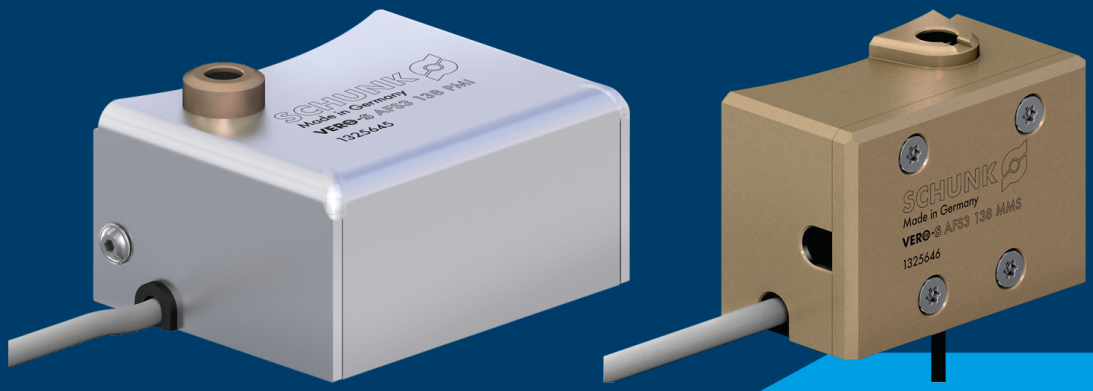

VERO-S Monitoring System
AFS3 138 PMI, AFS3 138 MMS
Assembly and Operating Manual

Hand in hand for tomorrow

Imprint

Technical changes:
We reserve the right to make alterations for the purpose of technical improvement.

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Dear Customer,

Thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

Customer Management

Tel. +49-7572-7614-1300
Fax +49-7572-7614-1039

cmm@de.schunk.com

Please read the operating manual in full and keep it close to the product.

Table of Contents

1 General

1.1 About this manual

This manual contains important information for a safe and appropriate use of the product.

This manual is an integral part of the product and must be kept accessible for the personnel at all times.

Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

In addition to these instructions, the documents listed under ▸ 1.1.2 [🗋 5] are applicable.

NOTE: The illustrations in this manual are intended to provide a basic understanding and may deviate from the actual version.

1.1.1 Presentation of Warning Labels

NOTICE

Material damage!

Information about avoiding material damage.

1.1.2 Applicable documents

- General terms of business *
- Catalog data sheet of the purchased product *
- Assembly and Operating Manual VERO-S clamping system *

The documents labeled with an asterisk (*) can be downloaded from **schunk.com/downloads**.

1.1.3 Sizes

This operating manual applies to the following sizes:

Monitoring system for quick-change pallet system

- AFS3 138 PMI
- AFS3 138 MMS

1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the date of delivery from the production facility under the following conditions:

- Observe the applicable documents, ▸ 1.1.2 [🗋 5]
- Observe the ambient conditions and operating conditions, ▸ 2.4 [🗋 7]
- Observance of the specified care and maintenance instructions ▸ 8 [🗋 24]

Parts touching the workpiece and wear parts are not included in the warranty.

1.3 Scope of delivery

The scope of delivery includes

AFS 138 PMI

- Monitoring rod
- Fastening screw
- Grommets for cable feed-through

AFS 138 MMS

- Adapter piece, set-screw
- Grommets for cable feed-through
- Sealing inserts for unprotected cable outlets

1.4 Accessories

(see catalog or data sheets when ordering separately)

- Teaching device (Ident. No. 9988354) suitable for **AFS3 138 PMI**
- Teaching device + power supply unit (Ident. No. 40103327) suitable for **AFS3138 PMI**
- Connection cable to position measuring system (Ident. No.9987062) for **AFS3 138 PMI**
- Teaching device (Ident. no. 0301026) suitable for **AFS3 138 MMS** (Selectable alternative to the supplied magnet teaching tool, requires integration in supply cable)
- Extension cable for **AFS3 138 MMS**
- Extension cable for **AFS3 138 PMI** & **AFS3 138 MMS** for Sensor for presence monitoring of the clamping pallet

2 Basic safety notes

2.1 Intended use

This product is intended solely as a supplemental accessory for monitoring operating conditions on quick-change pallet systems for machine tools or other suitable engineering equipment.

- The product may only be used within the scope of its technical data, ▸ 3 [🗋 11].
- The product is intended for industrial and industry-oriented use.
- Appropriate use of the product includes compliance with all instructions in this manual.

2.2 Not intended use

The product is not being used as intended if, for example:

- It is used for turning applications.
- It is used in working environments that are not permissible.
- People work on machines or technical equipment that do not comply with the EC Machinery Directive 2006/42/EC, disregarding the applicable safety regulations.
- The technical data specified by the manufacturer are exceeded.

2.3 Spare parts

Use of unauthorized spare parts

Using unauthorized spare parts can endanger personnel and damage the product or cause it to malfunction.

- Use only original spare parts or spares authorized by SCHUNK.

