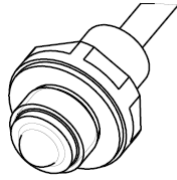


IR Light Reflection Sensor Datasheet



Housing type A



Housing type B

1 General Description

- Smart optoelectronic sensor
- Very low ambient-light susceptibility due to Lock-In algorithm
- Operation temperature range between -40°C .. +55°C
- 24VDC +30% / -50% input voltage range
- Complies to EN 50155
- Complies to EN 45545-2

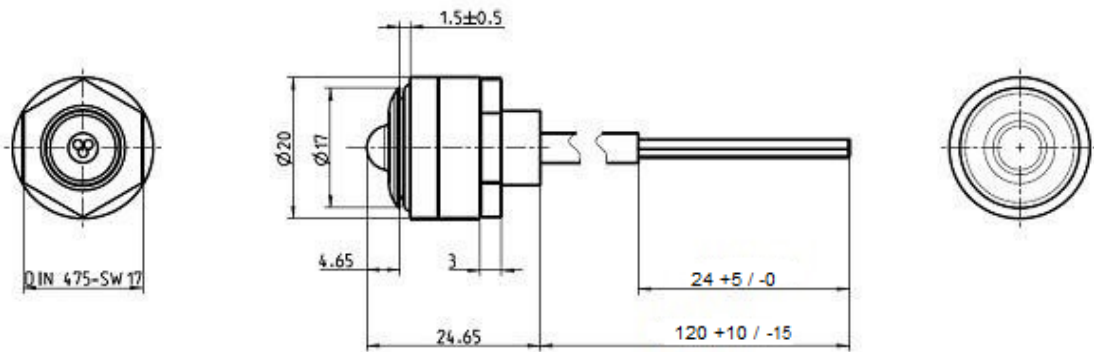
2 Applications, Intended Use

- The IR Light Reflection Sensor is intended to recognize liquids in rolling stock applications. The customer is responsible for proper validation of the specific application and the liquids used. The IR Light Reflection Sensor is provided by m-u-t in a fixed packaging unit of 100pcs. and has to be prepared individually for the integration into an apparatus or the making available to the end-user by the legal manufacturer (customer).

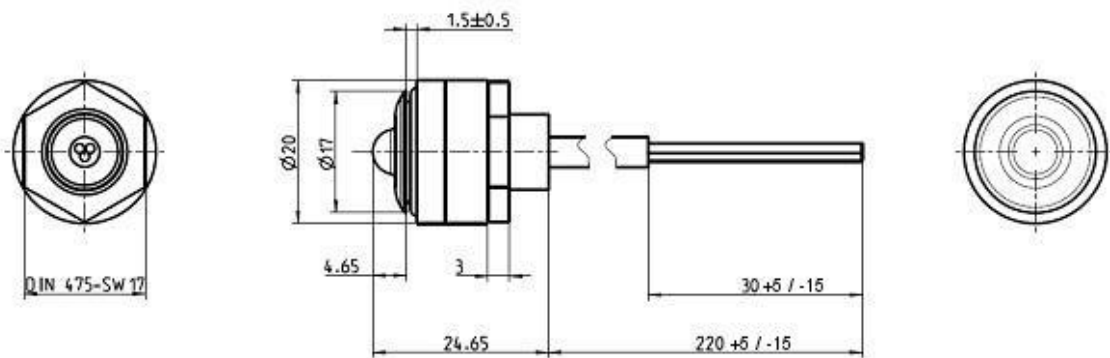
3 Mechanical characteristics

Housing type B push-through installation (including lock nut)

Product variant 30-109176:

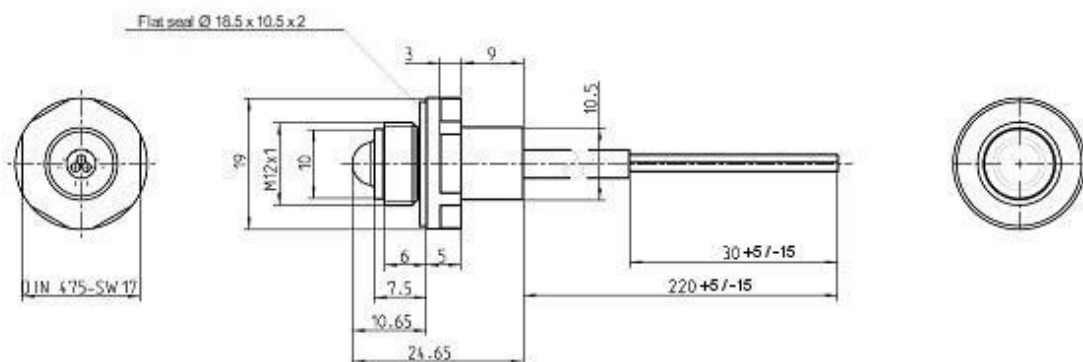


Product variant 30-109197:



Housing type A back faced mounting

Product variant 30-109202:



Technical data	
Overall length (typical)	ca. 145mm (variant 30-109176; excl. M12 connector)
	ca. 245mm (variant 30-109197; variant 30-109202)
Diameter of housing dome	10mm (type A) / 17mm (type B)
Length of housing	25mm
Diameter of mounting hole	M12x1 (type A) / 14.5mm (type B)
Diameter of screw nut	20mm (type B)
Housing Material	PSU 1000 (polysulfone)
Casting compound	casting compound VT 3402 KK series, polyurethane resin based
Colour of housing	transparent
Thread	M12 x 1; L=6mm (type A) / L=9mm (type B)
Weight	approx. 14g (excl. M12 connector)
IP class	IP67 (excl. external connector interface)

4 General Description

- The IR Light Reflection Sensor is available in two different housing types for
 - Back faced mounting (housing type A)
 - Push-trough installation (housing type B)

Available IR Light Reflection Sensor variants		
Part No.	Part description	Connector type / Housing
30-109176	m-u-t IR Light Reflection Sensor (OEM set incl. accessories M12) incl. accessories without contacts / connector in a fixed batch size of 100pcs	Phoenix Contact M12 A-coded SACC-M12MS-4PL (1424691) Housing type B
30-109197	m-u-t IR Light Reflection Sensor (OEM set) incl. accessories without contacts / connector in a fixed batch size of 100pcs - Housing type B	None Housing type B
30-109202	m-u-t IR Light Reflection Sensor Type A (OEM set) incl. accessories without contacts / connector in a fixed batch size of 100pcs	None Housing type A

Standards	Description	Remarks
2014/30/EU	EU directive electromagnetic compatibility	
EN 50155	Railway application - Electronic equipment used on rolling stock	
EN 50121-3-2	Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock - Apparatus	
EN 50124-1	Railway applications - Insulation coordination – Part 1: Basic requirements - Clearance and creepage distances	
EN 50153	Railway applications - Rolling stock - Protective provisions relating to electrical hazards	
EN 45545-2	Fire protection on railway vehicles – Part 2: Requirements for fire behaviour of materials and components	HL1 – HL3
EN 61373	Railway applications - Rolling stock equipment - Shock and vibration tests	See ch. 6
EN 60529	Degrees of protection provided by enclosures (IP Code)	See ch. 3

Life cycle data	
lifetime	approx. 10 years (class L2 acc. EN 50155)
warranty	1 year

Cable	
Fire protection classification	DIN 5510-2, DIN EN 45545-2
Length	typ. 120 mm (variant 30-109176)
	typ. 220mm (variant 30-109197; variant 30-109202)
Diameter	4.6 mm
Single conductor cross section	0.5 mm ²
Minimal bending radius	25 mm
Conductor material	Cu tin-plated

Plug Phoenix Contact SACC-M12MS-4PL¹ – splash proof (30-109176)	
Article no.	1424691
Plug gender	M12 A-coded male connector
Pin count	4
Pin contact	Push-lock spring connection
Single conductor cross section	(0.14-0.75) mm ²

