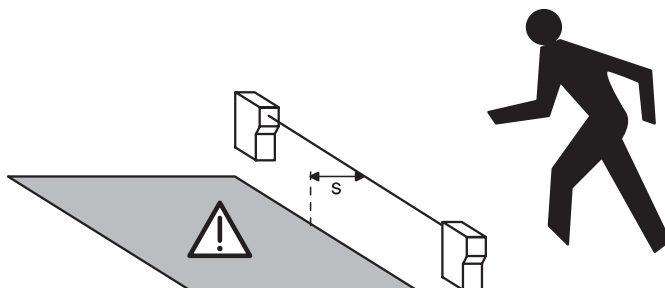


Figure 4.3: Safety distance from the danger area

Calculation of the safety distance

The safety distance **S** between photoelectric sensor and danger area is calculated acc. to EN 999 using the following formula:

$$S = K * T + C$$

- S** Safety distance between photoelectric sensor and danger area
- K** Grip and approach speed
- T** Time delay between interruption of the light beam and stand-still of the machine
- C** Safety constant
 - 1200mm with uniaxial installation,
 - 850mm with multi-axle installation

Example for the calculation of the safety distance:

This example assumes a machine with a system response time of 500ms and a two-axle safeguard by the SRK 96 system. The response time of the SRK 96 and TNT 35 test monitoring unit is 20ms.

Application of the formula: $S = K * T + C$:

Where:

S: the minimum distance of the SRK 96 systems from the danger area

K: approach speed 1600mm/s (EN 999)

T: sum of the system response time of the machine and response time of the AOPD (500ms + 20ms = 520ms)

C: 850mm with multi-axle installation

this results in:

$S = (1600\text{mm/s} * (500\text{ms} + 20\text{ms})) + 850\text{mm}$

$S = 1682\text{mm}$

4.4.3 Multi-axle installation

For the safeguarding of danger areas, the protection heights and the number of photoelectric sensors are determined in EN 999 or through a risk analysis acc. to EN 954-1.

Number of photoelectric sensors	Mounting height above access level in mm			
1	750			
2	400	900		
3	300	700	1100	
4	300	600	900	1200

Table 4.1: Protection heights and number of photoelectric sensors

Depending on the number of photoelectric sensor pairs, the single systems have to be mounted at different heights acc. to EN 999. The number of needed systems results from the corresponding type C standard or risk evaluation.

5 Electrical Installation

The electrical installation is only to be performed by authorised and specialised personnel. During installation, ensure that the supply and signal lines are laid separate from mains lines. Inside the switching cabinet, suitable spark extinction has to be provided if using contactors. In connection with driving motors and breaks, the corresponding manuals have to be observed.

5.1 Electrical connection

The electrical connection of the SRK 96 is to be performed acc. to the connection figures shown below.

The activation input (terminal 4/with plug connection PIN 2) is active upon application of DC voltage $\geq 8V$. The transmitter now functions and emits visible red light.

If the activation input drops below a DC voltage of $\leq 2V$, the internal test of the SRK 96 is triggered.

In normal operation, the activation input is controlled by the test-monitoring circuit, for example TNT 35.