2.4 Environmental and operating conditions

Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

- Make sure that the product is used only in the context of its defined application parameters, ▸ 3 [🗋 11].
- Only use high-quality cooling emulsions with anti-corrosive additives during processing.

2.5 Personnel qualification

Inadequate qualifications of the personnel

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to the product:

Trained electrician
Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations.

Qualified personnel
Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations.

Instructed person
Instructed persons were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour.

Service personnel of the manufacturer
Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers.

2.6 Personal protective equipment

Use of personal protective equipment

Personal protective equipment serves to protect staff in the event of a danger that may interfere with their health or safety at work.

- Observe the valid safety and accident prevention regulations.

2.7 Notes on safe operation

Incorrect manner of working by personnel

Working in an incorrect manner can make the product unsafe and risk the danger of serious injuries and considerable material damages.

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. Products for special ambient conditions are excluded.
- Rectify malfunctions as soon as they occur.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention, and environmental protection regulations for the application field of the product.

2.8 Malfunctions

Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

2.9 Disposal

Handling of disposal

The incorrect handling of disposal may impair the product's safety and cause serious injuries as well as considerable material and environmental harm.

- Follow local regulations on dispatching product components for recycling or proper disposal.

2.10 Fundamental dangers

General

- Observe safety distances.
- Never deactivate safety devices.

2.10.1 Protection during handling and assembly

Incorrect handling and assembly

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Have all work carried out by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

Incorrect lifting of loads

Falling loads may cause serious injuries and even death.

- Stand clear of suspended loads and do not step into their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.

3 Technical data

Description / Type	AFS3 138 PMI	AFS3 138 MMS
Description of function	Inductive monitoring segment	Magnetic monitoring segment
Monitoring functions clamping slide position	• "Open" clamping module • "Clamped" clamping module • "Clamped without clamping pins" clamping module	• "Open" clamping module • "Clamped" clamping module
Monitoring of palette / workpiece presence	Inductive proximity switches	Inductive proximity switches
Suitable for	NSE3 138 all variants except NSE-T3 138	NSE3 138 all variants except NSE-T3 138
Weight [kg]	0.3	0.15
Installation position	Mounted to VERO-S NSE3 138, position in operation at operator discretion	Mounted to VERO-S NSE3 138, position in operation at operator discretion
Operating temperature [°C]	+ 5 to + 50	+ 5 to + 60
Required level of cleanliness	IP 30 in accordance with DIN EN 60529	IP 30 in accordance with DIN EN 60529

4 Function

4.1 General functions

Electronic monitoring systems are used to monitor clamping slide position as well as workpiece presence for the NSE3 quick-change pallet module. They can be used to set up an automated production procedure. In this case, the adapted control unit replaces the pneumatic clamping slide monitoring of the clamping system. Besides clamping slide monitoring, the monitoring components also have a workpiece system function with which the presence of the workpiece or the clamping pallet can be monitored via an inductive proximity switch. The monitoring of the workpiece system function is positioned outside the clamping module support. The workpiece dimensions must cover the sensor monitoring.

4.2 AFS3 138 PMI

The AFS3 138 PMI has two monitoring control functions. It is fitted onto the housing of the clamping module in the clamping slide axis via 2 mounting threads below the clamping slide bore holes and 2 M4 screws. The screw-on parts on the quick-change pallet system can be selected as required on one of the two clamping slides. In the AFS3 138 PMI monitoring system, an electronic position measuring system is fitted. On the clamping slide, a monitoring rod is adapted as a hoistway encoder. Via the position measuring system, the monitoring unit detects the precise clamping slide position monitoring in the "unlocked" or "clamped" operational condition. The switching points of the position measuring system can be precisely taught in and saved. The workpiece system control is monitored with an inductive proximity switch, which is located below a raised base in the protective cover of the monitoring system.

Note

To ensure a reliable evaluation of the clamping slide position, the electronic position measuring system must be precisely taught into the stroke positions of the quick-change pallet system. A readjustment of the position measuring system may be required after longer time intervals. The inductive proximity switch must be positioned for a reliable function at a flush installation height to the cover plug of the protective cover.

4.3 AFS3 138 MMS

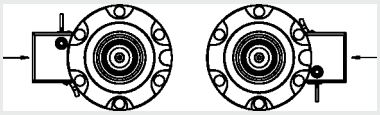
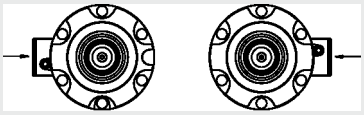
The AFS3 138 MMS is a compact monitoring unit with two monitoring control functions. It is fitted onto the housing of the clamping module in the clamping slide axis via 2 mounting threads below the clamping slide bore holes and 2 M4 screws. The screw-on parts depend on the type of quick-change pallet system. For the NSE3 138(-K) version, the unit can be adapted to one of the two clamping slides. For the size NSE3 138-V1(-K), the fitting position of the monitoring system is specified to be opposite the torque pin nut. In the housing of the AFS3 138 MMS monitoring system, an electronic magnetic switch is fitted with two programmable switching points. On the clamping slide, an adapter piece with an inserted round magnet is applied. The system detects via the electronic magnetic switch the precise clamping slide position in the "unlocked" or "clamped" operating condition. The switching points of the magnetic switch can be precisely taught in and saved. The workpiece system control is monitored with an inductive proximity switch, which is located below a raised base in the housing of the monitoring system.

