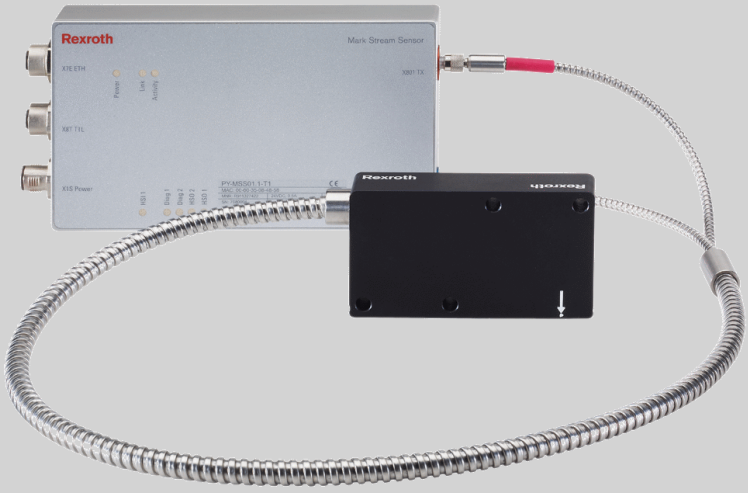
rexroth
A Bosch Company

MLC 14VRS

RegisterControl ATEX

Operating Instructions
R911341913

Edition 05



PY-MSS01.1-T1
PY-MSS01.3-O1

Change Record

Edition 05, 2021-06

Refer to "Editions of this documentation" on page 1

Copyright

Liability

Editorial Department

Engineering Automation Systems Solution Integration Motion and Communication SF (TaDo/MePe)

Table of Contents

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1 About this documentation

Editions of this documentation

Edition	Release date	Note
01	2014-02	First edition
02	2014-08	Corrections
03	2016-05	Changes in standards, two notes supplemented. Declaration of conformity updated
04	2018-07	Title cover: Type names supplemented (PY-MSS01.1-T1 / PY-MSS01.1-O1 / PY-MSS01.2-O1/000,0 / PY-MSS01.3-O1) Chapter "Electric installation": ATEX zone supplemented in graphics Declaration of conformity updated Chapter “Interfaces”: “EMC noise immunity” supplemented
05	2021-06	Optics PY-MSS01.1-O1 and PY-MSS01.2-O1/000,0 removed. Spelling corrected PY-MSS01.3-O1

Tab. 1-1: Change Record

Overview on target groups and product phases

In the following illustration, the framed activities, product phases and target groups refer to the present documentation.

Example: In the product phase "Mounting (assembly/installation)", the "mechanic/electrician" can execute the activity "unpack, mount and install" using this documentation.

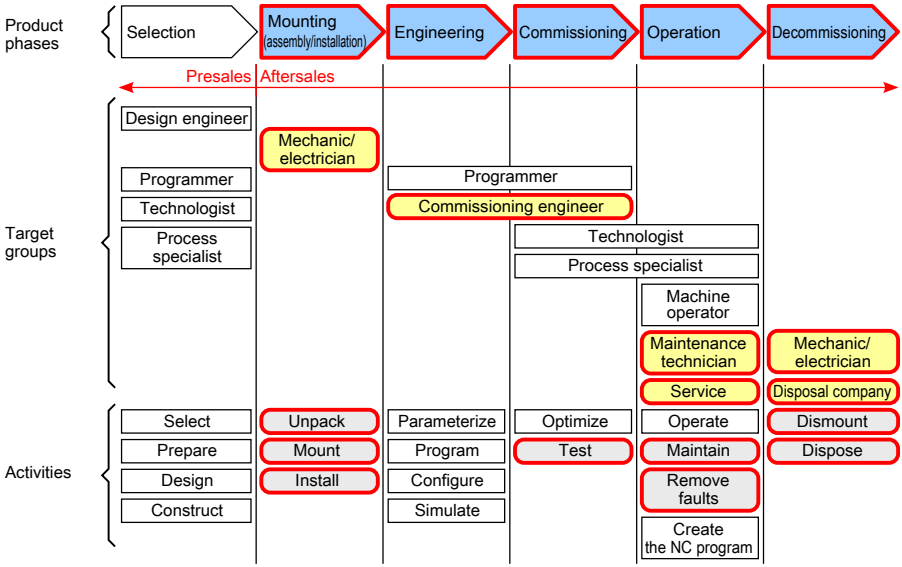


Fig. 1-1: Assigning the present documentation to the target groups, product phases and activities of the target group

Purpose

This documentation includes the boundary conditions to be kept when using the PY-MSS01.1-T1 mark stream sensor in the potentially explosive area according to ATEX and notes on your personal safety when using the product. The present operating instructions provides special notes on mounting, installation, commissioning, operation, demounting and maintenance of the mark stream sensor.

Qualifications

Required qualification: Individual who is able to assess the tasks assigned and to identify possible safety risks owing to qualification in the subject, knowledge and experience. The individual should also be familiar with the standards and regulations.

Scope

This operating instructions applies to the PY-MSS01.1-T1 mark stream sensor and to the corresponding optics PY-MSS01.3-O1.

The type code specifications are located on the type plate of the device, also refer to chapter 2 "Product identification and scope of delivery" on page 3.

Related documents

The following documentations are available for the PY-MSS01.1-T1 mark stream sensor:

Document	Title	Part number
Application Description	IndraMotion MLC 14VRS RegisterControl	R911341507
Library	IndraMotion MLC 14VRS RegisterControl	R911341509

Tab. 1-2: Related documents

Names and abbreviations

Term	Explanation
CE	The CE marking (Conformité Européenne) is used by the manufacturer or EU importer according to the EU regulation 765/2008 and "indicates that the product is in conformity with the applicable requirements set out in Community harmonization legislation providing for its affixing"
OWG	Optical fibers. They are pre-assembled cables and wires consisting of optical fibers and partially also of connectors to transfer light
Ethernet	It is a technology that specifies software (protocols, etc.) and hardware (cables, distributors, network cards, etc.) for cabled data networks
TTL	The transistor-transistor logic (TTL) is a circuit technique (logic family) for logic circuits (gates). Planar npn bipolar transistors are used as active component

Tab. 1-3: Terms and abbreviations

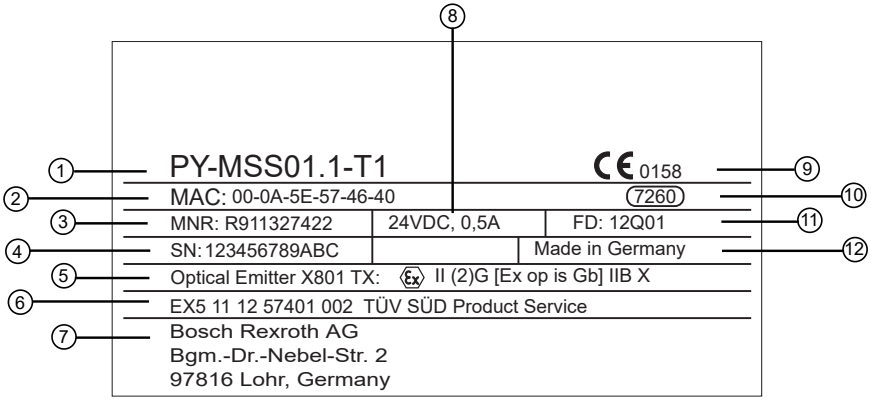
Customer Feedback

Customer requests, comments or suggestions for improvement are of great importance to us. Please email your feedback on the documentations to Feedback.Documentation@boschrexroth.de. Directly insert comments in the electronic PDF document and send the PDF file to Bosch Rexroth.

2 Product identification and scope of delivery

2.1 Product identification

The type plate is located on the front side of the mark stream sensor PY-MSS01.1-T1.