5.1.1 Electrical connection diagrams

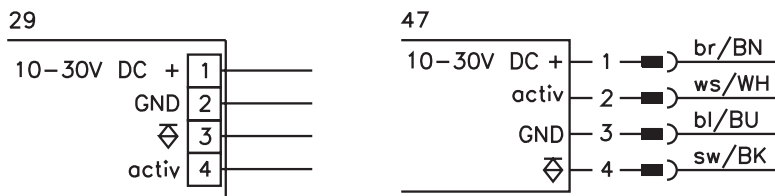


Figure 5.1: Electrical connection diagrams

Connection diagram SRK 96 with TNT 35

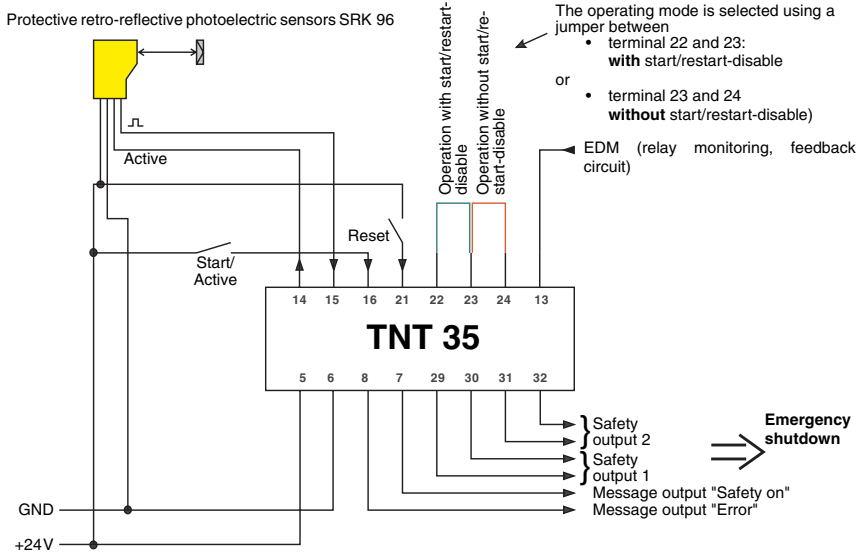


Figure 5.2: Connection SRK 96 with TNT 35

Connection diagram SRK 96 with TMC 66

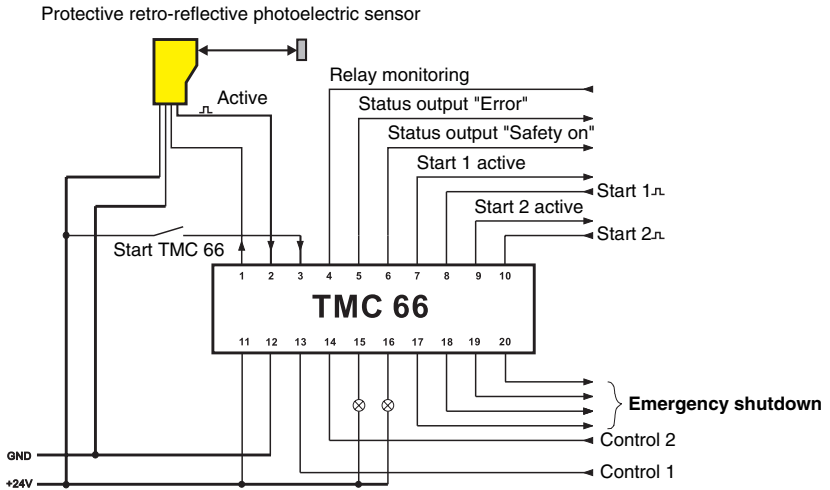


Figure 5.3: Connection SRK 96 with TMC 66

6 Specifications

Optical data

Typ. Operating range limit ¹⁾	0.5 ... 7 m
Operating range ²⁾	0.5 ... 6 m
with reflector	PTKS 50x50 (preferred type)
Light source	red light laser diode
Wavelength	670 nm
Laser class	2 acc. to EN 60825-1 (2001/11)

Timing

Switching frequency	100 Hz
Response time	6 ms
Delay before start-up	≤ 200 ms

Electrical data

Operating voltage U_B	10 ... 30 VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Bias current	≤ 40 mA
Switching output	PNP transistor
Function	light switching
Signal voltage high/low	≥ ($U_B - 2V$) / ≤ 2V
Output current	max. 100 mA

Indicators

LED green	ready
LED yellow	light path free
LED yellow flashing	light path free, no performance reserve

Mechanical data

Housing	diecast zinc
Colour	yellow
Optics cover	glass
Weight	380 g
Connection type	terminals or M12 connectors

Environmental data

Ambient temp. (operation/storage)	-10°C ... +50°C / -30°C ... +60°C
Protective circuit ³⁾	1, 2, 3, 4
VDE safety class ⁴⁾	II, all-insulated
Air humidity	humidity class G acc. to IEC 68 part 2-3
Storage temperature	-30°C ... +60°C
Protection class	IP 67
Impact resistance	semi-sine 30 gn, 11 ms (VDE 0660 T 208)
Vibration resistance	10 ... 55 Hz, max. 7.5 gn (VDE 0660 T 208)
EMB/EMV	acc. to EN 61496-1