Note

To ensure a reliable evaluation of the clamping slide position, the electronic magnetic switch must be precisely taught into the stroke position of the quick-change pallet system. A readjustment of the magnetic switch may be required after longer time intervals. For reliable functionality, the inductive proximity switch must be positioned at a flush installation height in the installation housing.

5 General Installation Notes

The monitoring systems are intended to be used with the VERO-S NSE3 clamping module. Installation with the VERO-S NSE-T3 138 is not possible. For mounting, there are two mounting threads below the clamping slide on the outer circumference of the quick-change pallet module. The mounting options for the monitoring system depend on the clamping module used and can be found in the following table.

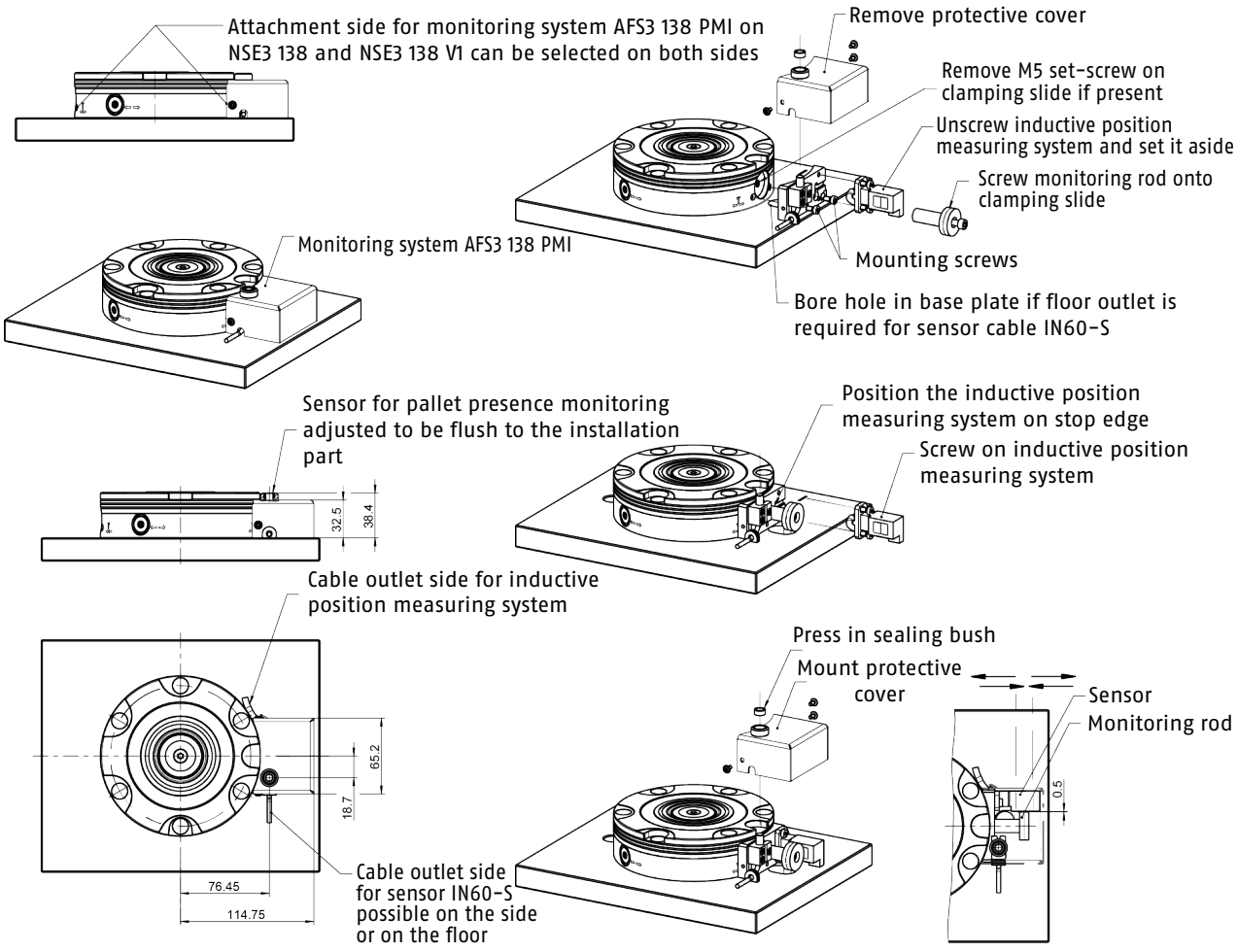
Clamping module type	PMI monitoring system type		MMS monitoring system type	
				