¹Other version available

5 Electrical characteristics

Feature	Description
Power supply	24VDC +30% / -50%
Supply voltage interruption	≤ 10ms (class S2 acc. EN 50155)
Supply change over	0,6 U _N <100ms (class C1 acc. EN 50155)
Current consumption	typ. 7mA, max. 33mA w/o output load
Output	24 VDC low side switch / 40mA to ground Internal 10kΩ Pull-Up to +24V DC

Plug position / conductor marking	Description
1	+24V DC
2	Output
3	Ground (0V DC)

6 Environment characteristic

Feature	Description
Operating temperature	-40°C .. +55°C (class OT2 acc. EN 50155)
Start-up extended temperature	+70°C (class ST1 acc. EN 50155)
Temperature variation	No requirements (class H1 acc. EN 50155)
Storage temperature	-40°C .. +70°C
Storage humidity	Max. 95%, non-condensing
Working humidity	Max. 95%, non-condensing
Working height	Max. 1400m asl (class A1 acc. EN 50125-1)
Pollution degree	PD1
Shock / vibration	Cat. 1 class B (classification acc. EN 61373)
Protective coating class	Hermetically sealed (class PCX acc. EN 50155)

7 Installation

- The typical mounting orientation of the sensor is horizontal. A vertical mounting orientation is not recommended. It has to be ensured, that liquids do not adhere on the sensor housing.
- Assembling instruction are given within an instruction leaflet, which is scope of delivery.
- The bonding surface of sensor and position of installation must be clean and free from burrs.
- The cable of sensor should be supported mechanically.
- Assemble the sensor including the gasket with a torque of 100 Ncm.
- Assemble the connector housing acc. to the instruction leaflet (depending on sensor model).
- Housing type A variant:
Thread sealant has to be considered. For details please refer to the instruction leaflet.

8 Application note

- The measurement is internally triggered by software. Every 150ms a measurement is initialised. The calculation of the sensor state requires a time period of 1 second.
- If the dome of the sensor housing is dipped into liquids, the sensor signal will be activated (switched to ground potential) with a delay of 1s. If the sensor front is removed from the liquid surface completely, the signal will be deactivated (24V DC signal by an internal Pull-Up resistor) with a delay of at least 1s.

- It has to be considered, that liquids may adhere to the sensor housing during liquid level drops. Therefore, an additional delay of approx. 10s within the external control application is recommended.
- The output signal is internally connected to the 24V DC signal level by a 10kΩ resistor. Therefore, the output signal depends on the connected load.

9 Cleaning

- Neutral cleaning agent and warm water may be used for cleaning purpose
- Make sure that the cleaner does not react with the cast resin
- Do not use abrasive cleaning options
- Remove cleaning material after use
- The sensor should be free of cleaning residues

10 Packaging Information

The IR light reflection sensor is provided by m-u-t in a fixed batch size of 100pcs. The package includes the sensors, screw nuts and additional accessories like contacts and connectors (depending on product variant). An instruction leaflet regarding further necessary preparations is included in the package.

10.1 Labelling

The fixed batch size of the IR Light Reflection Sensor is marked with a type label. The individual sensor is marked with a small serial number label only and has to be labelled by the system integrator/device manufacturer prior to making available to end user.

11 Contact

Address: m-u-t GmbH ♦ Am Marienhof 2 ♦ D-22880 Wedel ♦ Germany
Fon: +49 (0)4103 / 93 08-0
Fax: +49 (0)4103 / 93 08-99
Internet: <http://www.mut-group.com>
Email: info@mut-group.com

Version History

Version	Date	Author	Comments
1.0	2021-12-16	P. Adamowski	Initial version for IR Light Reflection Sensor
1.1	2022-03-23	T. Steinbeck	14689-ECR: <ul style="list-style-type: none">- Correction of cable length tolerance- Product variant 30-109197 added
1.2	2022-05-18	T. Steinbeck	14709-ECR: <ul style="list-style-type: none">- Product variant 30-109202 (Housing type A) added