Table 6.1: Specifications

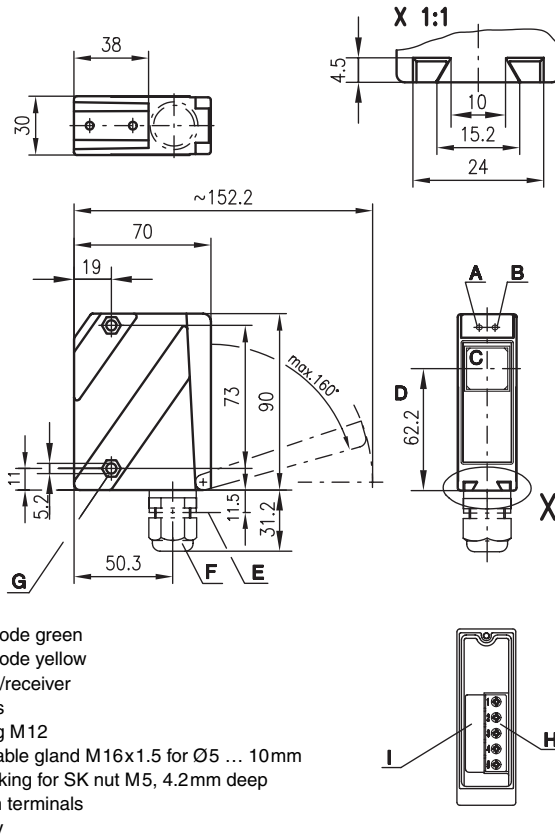
Options

Activation input active	$\geq 8V/\leq 2V$
Input resistance	$10k\Omega \pm 10\%$
Testing time	12ms + response time test monitoring unit

Table 6.1: Specifications

- 1) Typ. operating range limit: max. attainable range without performance reserve
- 2) Operating range: recommended range with performance reserve
- 3) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
- 4) Rating voltage 250VAC

6.1 Dimensioned drawings



- A Indicator diode green
- B Indicator diode yellow
- C Transmitter/receiver
- D Optical axis
- E Device plug M12
- F Screwed cable gland M16x1.5 for $\varnothing 5 \dots 10$ mm
- G Countersinking for SK nut M5, 4.2mm deep
- H Connection terminals
- I Cable entry

Figure 6.1: Dimensioned drawing SRK 96

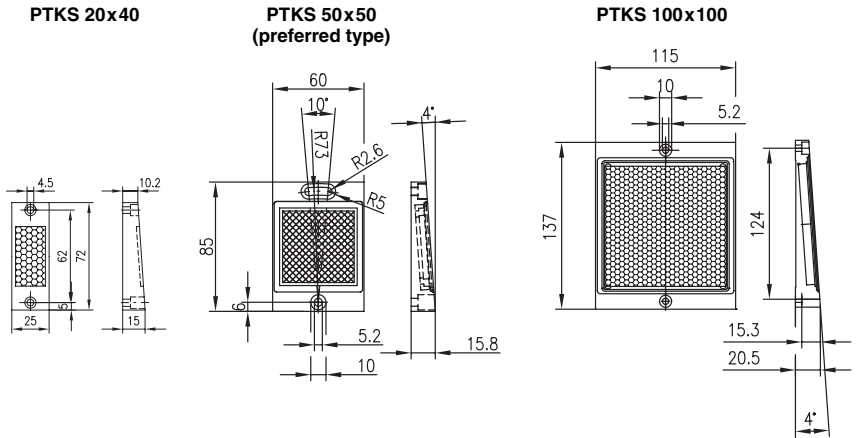


Figure 6.2: Dimensioned drawings for PTKS... reflectors

Leuze electronic GmbH + Co KG
 Postfach 11 11, D-73277 Owen/Teck
 Tel. +49(0)7021/573-0,
 Fax +49(0)7021/573-199
 E-mail: info@leuze.de, http://www.leuze.de

Sales and Service

A
 Ing. Franz Schmachtl KG
 Tel. Int. + 43 (0) 732/7646-0
 Fax Int. + 43 (0) 732/785036
 E-mail: office@schmachtl.at
 http://www.schmachtl.at

ARG
 Nortecónica S. R. L.
 Tel. Int. + 54 (0) 11/4757-3129
 Fax Int. + 54 (0) 11/4757-1088
 E-mail: info@norteconica.com.ar

AUS + NZ
 Balluff-Leuze Pty. Ltd.
 Tel. Int. + 61 (0) 3/97642366
 Fax Int. + 61 (0) 3/97533262
 E-mail: balluff_leuze@balluff.com.au
 http://www.balluff.com.au

B
 Leuze electronic nv/sa
 Tel. Int. + 32 (0) 2/2531600
 Fax Int. + 32 (0) 2/2531536
 E-mail: leuze.info@leuze.be
 http://www.leuze.de

BR
 Leuze electronic Ltda.
 Tel. Int. + 55 (0) 11/4195-6134
 Fax Int. + 55 (0) 11/4195-6177
 E-mail: leuze@leuze.com.br
 http://www.leuze.com.br