	Mounting side for version -V1		Mounting side for version -V1	
NSE3 138	x	x	x	x
NSE3 138-K	x	x	x	x
NSE3 138-V1	x	x	x	–
NSE3 138-V1-K	x	x	x	–
NSE3 138-V4	x	x	x	x
NSE3 138-V4-K	x	x	x	x
NSE3 138-P	x	x	x	x
NSE3 138-P-K	x	x	x	x
NSE-T3 138	–	–	–	–
NSE-T3 138-K	–	–	–	–
NSE-T3 138-V1	–	–	–	–
NSE-T3 138-V1-K	–	–	–	–
NSE-T3 138-V4	–	–	–	–
NSE-T3 138-V4-K	–	–	–	–

6 Mounting / connection / programming of the AFS3 138 PMI

6.1 Installing the AFS3 138 PMI to the NSE 138 (-V1) (-K)

The AFS3 138 PMI is attached to a VERO-S NSE3. The system is supplied partially assembled. Step-by-step installation instructions makes assembly of the multi-part monitoring unit easier. Adjustment of the monitoring sensors is described in chapter ▸ 12 [🗋 29]. For the description, refer to the assembly drawing in chapter ▸ 11 [🗋 28] and the parts list in chapter ▸ 10 [🗋 27].

Installing the AFS3 138 PMI to the NSE3 138 (-V1) (-K)



The unit is installed to a VERO-S NSE3 according to the following assembly steps

1. Select installation side on the quick-change pallet system.
2. Unscrew M5 grub screw on clamping slide (if present).
3. Unscrew fastening screws of the protective cover, remove protective cover vertically.

4. Dismantle inductive position measuring system PMI from the bracket of the assembly group carefully lay to one side.
5. Fix bracket to quick-change pallet system using two M4 screws.
6. Unscrew monitoring rod with M5 screw on clamping pin.
7. Mount inductive position measuring system PMI on bracket, adjust to stop in direction of monitoring rod. Insert sensor cable in cable bushing and fix onto cable outlet of the bracket. Integrated sensors of the system into the control.
8. Perform functional test of the inductive proximity switch to monitor the presence of the clamping pallet → open clamping system → insert clamping pallet → close clamping system → open clamping system → lift off clamping pallet.
9. Check signal output of the inductive proximity switch for monitoring the presence of the clamping pallet; signal output required for clamped clamping pallet; sensor can be readjusted on the bracket.
10. Program inductive position measuring system PMI with separately available teaching device (accessory).
11. Place the protective cover on vertically, integrated sealing bush in cover plug, fix protective cover with fastening screws.
12. Monitoring system AFS3 138 PMI is operational.

6.2 Connecting the AFS3 138 PMI

The position measuring system PMI monitors the end positions of the clamping slide positions inductively.

When installing the AFS3 138 PMI to a NSE3, it comes adjusted and operational directly from the factory.

When retrofitting, the AFS3 138 PMI must be adjusted to the stroke positions of the clamping module using a teaching device, ▸ 6.3 [🗋 17].

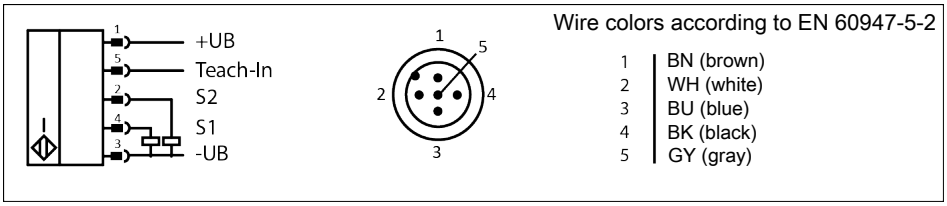
Note:

The teaching device ID 9988354 or teaching device + power supply 40103327 that is required to program the position measuring system is available as an additional accessory and is not included in the scope of delivery of the AFS3 138 PMI.

Via an interface, two switching outputs "S1 + S2" are provided to the user for clamping condition monitoring.

- "Open" clamping module
- "Clamped" clamping module
- "Clamped without clamping pins" clamping module

Connection assignment



Technical data positioning system PMI

General data	Value / function
Range of measurement	14 mm
Switching element function	PNP Dual NO contact
Characteristics	
Voltage supply	18–30 V DC
Switching output	
Output type	PNP (2 channels)
Operating current [mA]	50 per channel
Short circuit protection	clocking
Mechanical data	
Connection type	Cable connector, M12, 5-pin 1m, PUR cable, shielded
Length of the connection cable [mm]	350

Tab.: Electrical specifications

Clamping slide position	Switching output S1	Switching output S2
Open clamping module	0	1
Closed without clamping pins clamping module	0	0
Closed with clamping pallet clamping module; without turbo	1	0
Closed with clamping pallet clamping module; with 6 bar turbo	1	0

6.3 Programming the switching positions for the clamping slide monitoring with the AFS3 138 PMI

Note:

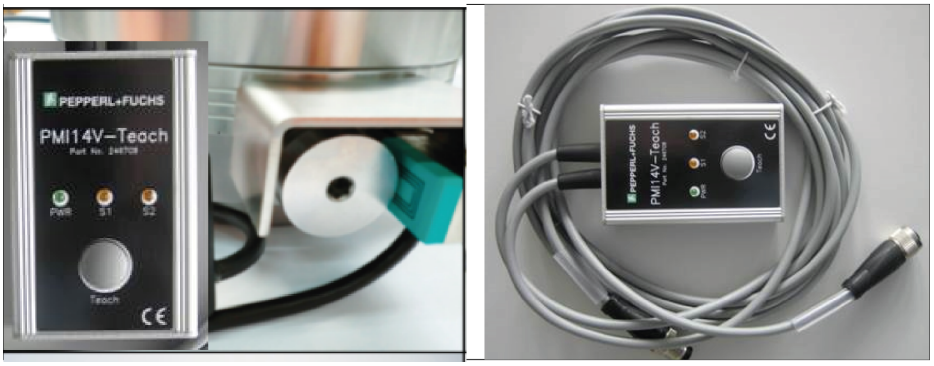
The switching positions on the measuring system are taught using the teaching device (ID: 9988354), teaching device + power supply unit (ID: 40103327). The teaching device is not included in the scope of delivery.

Note:

At the inductive stroke measuring system, 3 switching positions for monitoring the clamping slide position are monitored.

Note:

The teach-in process must be completed in 410 seconds, otherwise the positions will not be transferred and stored in the inductive position measuring system.



Connect sensor to teaching device
Press the "Teach" button on the teaching device for 1.5 seconds (until LED S2 flashes)
Put the clamping module in open status
Press the button on the teaching device (LED S2 illuminates and stays lit briefly; then LED S1 flashes)
Clamp the clamping pallet without turbo function
Press the "Teach" button on the teaching device (LED S1 illuminates and stays lit briefly; then LED S1 and LED S2 flash)
Open clamping module
Remove clamping pallet
Close clamping module (without clamping pins or clamping pallet)
Press the button on the teaching device (LED S1 and S2 illuminate and stay lit briefly)
Switch positions have been taught in and stored

Note:

An unsuccessful teach-in process (e.g. in the case of a teach-in attempt beyond the range of measurement) is indicated by the LED flashing rapidly (for 1.5 seconds). The previous switching limits are kept.

- By pressing the key for 6.5 seconds, the sensor can be reset to the factory settings.
- If the power supply is disconnected or the key is not pressed for more than 6 minutes during the programming process, the programming process is stopped without changing the previous limits.
- Programming is generally only possible in the first 6 minutes after switching on the sensor. The programming is then blocked.

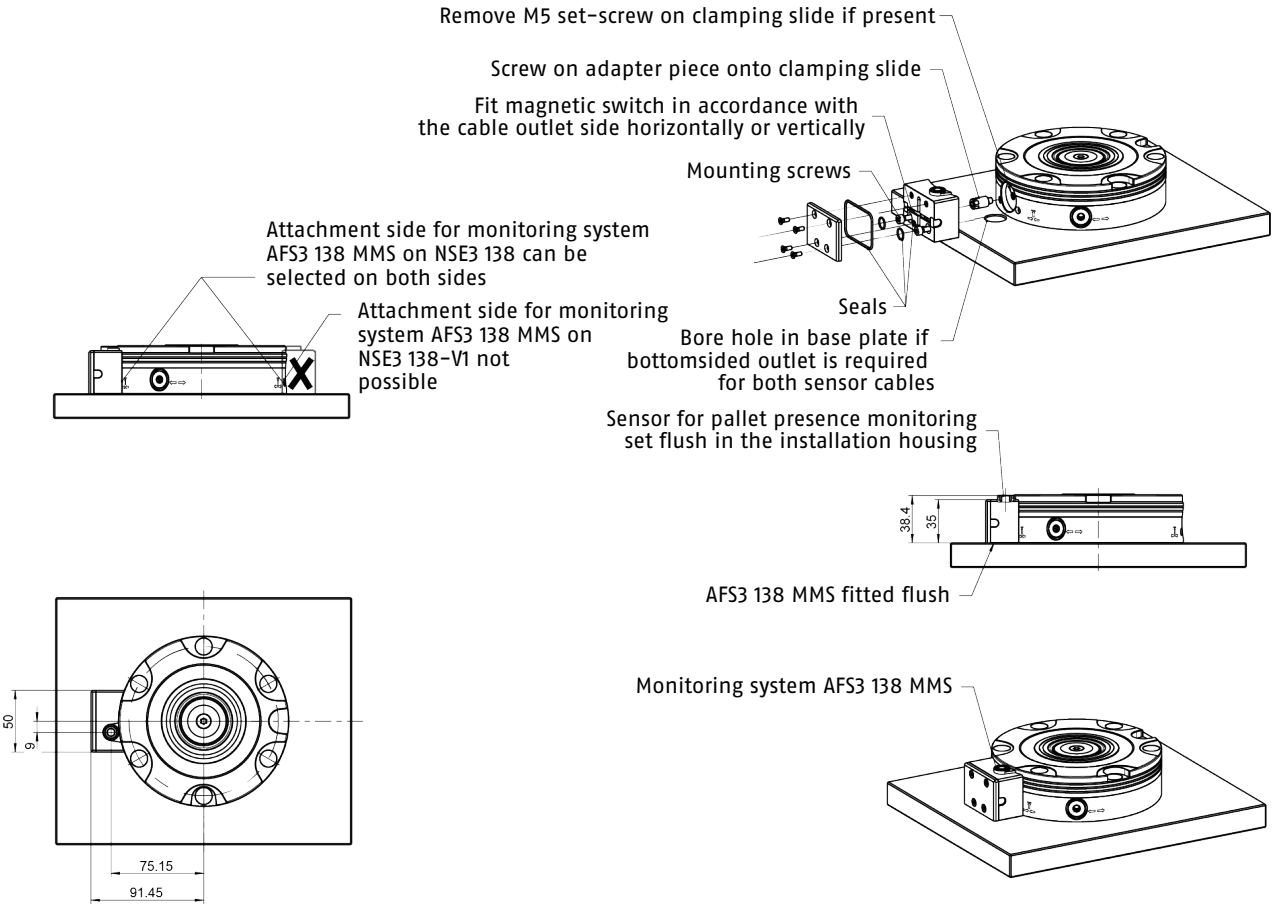
To re-enable programming, the sensor must be disconnected briefly from the power supply.