1	Type code	**7**	Company address
2	MAC address	**8**	Rated voltage/current
3	Part number	**9**	CE conformity mark
4	Serial number	**10**	Sector/plant number
5	Explosion protection test number	**11**	Production date
6	Explosion protection ID	**12**	Name of origin

Fig. 2-1: Type plate of the mark stream sensor PY-MSS01.1-T1

2.2 Scope of delivery

- Mark stream sensor PY-MSS01.1-T1

3 Using safety instructions

3.1 Structure of the safety instructions

The safety instructions are structured as follows:

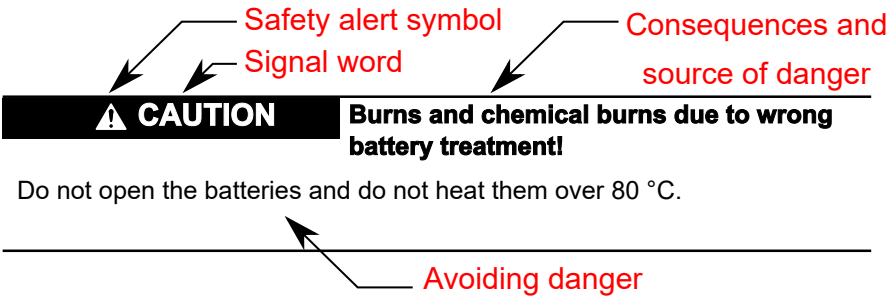


Fig. 3-1: Structure of the safety instructions

3.2 Explaining signal words and safety alert symbol

The safety instructions in this documentation contain specific signal words (danger, warning, caution, notice) and, if necessary, a safety alert symbol (according to ANSI Z535.6-2006).

The signal word draws attention to the safety instruction and indicates the risk potential.

The safety alert symbol (triangular safety reflector with exclamation marks), preceding the signal words Danger, Warning, Caution indicates hazards for persons.

⚠ DANGER

In case of non-compliance with this safety instruction, death or serious injury **will** occur.

⚠ WARNING

In case of non-compliance with this safety instruction, death or serious injury **can** occur.

⚠ CAUTION

In case of non-compliance with this safety instruction, minor or moderate injury can occur.

NOTICE

In case of non-compliance with this safety instruction, material damage can occur.

3.3 Symbols used

Pointers are displayed as follows:

This is a note.

Tips are displayed as follows:

This is a tip.

3.4 Explaining the signal alert symbol on the device

If this symbol is on your device, you have to observe the documentation on the device. The respective documentation informs on the type of hazard as well as the steps required to avoid this hazard.

4 Intended use

4.1 General information

The PY-MSS01.1-T1 mark stream sensor is intended for use together with a drive system and the corresponding software of the Bosch Rexroth company.

The PY-MSS01.1-T1 mark stream sensor was checked by an external technical inspection authority (German TÜV SÜD Product Service GmbH). The conformity of the PY-MSS01.1-T1 mark stream sensor was confirmed with a test report and an official test number.

Only commission the product after you have thoroughly read, understood and complied with the documents and safety instructions provided with the product

If no documents are available in your national language, please contact your Bosch Rexroth distribution partner.

The PY-MSS01.1-T1 mark stream sensor can only be commissioned in explosive environment if

- all following information on the commissioning and the application notes of the application description "IndraMotion MLC 14VRS RegisterControl" (see tab. 1-2 "Related documents" on page 3) were understood and implemented
- the entire system consisting of mark stream sensor, optic sensor, cable and accessories was checked, approved and documented according to the relevant standard requirements

- Comply with the specific standards and directives of your country when mounting, installing and using the PY-MSS01.1-T1 mark stream sensor
- The following national/international statutory provisions apply to installation and use as well as commissioning and periodic technical inspections of the PY-MSS01.1-T1 mark stream sensor:
  - Machine Directive 2006/42/EC
  - EMC directive 2014/30/EU
  - use of work equipment directive 89/655/EEC
  - Accident prevention regulations and safety rules

Only skilled personnel can execute the tests.

This operation instructions does not contain a guide for operating the machine, the PY-MSS01.1-T1 is or will be integrated in. The operating instructions of the machine contains detailed information.

Only use the PY-MSS01.1-T1 mark stream sensor in an industrial environment!

The PY-MSS01.1-T1 mark stream sensor meets the conditions of class A (industrial applications) according to the "emission" standard. Thus, the PY-MSS01.1-T1 mark stream sensor is only intended for use in an industrial environment.

4.2 Explosion Protection

4.2.1 General information

⚠ DANGER **Danger to life, danger of explosion or considerable material damage!**

All components and accessories used have to comply with the requirements for explosion protection according to the directive 2014/34/EU.

The application conditions mentioned in this documentation always have to be complied with during project planning, configuration and operation.

The evaluation electronic PY-MSS01.1-T1 contains a power-limited white light source of type PR0138.

Explosion protection ID:

- Evaluation electronic PY-MSS01.1-T1: Ex II (2)G [Ex op is Gb] IIB X
- Sensor optics PY-MSS01.3-O1: Ex II 2G Ex op is IIB T4 Gb X

4.2.2 Safety instructions/special conditions

Information on the test number

The EC type examination certificate number for the mark stream sensor system specified in the declaration of conformity and the type plate is labeled with an "X" at the end. This ID refers to the special conditions that have to be complied with in connection with the underlying standards of the specified safety and health requirements. The following special conditions have to be complied with for a safe operation of the mark stream sensors in the system.

White light source of type PR0138: Ex II (2)G [Ex op is Gb] IIB X

⚠ WARNING **The white light source/evaluation electronic must not be installed in an explosive environment**

The explosion protection can only be ensured in a combination of white light source PR0138 or evaluation electronic PY-MSS01.1-T1 and the optics PY-MSS01.3-O1 (see fig. 10-8 "Cabling the mark stream sensor system with the sensor optics PY-MSS01.3-O1" on page 29).

☞ Only optical fibers provided by Bosch Rexroth upon delivery may be used.

NOTICE **Do not open the housing**

The white light source PR0138/evaluation circuit PY-MSS01.1-T1 as well as the optics PY-MSS01.3-O1 must only be opened by the manufacturer.

⚠ WARNING **Create potential equalization**

When using the optics PY-MSS01.3-O1, a potential equalization has to be achieved between the evaluation circuit housing and the installation area of the sensor optics (e.g. by grounding). The metallic shrink sleeve of the optical fiber must not be used for potential equalization.

☞ The evaluation electronic may only be operated in areas with at least a degree of contamination 2 and on networks of a least overvoltage category II.

Comply with the technical connections loads (see chapter 7 "Technical data" on page 11) and the ambient conditions (see chapter 6 "Ambient conditions" on page 10).

Sensor optics PY-MSS01.3-O1: Ⓔx II 2G Ex op is IIB T4 Gb X

☞ The sensor optics may only be operated with the evaluation electronic PY-MSS01.1-T1 or with the power-limited white light source PR0138.

Potential equalization

⚠ WARNING **Create potential equalization**

The system/sensors has/have to be integrated into the local potential equalization. All conductive parts have to be grounded or connected to conductive parts. The bleeder resistor has to be smaller than 10^6 ohm.

☞ Appropriate measures regarding the explosion protection (e.g. intrinsically safe electric circuits) have to be complied with for monitoring systems.

5 Spare parts and accessories

5.1 Spare parts

There are no spare parts for the PY-MSS01.1-T1 mark stream sensor.

The PY-MSS01.1-T1 mark stream sensor is not subject to wear.

5.2 Accessories

To connect to the PY-MSS01.1-T1 mark stream sensor, the following sensor optics and cables are available:

Ordering code	Part number	Description
PY-MSS01.3-O1	R911342153	Sensor optics "Robust 2" (without pre-assembled optical fiber cables)
PY-KOER001/000,0	R911342154	Coaxial optical fiber cables to the sensor optics PY-MSS01.3-O1 with variable length (2 m - 6 m in steps of 0.5)
PY-KG0001/000,0	R911328938	Encoder cable (sensor electronics for IndraDrive/MEM card), variable length (max. 50 m)

Ordering code	Part number	Description
PY-KP0001/000,0	R911328939	Voltage supply cable (24 V sensor electronic box), variable length (max. 25 m)
PY-KE0001/000,0	R911328940	Ethernet cable (sensor electronics for hub/ switch/MotionControl), variable length (max. 100 m)

6 Ambient conditions

	In operation	Storage and transport
Ambient temperature of sensor optics PY-MSS01.3-01	+5 °C to +130 °C	-25 °C to +130 °C
Relative humidity	RH-2; 5% up to 95% acc. to DIN EN 61131-2, condensation not permitted	RH-2; 5% up to 95% acc. to DIN EN 61131-2, condensation not permitted
Operating height	Up to 2,000 m above sea level acc. to EN 61131-2	Up to 3,000 m above sea level acc. to EN 61131-2
Mechanical strength	Maximum vibration: Frequency range: 10 Hz to 150 Hz Excursion: 0.75 mm At 10 Hz up to 57 Hz Acceleration: 1 g At 57 Hz up to 150 Hz Acc. to EN 60068-2-6	Max. shock: 15 g acc. to EN 60 068-2-27, no malfunction
Contamination level	2	2
Overvoltage category	2	–

Tab. 6-1: Ambient conditions

This is a product that corresponds to the limit values of the emitted interference of class A (industrial environments). This is a product that does *not* correspond to the limit values of the emitted interference of class B (residential area and small enterprises)

When using the product in residential areas or small enterprises, the operator has to take actions to prevent radio interferences (also refer to DIN EN 55022).