CH
 Leuze electronic AG
 Tel. Int. + 41 (0) 1/8340204
 Fax Int. + 41 (0) 1/8332626
 E-mail: info@leuze.ch

CO
 Componentes Electronicas Ltda.
 Tel. Int. + 57 (0) 4/3511049
 Fax Int. + 57 (0) 4/3511019
 E-mail: rigogigu@col3.telecom.com.co

CZ
 Schmachtl CZ Spol. SR. O.
 Tel. Int. + 420 (0) 2/4401500
 Fax Int. + 420 (0) 2/44910700
 E-mail: office@schmachtl.cz
 http://www.schmachtl.cz

DK
 Desim Elektronik APS
 Tel. Int. + 45/70220066
 Fax Int. + 45/70222220
 E-mail: desim@desim.dk
 http://www.desim.dk

D
 Leuze electronic GmbH + Co KG
 Geschäftsstelle Dresden
 Telefon 0351/2841105
 Telefax 0351/2841103
 E-mail: vgd@leuze.de

Lindner electronic GmbH
 Vertrieb Nord, Hannover
 Telefon 0511/966057-0
 Telefax 0511/966057-57
 E-mail: lindner@leuze.de

W+M planttechnik GmbH + Co. KG
 Vertrieb West, Wuppertal
 Telefon 0202/37112-0
 Telefax 0202/318495
 E-mail: info@wm-planttechnik.de

Leuze electronic GmbH + Co KG
 Geschäftsstelle Frankfurt
 Telefon 06181/9177-0
 Telefax 06181/917715
 E-mail: vgf@leuze.de

Leuze electronic GmbH + Co KG
 Geschäftsstelle Owen/Bad.-Württ.
 Telefon 07021/9850-910
 Telefax 07021/9850-911
 E-mail: vgo@leuze.de

Leuze electronic GmbH + Co KG
 Geschäftsstelle München
 Telefon 08141/5350200
 Telefax 08141/5350220
 E-mail: vgm@leuze.de

E
 Leuze electronic S. A.
 Tel. Int. + 34 93/4 09 7900
 Fax Int. + 34 93/4 90 35 15
 E-mail: leuze@leuze.net

ET
 A Plus Systems
 Tel. Int. + 20 (0) 2/ 41 89 036
 Fax Int. + 20 (0) 2/ 41 41 280
 E-mail: ellifai@aplusystems.com.eg

F
 Leuze electronic sarl.
 Tel. Int. + 33 (0) 1/60051220
 Fax Int. + 33 (0) 1/60050365
 E-mail: info@leuze-electronic.fr
 http://www.leuze-electronic.fr

FIN
 SKS-automatio Oy
 Tel. Int. + 358 (0) 9/852661
 Fax Int. + 358 (0) 9/8526820
 E-mail: automatio@sksf.fi
 http://www.sks.fi

GB
 Leuze Mayser electronic Ltd.
 Tel. Int. + 44 (0) 1480/408500
 Fax Int. + 44 (0) 1480/403808
 E-mail: mail@leuzemayser.co.uk
 http://www.leuzemayser.co.uk

GR
 UTECO A.B.E.E.
 Tel. Int. + 30 (0) 210/4210050
 Fax Int. + 30 (0) 210/4212033
 E-mail: uteco@uteco.gr
 http://www.uteco.gr

RUS + EST + LV + LT
 All Impex
 Tel. + Fax + 7 095/ 9332097
 E-mail: adz-sensor@narod.ru
 http://www.adz-sensor.narod.ru

H
 Kvalix Automatika Kft.
 Tel. Int. + 36 (0) 1/2722242
 Fax Int. + 36 (0) 1/2722222
 E-mail: info@kvalix.hu
 http://www.kvalix.hu

HK
 Sensortech Company
 Tel. Int. + 852/2651 01 88
 Fax Int. + 852/2651 03 88
 E-mail: sensortech@navigator.com

I
 IVO Leuze Vogtle Malanca s.r.l.
 Tel. Int. + 39 02/26 11 0643
 Fax Int. + 39 02/26 11 0640
 E-mail: ivoleuze@tin.it
 http://www.ivoleuze.com

IL
 Galoz electronics Ltd.
 Tel. Int. + 972 (0) 3/9023456
 Fax Int. + 972 (0) 3/9021990
 E-mail: hirschfeld@galoz.co.il

IND
 Global Tech (India) Pvt. Ltd.
 Tel. Int. + 91 (0) 20/447 0085
 Fax Int. + 91 (0) 20/447 0086
 E-mail: tyo-mp@illies.de
 http://www.illies.de