7 Mounting / connection / programming of the AFS3 138 MMS

7.1 Installing the AFS3 138 MMS to the NSE3 138 (-V1) (-K)

The AFS3 138 MMS is installed on a VERO-S NSE3. The system is supplied partially assembled. Step-by-step installation instructions makes assembly of the multi-part monitoring unit easier. Adjustment of the monitoring sensors is described in chapter ▸ 12 [🗋 29]. For the description, refer to the assembly drawing in chapter ▸ 11 [🗋 28] AFS3 138 MMS and the parts list in chapter ▸ 10 [🗋 27].

Installing the AFS3 138 MMS to the NSE3 138 (-V1) (-K)



The unit is installed to a VERO-S NSE3 quick-change pallet system according to the following assembly steps

1. Select installation side on the quick-change pallet system.
2. Unscrew M5 grub screw on clamping slide (if present).
3. Screw on adapter piece over set-screw M5 onto clamping slide, included in the accessory kit.
4. Unscrew fastening screws of the lid onto the AFS3 138 MMS, remove lid.
5. Remove seals and lay to one side.

6. Select cable outlet for both sensors (selectable on the side or bottom). Insert electronic magnetic switch in one of the two sensor slots in the housing or transversely and rotate 90° pointing towards the LED display. Fix sensor cable in attached cable bushings and fix them in the housing.
7. If necessary, slide the protective cover over the sensor cable.
8. Use the enclosed closed sealing plugs to seal the cable outlet openings that are not required. The cable bushings and sealing plugs are included in the scope of delivery.
9. Adjust the electronic magnetic switch, sensor head approx. 12 mm over the center of the crossing over of the two sensor slots. Clamp sensor via attachment screw to sensor head. Use the Allen key included in the scope of delivery.
10. Screw on housing to quick-change pallet system over the two M4 bolts, ensuring that there is no gap between the clamping station.
11. Integrated sensors of the system into the control.
12. Conduct inductive proximity switch function test for presence monitoring of the clamping pallet. Open clamping system → insert clamping pallet → close clamping system → open clamping system → lift clamping pallet.
13. Test inductive proximity switch signal output for presence monitoring of the clamping pallet. Signal output for clamped clamping pallet required.
14. Program electronic magnetic switch with enclosed programming tools. In the magnetic switch, the operating positions "opened" and "clamped with clamping pallet" must be programmed. For programming, the quick-change pallet system must be actively supplied with compressed air. The programmed switching points are indicated by a flashing LED on the sensor head. The switching points remain saved permanently in the magnetic switch and can be readjusted if required. The programming tools are included in the scope of delivery, consisting of plastic bracket with magnetic insert and an Allen key to jam sensor in the housing of the AFS3 138 MMS.
15. Perform functional test of the electronic magnetic switch for the clamping slide monitoring. Open clamping system → insert clamping pallet → close clamping system.
16. Inspect signal output of the electronic magnetic switch for the clamping slide request, signal output for clamped clamping pallet and for opened clamping system required.
17. Insert seals in the housing and in the lid, screw on lid.
18. Monitoring system AFS3 138 MMS is operational

7.2 Connecting the AFS3 138 MMS

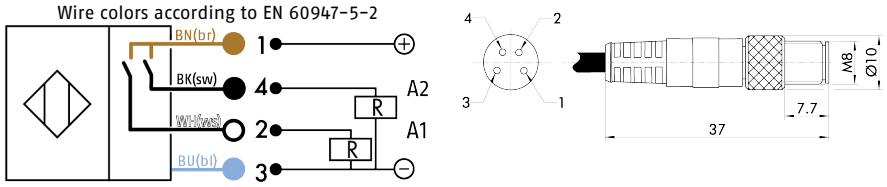
Programmable magnetic switch MMS 22-PI2-S-M8-PNP:

The AFS3 138 MMS features a magnetic switch with two programmable switching positions for monitoring the end positions of the clamping slide positions.