7 Technical data

7.1 General data

Sampling frequency	250 kHz
Resolution	16 bits per channel
Sensitivity	8 amplifying stages in the ratio 2:1
Light source	Power-limited white light source PR0138; current-controlled operation
Interfaces	Incremental encoder connection, M12 8-pin, circular socket Ethernet interface, M12 4-pin, circular socket Power supply, M12 8-pin, circular connector Connecting the sensor optics via two optical fibers with SMA port
Digital interface	1 differential input for a signal level of 24 V 2 differential outputs for high speed signals with levels of 24 V. Current limitation of 30 mA, suitable for connection lengths for up to 5 m and an edge steepness of < 2 µs
Date of manufacturing	The manufacturing date is specified on the type plate behind the "FD:" label as quarter FD following DIN ISO 8601. Structure of the 5-digit alphanumerical quarter FD: Year (2 digits), quarter (1 digit) and quarter of the current year (2 digits) = YYQqq Example: 11Q04 = 4th quarter 2011
Maximum path velocity	1200 m/min (= 20m/s)
Setup velocity	At least 1 m/min (0.017 m/s)
Format length	0.3 m - 2.5 m
Printing materials	Cardboard (folding carton), plastic foil (BOPP, PET, LDPE,...) and aluminum foil, laminate and paper
Number of colors	Up to 12 registration marks at a same time
Colors	Solvent colors, watercolors, UV colors, varnishes (ethyl acetate and ethanol)
Length of mark pattern	Results from the number of colors and mark distances The maximum length of the mark window depends on the setup velocity: • Ca. 0.6 m at 10 m/min • Ca. 0.3 m at 5 m/min • Ca. 0.06 m at 1 m/min
Other printing	Printing before and after the mark pattern is possible, but not during the mark pattern

7.2 Voltage supply

The voltage for the PY-MSS01.1-T1 mark stream sensor is supplied via "X1S Power".

Supply voltage	24 V DC (19 V...30 V DC)
Nominal current	Typ. 240 mA (at a nominal current of 24 V)
Power consumption	Max. 5.8 W

7.3 Degree of protection and weight

Degree of protection	IP 54
Weight (without packaging)	Ca. 300 g

8 Standards

8.1 Standards used

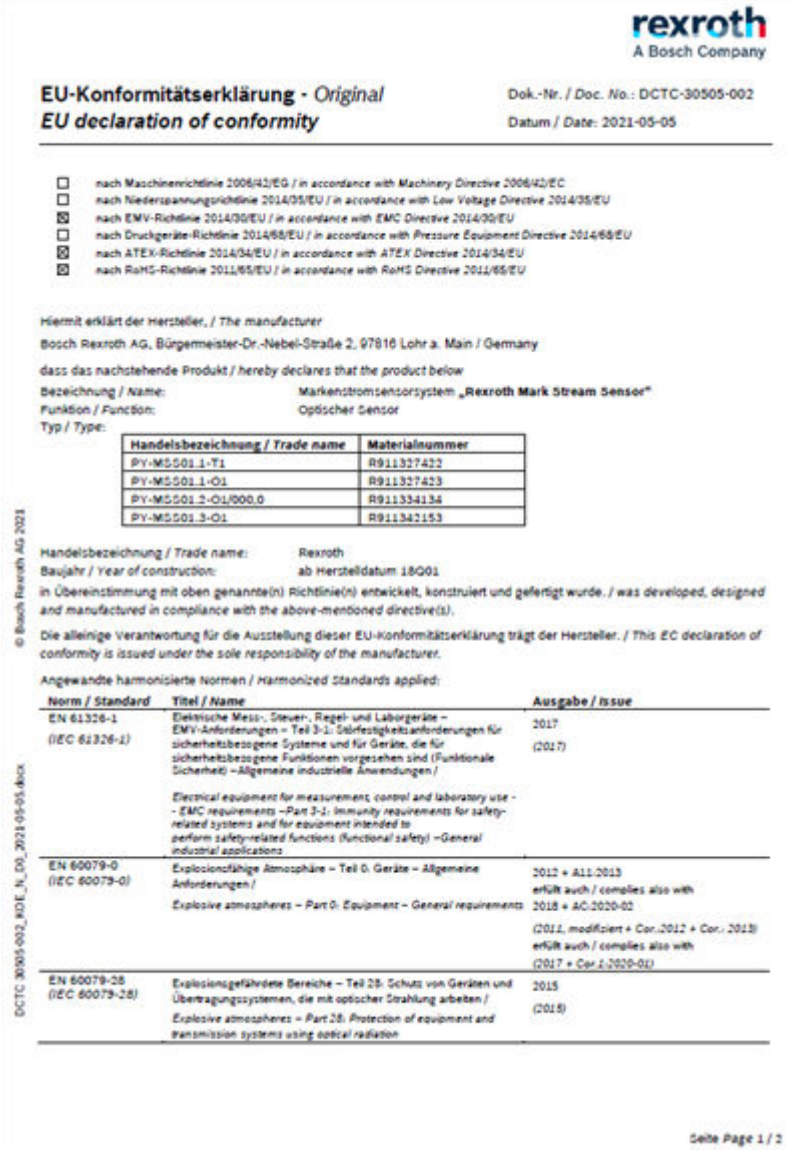
The PY-MSS01.1-T1 mark stream sensor complies with the DIN EN standards listed in the following:

Standard	
EN 61326-1	Electrical equipment for measurement, control and laboratory use –
(directive 2014/30/EU)	EMC requirements – Part 1: General requirements
	Edition 2013
DIN EN 60079-0	Explosive atmospheres - Part 0
(directive 2014/34/EU)	Equipment – General requirements
DIN EN 60079-28	Explosive atmospheres - Part 28
(directive 2014/34/EU)	Protection of equipment and transmission systems using optical radiation

Tab. 8-1: Safety standards

8.2 Declaration of conformity

CE



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EU-Konformitätserklärung - *Original*
EU declaration of conformity

Dok.-Nr. / *Doc. No.*: DCTC-30505-002
Datum / *Date*: 2021-05-05

- ☐ nach Maschinenrichtlinie 2006/42/EG / *in accordance with Machinery Directive 2006/42/EC*
- ☐ nach Niederspannungsrichtlinie 2014/35/EU / *in accordance with Low Voltage Directive 2014/35/EU*
- ☒ nach EMV-Richtlinie 2014/30/EU / *in accordance with EMC Directive 2014/30/EU*
- ☐ nach Druckgeräte-Richtlinie 2014/68/EU / *in accordance with Pressure Equipment Directive 2014/68/EU*
- ☒ nach ATEX-Richtlinie 2014/34/EU / *in accordance with ATEX Directive 2014/34/EU*
- ☒ nach RoHS-Richtlinie 2011/65/EU / *in accordance with RoHS Directive 2011/65/EU*

Hiermit erklärt der Hersteller, / *The manufacturer*

Bosch Rexroth AG, Bürgermeister-Dr.-Nebel-Straße 2, 97816 Lohr a. Main / Germany

dass das nachstehende Produkt / *hereby declares that the product below*

Bezeichnung / *Name*: Markenstromsensorsystem „**Rexroth Mark Stream Sensor**"
Funktion / *Function*: Optischer Sensor
Typ / *Type*:

Handelsbezeichnung / *Trade name*	Materialnummer
PY-MSS01.1-T1	R911327422
PY-MSS01.1-O1	R911327423
PY-MSS01.2-O1/000.0	R911334134
PY-MSS01.3-O1	R911342153

Handelsbezeichnung / *Trade name*: Rexroth
Baujahr / *Year of construction*: ab Herstelldatum 18Q01

in Übereinstimmung mit oben genannte(n) Richtlinie(n) entwickelt, konstruiert und gefertigt wurde. / *was developed, designed and manufactured in compliance with the above-mentioned directive(s).*

Die alleinige Verantwortung für die Ausstellung dieser EU-Konformitätserklärung trägt der Hersteller. / *This EC declaration of conformity is issued under the sole responsibility of the manufacturer.*