J
 C. Illies & Co., Ltd.
 Tel. Int. + 81 (0) 3/34434111
 Fax Int. + 81 (0) 3/34434118
 E-mail: tyo-mp@illies.de
 http://www.illies.de

KOR
 Leuze electronic Co., Ltd.
 Tel. Int. + 82 (0) 31/3828228
 Fax Int. + 82 (0) 31/3828522
 E-mail: hgshim@leuze.co.kr
 http://www.leuze.co.kr

MAL
 Ingermark (M) SDN.BHD
 Tel. Int. + 60 (0) 3/60342788
 Fax Int. + 60 (0) 3/60342188
 E-mail: ingmal@tm.net.my

MEX
 Leuze Lumiflex Mexico, S.A. de C.V.
 Tel. Int. + 52 (0) 81/83 71 86 16
 Fax Int. + 52 (0) 81/83 71 85 88
 E-mail: info@leuzemexico.com.mx
 http://www.leuze.de

N
 Elteco A/S
 Tel. Int. + 47 (0) 35/573800
 Fax Int. + 47 (0) 35/573849
 E-mail: firmapost@elteco.no
 http://www.elteco.no

NL
 Leuze electronic B.V.
 Tel. Int. + 31 (0) 418/653544
 Fax Int. + 31 (0) 418/653808
 E-mail: info@leuze.nl
 http://www.leuze.nl

P
 LA2P, Lda.
 Tel. Int. + 351 (0) 21/4447070
 Fax Int. + 351 (0) 21/4447075
 E-mail: la2p@ip.pt
 http://www.la2p.pt

PALL
 Pall Sp. z o. o.
 Tel. Int. + 48 (0) 22/8331564
 Fax Int. + 48 (0) 22/8330969
 E-mail: balluff@pall.pl
 http://www.balluff.pl

RCH
 Imp. Tech. Vignola S.A.I.C.
 Tel. Int. + 56 (0) 32/256521
 Fax Int. + 56 (0) 32/258571
 E-mail: vignola@entelchile.net

ROC
 Great Cofue Technology Co., Ltd.
 Tel. Int. + 886 (0) 2/29838077
 Fax Int. + 886 (0) 2/29853373
 E-mail: service@cofue.com.tw
 http://www.cofue.com.tw

RO
 O'Boyle s.r.l.
 Tel. Int. + 40 (0) 56/201346
 Fax Int. + 40 (0) 56/221036
 E-mail: oboyle@rdslink.ro
 http://www.oboyle.ro

RSA
 Countapulse Controls (PTY.) Ltd.
 Tel. Int. + 27 (0) 11/6157556
 Fax Int. + 27 (0) 11/6157513
 E-mail: clive@countapulse.co.za

S
 Leuze SensorGruppen AB
 Tel. + 46 (0) 8/7315190
 Fax + 46 (0) 8/7315105
 E-mail: info@leuze.se
 http://www.leuze.se

SGP + RI + RP
 Balluff Asia Pte. Ltd.
 Tel. Int. + 65/62524384
 Fax Int. + 65/62529060
 E-mail: balluff@balluff.com.sg
 http://www.balluff.com.sg

SK
 Schmachtl SK s.r.o.
 Tel. Int. + 421 (0) 2/54789293
 Fax Int. + 421 (0) 2/54772147
 E-mail: office@schmachtl.sk
 http://www.schmachtl.sk

SLO
 Tipteh d.o.o.
 Tel. Int. + 386 (0) 1/2005150
 Fax Int. + 386 (0) 1/2005151
 E-mail: info@tipteh.si
 http://www.tipteh.si

TH
 Industrial Electrical Co. Ltd.
 Tel. Int. + 66 (0) 2/642-6700
 Fax Int. + 66 (0) 2/642-4249
 E-mail: iec@ie.co.th
 http://www.ie.co

TR
 MEGA Teknik elektronik. San. ve Tic. Ltd.
 Tel. Int. + 90 (0) 212/3200411
 Fax Int. + 90 (0) 212/3200416
 E-mail: mega@megateknik.com
 http://www.megateknik.com

USA + CDN
 Leuze Lumiflex Inc.
 Tel. Int. + 1 (0) 973/5860100
 Fax Int. + 1 (0) 973/5861590
 E-mail: info@leuze-lumiflex.com
 http://www.leuze-lumiflex.com

VC
 TR Electronic GmbH
 Shanghai Rep. Office
 Tel. Int. + 86(0)21/58314825
 Fax Int. + 86(0)21/58314829
 E-mail: tr-electronic@online.sh.cn