When installing the monitoring system directly from the factory, the system comes preadjusted and operational.

when retrofitting, the sensor system must be taught to the clamping slide-stroke position of the clamping module (see ▸ 7.3 [🗋 22]).

Pin assignment



Technical Data of Programmable Magnetic Switch MMS 22-PI2-S-M8-PNP

Designation	Value/description
Measuring principle	magnetic
Switching function	PNP Closer
Number of switching points	2
Ambient temperature [°C]	-10 to +70
IP rating (sensor)	67
IP rating (sensor, connected)	67
Rated voltage [VDC]	24
min. / max. voltage [VDC]	10 / 30
min. bending radius (dynamically) [mm]	21
min. bending radius (statically) [mm]	10.5
Length of the connection cable [mm]	350
Connecting plug	M8 4-pin

Optional accessories

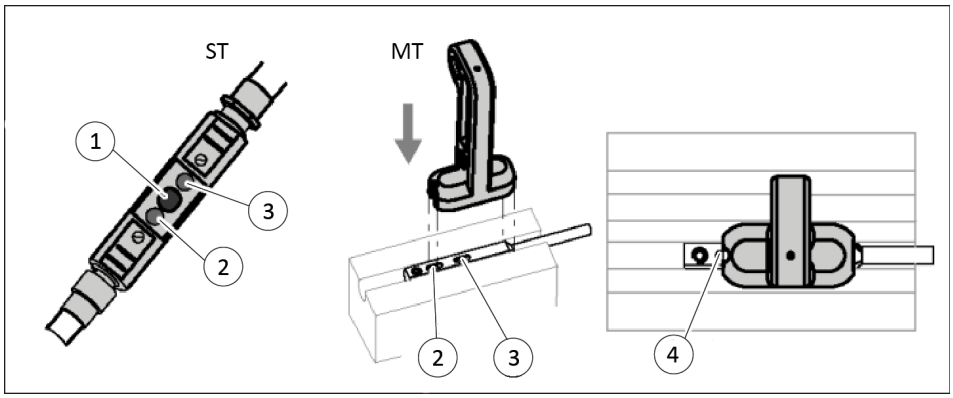
- Connection cable KA M8 with M8 plug connection, angled socket, 5 meter cable length (individual): ID: 0307765
- Connection cable KA M8 with M8 plug connection, angled socket, 10 meter cable length (individual): ID: 0307766

Caution:

- If the AFS3 138 MMS generates a magnetic field in the area of the sensor, a malfunction will occur.

  This magnetic field can be generated by:
  - Crane loading with a magnet
  - Magnetic chucks
  - Other magnetic sources in the immediate proximity

7.3 Programming the switching positions of the programmable magnetic switch for the clamping slide monitoring with the AFS3 138 MMS



ST	Plug teaching tool	MT	Magnet teaching tool

Fig. 1: ST – Plug teaching tool

Fig. 2: MT – Magnet teaching tool

For the AFS3 138 MMS, 2 switching positions are monitored. The switching positions are taught in with the plug teaching tool (ST) (ID: 0301026) with integrated LED A1 (blue) and LED A2 (blue). The LEDs are each oriented outwardly from the recessed A1 and A2 markings. Visualization for programming is also provided on sensor MMS 22-PI2 via a yellow LED and a red LED. The plug teaching tool (ST) is inserted into the wiring from the sensor to the PLC.

Or with the enclosed magnet teaching tool (MT), visualization for programming is provided on sensor MMS 22-PI2 via a yellow LED and a red LED.

There is a button in the center of the ST that starts teaching mode (ST is interconnected via the connection cable). Alternatively, the teaching mode can also be started with the supplied MT that is held on the sensor.

Bring the clamping module in open position.

Start teaching mode with ST or MT (2 seconds actuation time)

Yellow LED flashes on the sensor, blue LED (A1) flashes on the ST

10 seconds time to teach in the open position by pressing the button on the ST again or holding the MT on the sensor until the LED (A1) on the ST or the yellow LED on the sensor flashes and then goes out.

Put clamping module in clamped position with inserted clamping pallet without the turbo function switched on.

Start teaching mode with ST or MT (2 seconds actuation time)

Yellow LED flashes on the sensor, blue LED (A1) flashes on the ST

Wait 10 seconds until the red LED on the sensor flashes and/or the blue LED (A2) on the ST

10 seconds time to teach in the position clamped with inserted clamping pallet without turbo function by pressing the button on the ST again or by holding the MT on the sensor until the LED (A1) on the ST or the yellow LED on the sensor flashes and then goes out

Switch positions have been taught in and stored in the sensor

Setting the hysteresis

The switch-off point of the end position can be manually adjusted by adjusting the hysteresis.