Angewandte harmonisierte Normen / *Harmonized Standards applied:*

Norm / Standard	Titel / Name	Ausgabe / Issue
EN 61326-1 *(IEC 61326-1)*	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 3-1: Störfestigkeitsanforderungen für sicherheitsbezogene Systeme und für Geräte, die für sicherheitsbezogene Funktionen vorgesehen sind (Funktionale Sicherheit) –Allgemeine industrielle Anwendungen / *Electrical equipment for measurement, control and laboratory use - - EMC requirements –Part 3-1: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) –General industrial applications*	2017 *(2017)*
EN 60079-0 *(IEC 60079-0)*	Explosionsfähige Atmosphäre – Teil 0: Geräte – Allgemeine Anforderungen / *Explosive atmospheres – Part 0: Equipment – General requirements*	2012 + A11:2013 erfüllt auch / *complies also with* 2018 + AC:2020-02 *(2012, modifiziert + Cor.:2012 + Cor.: 2013)* erfüllt auch / *complies also with (2017 + Cor.1:2020-01)*
EN 60079-28 *(IEC 60079-28)*	Explosionsgefährdete Bereiche – Teil 28: Schutz von Geräten und Übertragungssystemen, die mit optischer Strahlung arbeiten / *Explosive atmospheres – Part 28: Protection of equipment and transmission systems using optical radiation*	2015 *(2015)*

Seite / *Page* 1 / 2

DCTC 30505-002_KDE_N_D0_2021-05-05.docx

Fig. 8-1: Declaration of conformity of the mark stream sensor system, page 1

EU-Konformitätserklärung - Original *EU declaration of conformity*

Seite Page 2 / 2
DCTC 30505-002 : 2021-05-05

EN IEC 63000 (IEC 63000)	Technische Dokumentation zur Beurteilung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe / *Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*	2018 (2016)

Kennzeichnung zum Explosionsschutz / *Marking for explosion protection:*

Bezeichnung / *Designation*	**ATEX-Kennzeichnung/ *ATEX marking***
Sencoroptik PY-MS501.1-01	II 2G Ex op is IIB T4 Gb X
Sencoroptik PY-MS501.2-01/000,0	II 2G Ex op is IIB T4 Gb X
Sencoroptik PY-MS501.3-01	II 2G Ex op is IIB T4 Gb X
Weißlichtquelle PR0138 eingebaut in Auswerteelektronik PY-MS501.1-T1	II (2)G [Ex op is Gb] IIB X

Benannte Stelle, die das EU-Baumusterprüfverfahren nach oben genannter Richtlinie durchgeführt hat – die das umfassende Qualitätssicherungssystem nach oben genannter Richtlinie genehmigt hat: / *Notified body that has conducted the EC type-examination procedure in accordance with the above-mentioned directive / approved the full quality assurance system in accordance with the above-mentioned directive:*

Name / *Name:* TÜV Süd Product Service GmbH
Anschrift / *Address:* Gottlieb-Daimler-Str., 70794 Filderstadt / Germany
Kennnummer / *Identification number:* 0123
EU-Baumusterprüfbescheinigungs-Nr / *No. of EC type-examination certificate:* EX5 11 12 57401 002

Benannte Stelle, die das umfassende Qualitätssicherungssystem nach oben genannter ATEX-Richtlinie genehmigt hat: / *Notified body that has approved the full quality assurance system in accordance with the above-mentioned ATEX directive:*

Name / *Name:* DEKRA EXAM GmbH
Anschrift / *Address:* Dinnendahlstr. 9, 44809 Bochum
Kennnummer / *Identification number:* 0158

Nachfolgende Person ist bevollmächtigt, die relevanten technischen Unterlagen zusammenstellen: / *The individual below is authorized to compile the relevant technical files:*

Name: / *Name:* Christian Russo, Abt. DC-AE/EPI3
Anschrift: / *Address:* Bürgermeister-Dr.-Nebel-Str. 2, 97816 Lohr a. Main

Weitere Erläuterungen / *Further explanations:*

Die Montage- und Installationshinweise gemäß Produktdokumentation sind zu beachten. / *The assembling and installation instructions according to the manual have to be followed.*

Lohr a. Main — Ort / *Place*
2021-05-05 — Datum / *Date*

i.V. pki, BOSCH, DE, F, R, frank.kaufmann — Digital unterschrieben von pki, BOSCH, DE, F, R, frank.kaufmann Datum: 2021.05.21 08:31:38 +02'00'
Frank Kaufmann
Leitung Marketing und Produktmanagement Drive Systems / *Head of Market and Product Management Drive Systems*

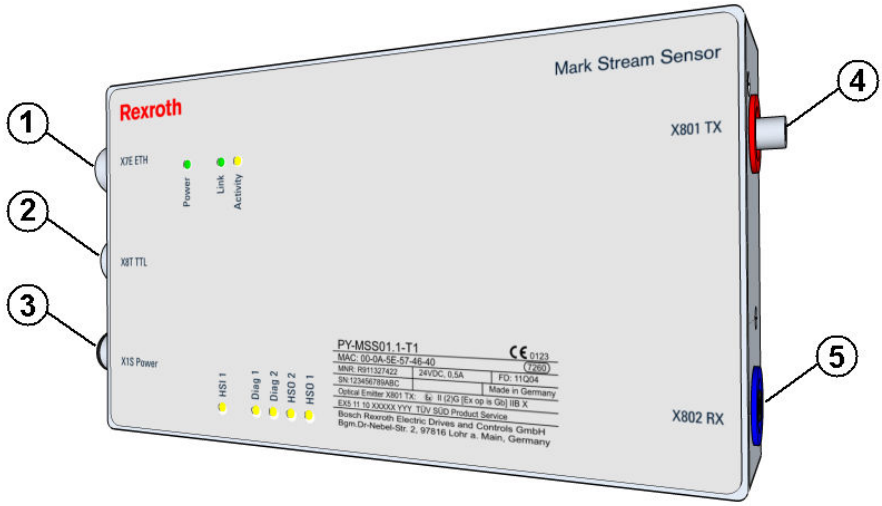
i.V. pki, bosch, de, T, h, Thomas.Schmid — Digitally signed by pki, bosch, de, T, h, Thomas.Schmid Date: 2021.06.01 10:19:51 +02'00'
Thomas Schmid
Leitung Entwicklung Hardware / *Head of Development Hardware*

Änderungen im Inhalt der EU-Konformitätserklärung sind vorbehalten. Derzeit gültige Ausgabe auf Anfrage.
We reserve the right to make changes to the content of the EU Declaration of Conformity. Current issue on request.

Fig. 8-2: Declaration of conformity of the mark stream sensor system, page 2

9 Interfaces

9.1 Connector panel



① Ethernet connection, X7E ETH
② Incremental encoder connection, X8T TTL
③ Power supply connection, X1S Power
④ Optical fiber connection, X801 TX
⑤ Optical fiber connection X802 RX

Fig. 9-1: Connector panel of the PY-MSS01.1-T1 mark stream sensor

Name at housing	Connection type	Connector type (installed)	Mating connector or connection (external)
X7E ETH	Network connection: Ethernet 10Base T or 100Base TX	4-pin circular socket, M12	4-pin circular connector M12 x 1, straight
X8T TTL	Incremental encoder connection	8-pin circular socket, M12	8-pin circular connector M12 x 1, straight
X1S Power	Power supply 24 V DC	8-pin circular connector, M12	8-pin circular socket, M12 x 1, straight
X801 TX	Optical fiber output of evaluation electronic	SMA socket for optical fibers	SMA connector for optical fibers
X802 RX	Optical fiber input of evaluation electronic	SMA socket for optical fibers	SMA connector for optical fibers

Tab. 9-1: Interfaces

NOTICE **Plugging or removing connections under voltage can damage the mark stream sensor!**

Disconnect the power supply before attaching or loosening connections!

Only the cables provided by Bosch Rexroth as accessories may be used to connect the PY-MSS01.1-T1 mark stream sensor.

9.2 24 V DC power supply X1S power

All internally required voltages are generated with electrical isolation via a DC/DC converter. The connection is an 8-pin M12 circular connector.

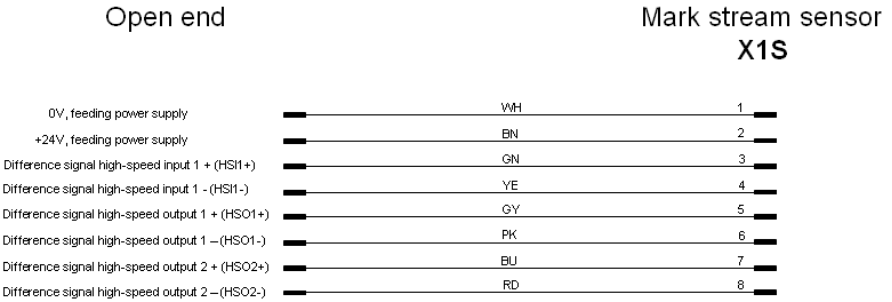


Fig. 9-2: Connection lead at X1S Power

Pin	Color	Function
1	White	0 V, feeding power supply
2	Brown	+24 V, feeding power supply
3	Green	Differential signal of high-speed input 1 + (HSI1+)
4	Yellow	Differential signal of high-speed input 1 - (HSI1-)
5	Grey	Differential signal of high-speed output 1 + (HSO1+)
6	Pink	Differential signal of high-speed output 1 - (HSO1-)
7	Blue	Differential signal of high-speed output 2 + (HSO2+)
8	Red	Differential signal of high-speed output 2 - (HSO2-)

Tab. 9-2: Pin assignment of X1S power

The PY-MSS01.1-T1 mark stream sensor is reverse polarity-protected. A reverse polarity of the 24 V power supply to X1S Power does not damage the device.

NOTICE

Damaging the PY-MSS01.1-T1 mark stream sensor by excessive input voltages

Overvoltages higher than 35 V for more than 500 ms damage components in the power supply area of the device.

EMC noise immunity

To increase noise immunity against high-frequency radiation (EMC), it is recommended to attach a braid-breaker (split ferrite) at the voltage supply cable.

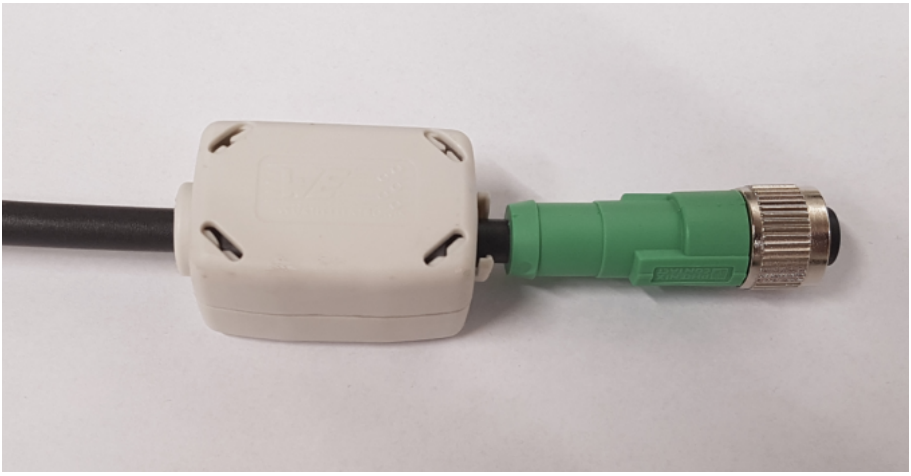


Fig. 9-3: Connection lead at X1S Power - Braid-breaker

If there is a very extensive cable routing of the 24V connection lead, it is recommended to additionally stabilize the supply voltage in the control cabinet of the sensor using pulse capacitors (Y-capacitors). For example by using pulse capacitors MKP10-1000 100N (100 nF, 1000 V).

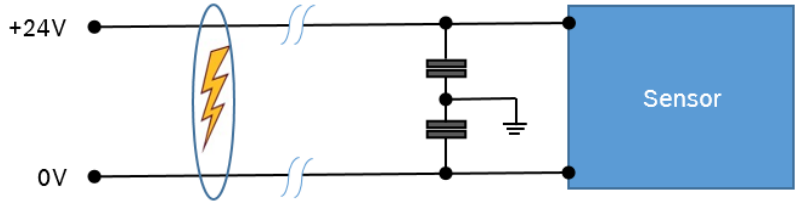


Fig. 9-4: Connection lead at X1S Power - Pulse capacitor

9.3 Ethernet interface X7E ETH

The Rexroth mark stream sensor can be connected to an Ethernet network via the Ethernet interface. The interface is a 4-pin M12 circular socket.

M12 circular socket, 4-pin	
Type	Ethernet 10Base T/100Base TX
Cable length	100 m max.
Cable type	Shielded, twisted pair, Cat 5
Transmission rate	10 or 100 MBit/s

Tab. 9-3: Technical data of the Ethernet interface

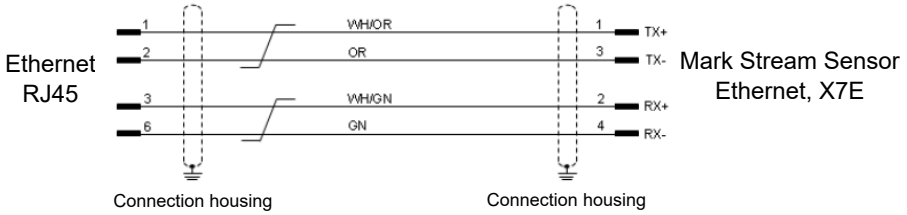


Fig. 9-5: Connecting lead at X7E ETH

Pin	Function
1	TX+
2	RX+
3	TX-
4	RX-

Tab. 9-4: X7E ETH pin assignment

NOTICE

The PY-MSS01.1-T1 mark stream sensor is not intended for connection to telecommunications networks!

Do not connect the device to a telecommunications network.

9.4 Incremental encoder interface X8T TTL

Via the incremental interface, the mark stream sensor PY-MSS01.1-T1 can be connected to a Bosch Rexroth drive via the control unit option "Encoder emulation output card" to transmit the velocity information to the mark stream sensor PY-MSS01.1-T1.

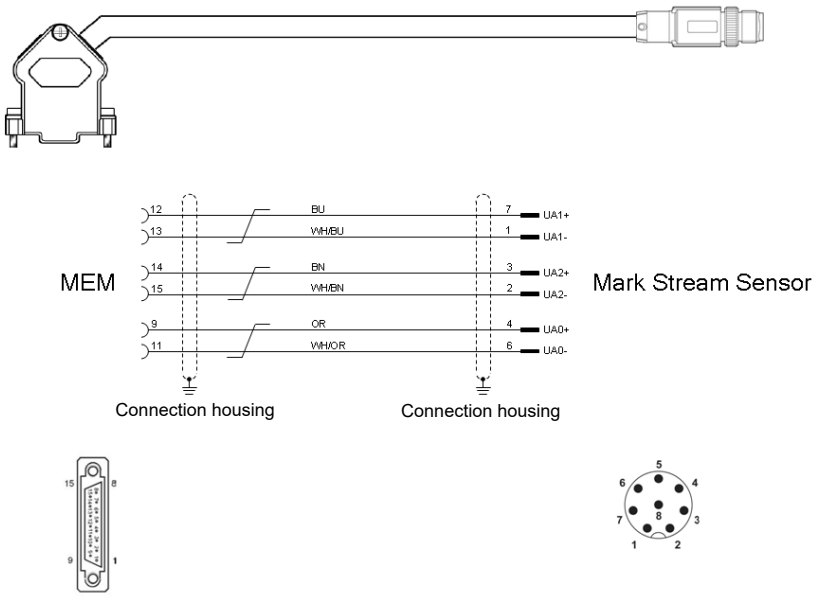


Fig. 9-6: Connection lead to X8T TTL

PIN	Color	Function
1	White/blue	Incremental encoder, track A (A-)
2	White/brown	Incremental encoder, track B (B-)
3	Brown	Incremental encoder, track B (B+)
4	Orange	Incremental encoder, reference track C (C+)
5	White/green	Not connected
6	White/orange	Incremental encoder, reference track C (C-)
7	Blue	Incremental encoder, track A (A+)
8	Green	Not connected

Tab. 9-5: X8T TTL pin assignment

Only connect the incremental encoder interface to the control unit option "Encoder emulation output card" of the drive system provided by Bosch Rexroth.

9.5 Optical fiber interfaces X801 TX and X802 RX

The optical fibers are connected with an SMA plug. A transmission link starts at the sender output and ends at the recipient input. The transmission path con-

sists of optical fibers. The coaxial optical fibers of the optics PY-MSS01.3-O1 is a glass optical fiber. The cable lengths are available in steps of 0.5 and can be freely configured. The minimum cable length is 2 m and the maximum cable length is 6 m.

PY-MSS01.3-O1

When using the optics PY-MSS01.3-O1, a 2 to 1 optical fiber with a flexible tube is used. The single end is connected to the X805 input of the optics. The two other ends are connected to the X801 TX and X802 RX connections of the evaluation electronic. There is no difference between sending and receiving optical fiber in case of the PY-MSS01.3-O1 optics with the optical fiber PY-KOER001/000,0.

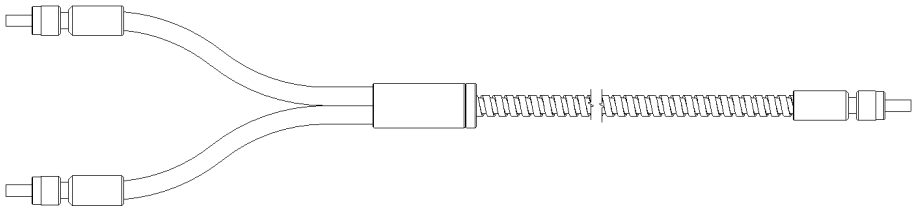


Fig. 9-7: Optical fiber for use with PY-MSS01.3-O1

Only cables provided by Bosch Rexroth can be used to connect the mark stream sensor.

⚠ WARNING **Light with high energy. Danger of blindness and eye injuries**

Do not look into the light ray (sender output or end of OWG).

NOTICE **Error when handling and mounting. The optical fiber components can be mechanically destroyed**

- Comply with valid mechanic limit values
- Do not tighten the optical fiber connector too tight

10 Mounting, demounting and electric installation

10.1 Housing dimensions

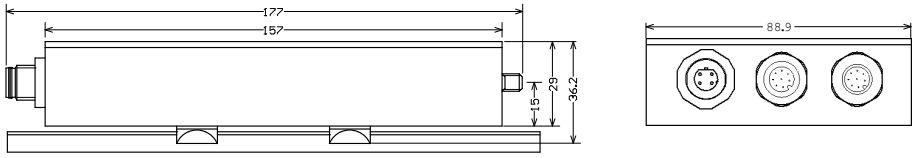
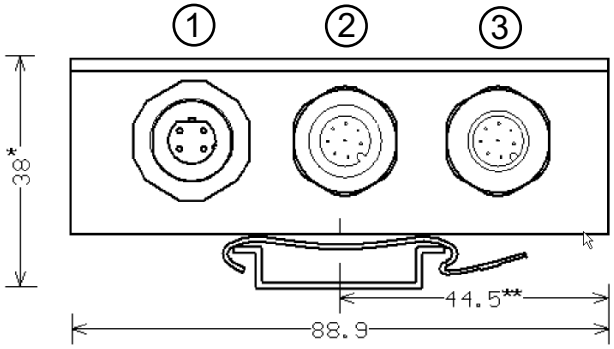


Fig. 10-1: Dimensions of the evaluation electronic

10.2 Mounting the evaluation electronic of mark stream sensor

The evaluation electronic is to be mounted on a mounting rail (standard C-rail 30 mm x 3.5 mm) with the clamp as shown in the following figure.



① Ethernet
② Encoder
③ Supply and I/O

* Approximate measurement, irrespective of the mounting rail
** Approximate measurement

Fig. 10-2: Evaluation circuit with mounting rail

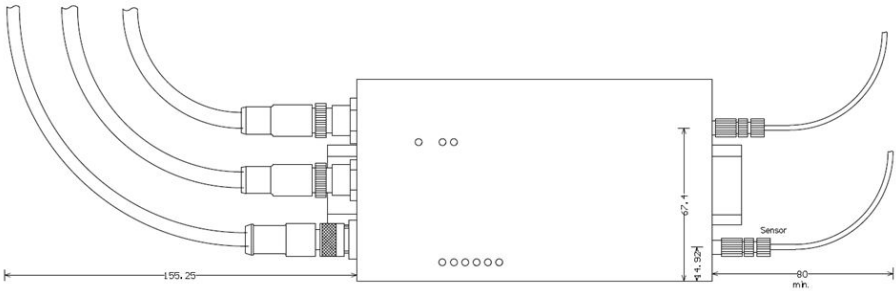


Fig. 10-3: Lateral free space for the connecting cables to the evaluation electronic

The evaluation electronic has to be outside the area exposed to explosion hazards. The mounting rail has to be grounded.

NOTICE **Electrostatic discharge-sensitive devices!**

Do observe all required precautionary measures when handling electrostatic discharge-sensitive devices! (EN 61340-5-1, EN 61340-5-2)!

⚠ CAUTION **Glare by strong light source!**

Only trained and qualified staff may install or replace the module! The internal white light source is very powerful. Do not look directly into the light source or into the connected optical fibers!

10.3 Mounting the sensor optics of mark stream sensor

The following optics type is available:

- **PY-MSS01.3-O1**

  The optical fibers are not firmly attached to the sensor optics. The optical fibers are screwed at the sensor optics via a thread. The length is variable (2 m - 6 m in steps of 0.5 m). The optical fibers are protected by a metallic tube and it is a 2 to 1 optical fiber with 3 connections

Sensor optics PY-MSS01.3-O1

The sensor optics of the mark stream sensor has to be mounted to a cross beam with mounting holes.

The sensor optics is connected to the sensor electronics using the optical fiber PY-KOER001/000,0 (transmission and receiving direction). The optical fibers are available in different lengths.

Fig. 10-4: Sensor optics PY-MSS01.3-O1

NOTICE **Do not fall below the minimum bending radius!**

For optical fibers, it may never be fallen below the valid bending radius of 50 mm.

The fixture used should be adjustable in lateral direction as well as in its distance using several adjusting screws. Furthermore, mount the sensor optics at a low vibration position to ensure a higher accuracy. The optical fiber is protected by a shrink sleeve. The single end of an optical fiber has to be connected to the optics. For the sensor optics PY-MSS01.3-O1, the two other ends of the optical fibers have to be connected to the evaluation box.

The sensor optics PY-MSS01.3-O1 has the following dimensions:

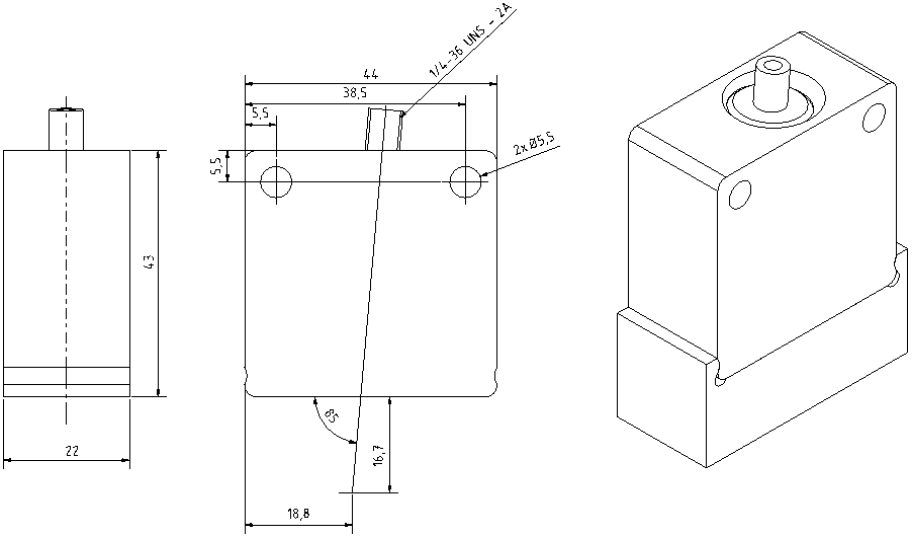


Fig. 10-5: Sensor optic dimensions PY-MSS01.3-O1

☞	Mount the sensor optics to an area that is electrically conducting and connected to a grounding conductor!
☞	The metallic shrink sleeve of the OWG has to be grounded as well.
☞	The background the spot is focusing on, has to be monochrome.

The OWG spiraled hose is available with lengths from 2 m to 6 m, in steps of 0.5.

The material web with the marks to be detected has to have with a fixedly defined distance to the sensor optics that corresponds exactly to the distance of the protective cap. The distance is 16.7 mm. The sensor optics has to be mounted parallel to the material web.

The following figure shows the correct alignment of the optics to the web. Please comply with these assembly instructions.

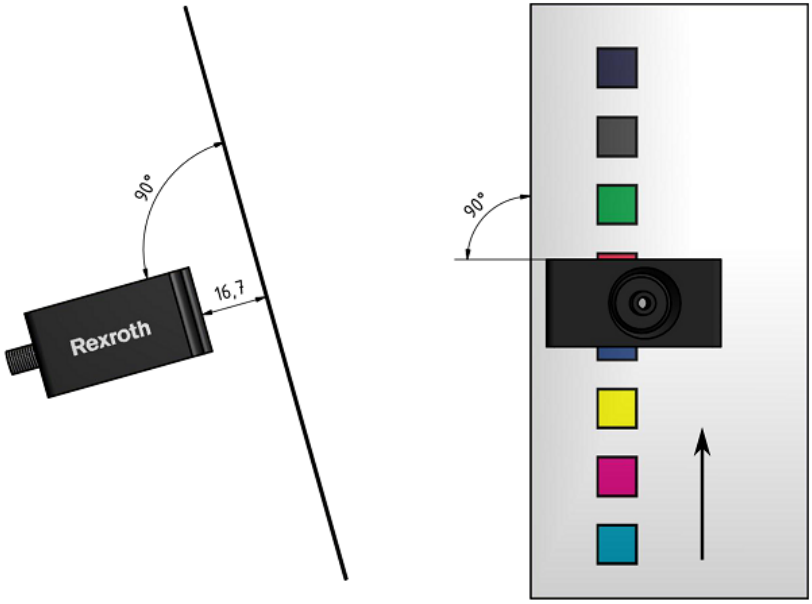


Fig. 10-6: Sensor optic alignment PY-MSS01.3-O1

The distance between optics and material path can also be adjusted using the protective cap, by minimal contact of the protective cap with the web.

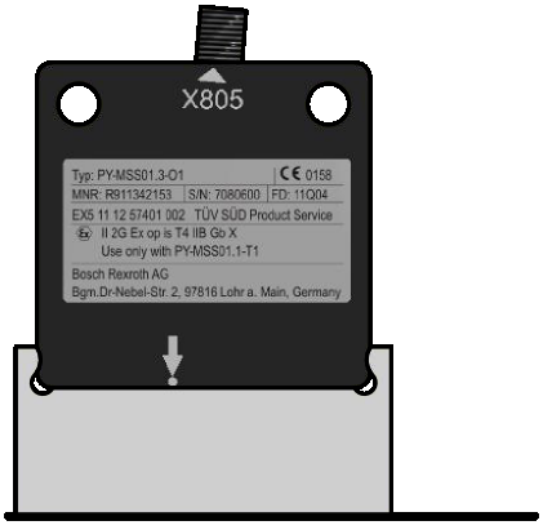


Fig. 10-7: Protective cap as assembly aid

After the correct sensor optic alignment, the protective cap can be removed carefully.

☞ Please ensure that the sensor optics is not displaced when removing the protective cap, as a change in distance might result in incorrect measuring signals.

After removing the protective cap, the sensor has a correct distance to the material web and a highly-precise measurement can be guaranteed.

☞ If the position of the sensor optics is displaced for a new production, it is strongly recommended to place the protective cap again and to use it for the optimum alignment of the sensor optics.

☞ The protective cap should also be placed again if the sensor optics is not used (e.g. when cleaning the machine) to protect the sensor optics from pollution.

Additional mounting instructions

- Mount the PY-MSS01.1-T1 mark stream sensor to ensure an ergonomic operation. Additionally, ensure that all moving machine components are visible for the operator at any time

- Avoid mounting locations that are exposed to direct sunlight, as this can result in additional warming
- Mount the optics to allow displacement and alignment at a right angle to the material web
- Keep the maximum distance possible from interference sources
- Lay all connecting cables in loops and use strain reliefs for all cables
- Provide sufficient space for mounting, demounting, plugs and the cable length

10.4 Demounting

⚠ WARNING **Personal injuries and material damages during installation works!**

- Do not work at running or unsecured machines
- Prior to start working at the machines, secure the machines against unpredictable motions and operation by unauthorized personnel
- Secure the mark stream sensor, the sensor optics and the supply lines from falling before releasing mechanical connections

To demount the mark stream sensor or the sensor optics, proceed as follows:

1. Set the machine to standstill.
2. Disconnect the voltage of the mark stream sensor.
3. Switch off the main switch of the machine.
4. Secure the machine against unpredicted motions and operation by unauthorized personnel.
5. Wait for the discharging time of the electric systems.
6. Disconnect all electric connections.
7. Prior to the disassembly, secure the mark stream sensor, the sensor optics and the supply lines from falling or moving before releasing mechanical connections.
8. Remove the mark stream sensor and/or the sensor optics from the machine.
9. Enter all executed measures into a maintenance protocol.

10.5 Electric installation

NOTICE **Malfunctions due to insufficient shielding!**

Use only shielded cables and metallic, conductive connector housings or coupling housings with large-area shield support.

First, connect the sensor optics and the PY-MSS01.1-T1 evaluation electronic using cables.

PY-MSS01.3-O1

The individual optical fiber connection has to be connected to the sensor optics in case of the sensor optics PY-MSS01.3-O1. The two other optical fiber connections can be arbitrarily connected to the evaluation electronic. The optical fibers have to be firmly and completely mounted to ensure the transmitting power.

NOTICE **Do not fall below the minimum bending radius!**

For optical fibers, it may never be fallen below the valid bending radius of 50 mm.

The correct distance between the sensor optics has to be checked and only then the protective cap can be removed from the sensor optics. Finally, connect the evaluation electronic to the control and the drive system using cables (see the following figures).

To connect the mark stream sensor system to the control and to the drive system, proceed as follows:

1. Connect the incremental encoder connection of the mark stream sensor to the control section “Encoder emulation card" of the corresponding drive.

   It has to be the drive that is to be controlled with the measured values of the mark stream sensor.
2. Connect the Ethernet connection of the mark stream sensor to the control.

   This is generally performed via an industrial Ethernet switch.
3. Connect the 24 V power supply to the mark stream sensor.

   Thus, the green "Power" LED and the "Link" LED flash if there is an Ethernet connection.

All mark stream sensor systems have to be cabled again and checked subsequently.

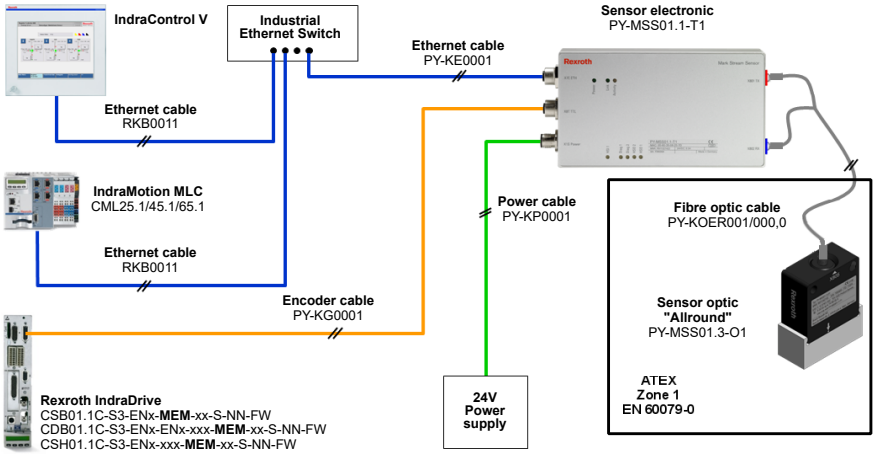


Fig. 10-8: Cabling the mark stream sensor system with the sensor optics PY-MSS01.3-O1

11 Commissioning

The product is operational upon delivery.

However, function blocks from the "RMB_TechRegiExtended" library are required for the communication with the mark stream sensor. For the use of the function blocks, refer to the corresponding library description and application description (refer to tab. 1-2 "Related documents" on page 3).

12 Device description

12.1 General information

The PY-MSS01.1-T1 mark stream sensor is intended for use together with a drive system and the corresponding software of the Bosch Rexroth company.

The mark stream sensor consists of the following components:

- Evaluation electronic PY-MSS01.1-T1
- Sensor optics PY-MSS01.3-O1

Electrical as well as optical connecting leads are available as accessories. The corresponding types are listed in chapter 5 "Spare parts and accessories" on page 9.

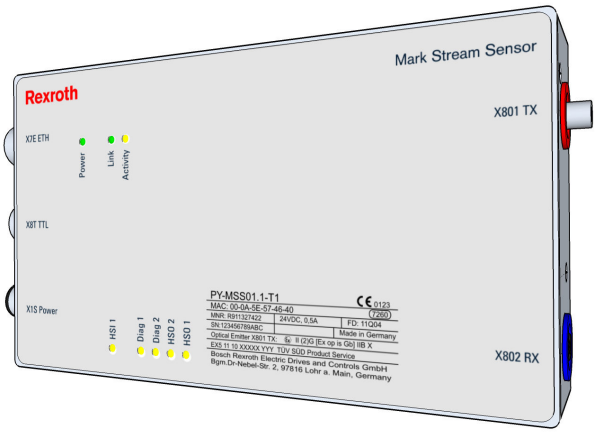


Fig. 12-1: Mark stream sensor PY-MSS01.1-T1

12.2 Operating and display components

12.2.1 General information

Several LEDs can be used to display and diagnose the current status of the PY-MSS01.1-T1 mark stream sensor on top of the evaluation electronic. The LEDs can still be used to diagnose errors (see tab. 12-1 "LEDs for operation and error display on the evaluation electronic" on page 31).

12.2.2 Operating and error displays

Two LED rows to display the device status and errors are located on the evaluation electronic.

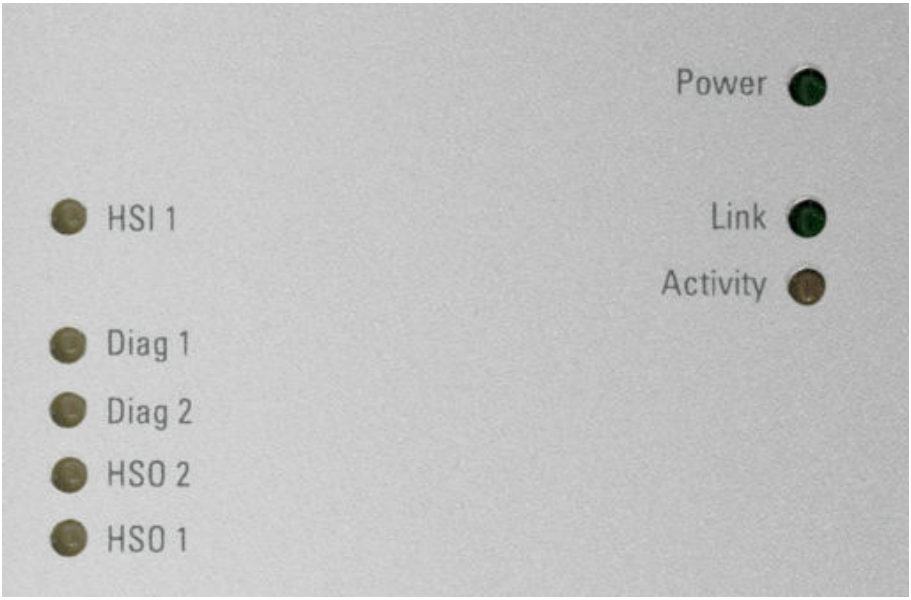


Fig. 12-2: LEDs of the evaluation electronic

The description of the display elements as well as the measures taken in case of errors are listed in the following table:

Symbol or LED	Display	Meaning	Measure
Power	LED green on	Normal mode	–
	LED green off	No supply voltage 24 V DC	Check supply voltage at the power supply unit!
Link	LED green on	Ethernet connection established	–
	LED green off	No Ethernet connection	Check the Ethernet connection!
Activity	LED flashing yellow	Ethernet data traffic available	–
	LED yellow off	No Ethernet data traffic	–
HSI 1	Reserved	Reserved	–

Symbol or LED	Display	Meaning	Measure
Diag 1	LED flashing yellow	LED flashes for 20 ms if the sensor receives a zero pulse from the incremental encoder emulation	–
	LED yellow off	No zero pulse from the incremental encoder simulation	Check whether the axis is rotating! Check the incremental encoder connection! Check parameterization of incremental encoder emulation
Diag 2	LED yellow ON	The sensor sends a measuring package with at least one valid measuring result	–
	LED yellow off	The sensor does not send any measuring results or no valid measured data is available.	Check whether the measurement was started. Check the correct configuration
HSO 1	LED yellow ON	LED flashes if the sensor generates a 24 V signal	–
	LED yellow off	Sensor does not generate a 24 V signal	Check whether 24 V is activated at the sensor
HSO 2	Reserved	Reserved	–

Tab. 12-1: LEDs for operation and error display on the evaluation electronic

The "HSO 1" LED is only required if the path/cylinder measuring method at the sensor was parameterized with 24 V. Otherwise, this LED can be ignored. "Diag 1" has to flash if the referenced axis is rotating and a correct configuration was transmitted to the sensor. After the measurement start, "Diag 2" indicates that valid measuring packages are sent.

12.2.3 Electronic type plate

The device is provided with an electronic type plate. In this type plate, the device data is retentively stored. The electronic type plate contains the following device data:

1. Operating hours counter
2. Serial number
3. Index
4. Part number
5. Type code

This data is entered into the electronic type plate during the production. The content of the electronic type plate can be read via the "MB_RegiSensor01ReadDiagType01" function block of the "RMB_TechRegiExtended" library.

13 Troubleshooting and debugging

LEDs indicate the operating states of the mark stream sensor PY-MSS01.1-T1.

For the description of the LED displays, refer to chapter 12.2.2 "Operating and error displays" on page 30.

NOTICE **Do not open the housing!**

Do not open the housing of the mark stream sensor PY-MSS01.1-T1!

Repairs at the device by the customer are not permitted. Exceptions are maintenance works listed in the chapter "Maintenance".

For further information in the event of repair, please contact the Bosch Rexroth Service.

14 Maintenance and repair

The service life is increased by regular, preventive maintenance. Comply with the specifications of the machine manufacturer in the machine maintenance schedule as well as with the following specifications regarding maintenance measures and intervals at the PY-MSS01.1-T1 mark stream sensor.

⚠ WARNING **Personal injuries and damage to property in case of maintenance or repair work!**

- Do not work at running or unsecured machines
- Prior to start working at the machines, secure the machines against unpredictable motions and operation by unauthorized personnel
- Secure the mark stream sensor, the sensor optics and the supply lines from falling before releasing mechanical connections

In case of malfunctions or maintenance and or repair work of the PY-MSS01.1-T1 mark stream sensor, proceed as follows:

1. Set the machine to standstill.
2. Disconnect the voltage of the mark stream sensor.
3. Switch off the main switch of the machine.
4. Secure the machine against unpredicted motions and operation by unauthorized personnel.

5. Wait for the discharging time of the electric systems.
6. Disconnect all electric connections.
7. Prior to the disassembly, secure the mark stream sensor, the sensor optics and the supply lines from falling or moving before releasing mechanical connections.
8. Remove the mark stream sensor and/or the sensor optics from the machine.
9. Log all measures into the machine maintenance report.

Maintenance measures

Action	Interval
Check mechanic and electric connections	According to machine maintenance schedule, check at least every 1000 operating hours
Remove dust, chips and other dirt from the mark stream sensor, the sensor optics and the connections	According to the contamination level, remove them at least after one year of operation

Tab. 14-1: Maintenance measures

Repairs

The PY-MSS01.1-T1 mark stream sensor may only be repaired in the plant of the manufacturer or in a shop authorized by Bosch Rexroth. The following repairs can be executed in authorized shops:

- Exchanging mark stream sensor
- Exchanging sensor optics
- ...

15 Ordering information

15.1 Accessories and spare parts

For ordering information on accessories and spare parts, refer to chapter 5.2 "Accessories" on page 9.

15.2 Ordering data

Type code	Product description	Part number
PY-MSS01.1-T1	Color sensor electronics and Ethernet interface	R911327422

16 Disposal

16.1 Return

The products manufactured by Bosch Rexroth can be returned free of charge for disposal. There must not be any built-up such as oil and grease on the product when returning the products.

Furthermore, the product may not contain any inappropriate foreign substance or third party components.

Send the product(s) free of charge to the following address:

Bosch Rexroth AG
Electric Drives and Controls
Bürgermeister-Dr.-Nebel-Straße 2
97816 Lohr, Germany

16.2 Packaging

Packaging material consists of paperboard, plastics, wood or expanded polystyrene. These materials can be recycled easily.

Due to ecological reasons, packaging material should not be returned.

17 Service and support

Our worldwide service network provides an optimized and efficient support. Our experts offer you advice and assistance should you have any queries. You can contact us **24/7**.

Service Germany

Our technology-oriented Competence Center in Lohr, Germany, is responsible for all your service-related queries for electric drive and controls.

Contact the **Service Hotline** and **Service Helpdesk** under:

Phone:	**+49 9352 40 5060**
Fax:	**+49 9352 18 4941**
E-mail:	service.svc@boschrexroth.de
Internet:	http://www.boschrexroth.com

Additional information on service, repair (e.g. delivery addresses) and training can be found on our internet sites.

Service worldwide

Outside Germany, please contact your local service office first. For hotline numbers, refer to the sales office addresses on the internet.

Preparing information

To be able to help you more quickly and efficiently, please have the following information ready:

- Detailed description of malfunction and circumstances
- Type plate specifications of the affected products, in particular type codes and serial numbers
- Your contact data (phone and fax number as well as your e-mail address)

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Notes

rexroth
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