A minimum and maximum hysteresis is defined based on the magnetic field. This defines the distance between the switch-on and switch-off point. The sensor prevents a hysteresis that is too low when the hysteresis is adjusted. If the switch-off point is taught too far away from the switch-on point, the switch-off position close to the switch-on point is automatically used. The switch-off point must then be taught closer to the switch-on point.

1. Place the module in *Switch-off point* position.
2. Place the MT on the sensor (4) for at least 5 s
   Or: Press the button (1) on the ST for at least 5 s.
   ⇨ The LED (2) flashes after 2 to 5 s and goes out.
3. Quickly remove the MT
   Or: Release the button (1) on the ST.
   ⇨ The LED (2) lights up to show the current switching point, otherwise the LED (2) flashes.
   For switch-off point 1: Continue with the next step.
   For switch-off point 2: Wait 10 s until the LED (3) lights up to display the current switching point, otherwise the LED (3) flashes, then continue with the next step.
4. Place the MT back on the sensor (4) for at least 0.3 s, then quickly remove it
   Or: Press the button (1) on the ST for at least 0.3 s.
5. Wait 2 s. After approximately 2 s, the LED (2) flashes twice if the field is not too large, otherwise it flashes at 2 s intervals.

NOTE

A minimum and maximum hysteresis is defined based on the magnetic field. This defines the distance between the switch-on and switch-off point. If the switch-off point is taught too far away from the switch-on point, the switch-off position close to the switch-on point is automatically used. In this case, the switch-off point closer to the switch-on point must be taught.

7.4 Function test on the clamping module with connected, ready for operation AFS3 138 MMS

The monitoring system can monitor 2 clamping positions:

1. Open clamping module (A1: 1 ; A2: 0)
2. Closed without clamping pallets clamping module (A1: 0; A2: 1)
   Closed with clamping pallet clamping module; without turbo function (A1: 0; A2: 1)
   Closed with clamping pallet clamping module; with 6 bar turbo function (A1: 0; A2: 1)

While the monitoring system is operating, the corresponding clamping stroke positions of the clamping module have to detect the required switching signal.

8 Maintenance and care

Carry out regular visual / functional checks. In case of visible damage or signs of malfunction, shut down the system immediately. The system may only be commissioned again once the faults have been removed. For example, by replacing the damaged unit.

9 Troubleshooting

9.1 The AFS3 138 PMI is not working

No control of switching valves due to missing signal output

Possible cause	Remedial measures
Position measuring system for monitoring the clamping slide positions is not working properly	Check all screw connections of the sensor, as well as the target mounting for correct seating. Adjust gap distance of the position measuring system for adjustable target. Teach in switching windows of the electronic position measuring system with teaching device (accessory) and program in.
Position measuring system for monitoring the clamping slide positions is not reporting any signal	Check sensor and feed cable of the position measuring system for damage (replace position measuring system or connection cable if required)
Proximity switch not switching	Readjust positions. Adjust and tighten position and switching distance.
Proximity switch not switching	Check the proximity switch on the sensor head and on the connection cable for damage (replace proximity switch if necessary).
Proximity switch moves independently	Tighten bracket according to tightening torque specification, check protective cover for damage and check collision contact to the proximity switch. Replace proximity switch type IN if required.
Mechanical tensile force influenced on connection cable	Check sensor cable for damage. Readjust sensor position and teach in switching window again. Replace proximity switch or position measuring system if required.
Cable plug-in connection to the supply cable	Check plug connections, if necessary tighten. Proximity switch type IN or replace specially available feed cable if required.

9.2 The AFS3 138 MMS is not working

No control of switching valves due to missing signal output

Possible cause	Remedial measures
Electronic magnetic switch is not switching	Teach in switching window of the magnetic switch with the magnet teaching tool (included in the scope of delivery) to the clamping slide positions and program
Electronic magnetic switch is not switching	Check magnetic switch on sensor head and on the connection cable for damage. Check signal output on the status LEDs. Mechanical sealing of the entire monitoring system and check on the cable exits (replace magnetic switch if required).
Switching positions of the electronic magnetic switch change independently	Tighten attachment screw to magnetic switch according to torque specification with supplied, angled hexagonal socket screwdriver. Check target for fixed jamming to the clamping slide. Check sensor head, attachment screw and installation groove for damage. Replace magnetic switch type MMS PI2 if required.
Proximity switch not switching	Readjust position. Adjust and tighten position and switching distance.
Proximity switch not switching	Check the proximity switch on the sensor head and on the connection cable for damage (replace proximity switch if necessary)
Proximity switch moves independently	Tighten bracket according to tightening torque specification, check installation housing for damage and check collision contact to the proximity switch. Replace proximity switch type IN if required.
Mechanical tensile force influenced on connection cable	Check sensor cable for damage. Readjust sensor position and teach in switching window again. Replace proximity switch or magnetic switch if required.
Cable plug-in connection to the supply cable	Check plug connections, if necessary tighten. Proximity switch type IN or replace specially available feed cable if required.

10 Parts lists

AFS3 138 PMI (ID no. 1325645)

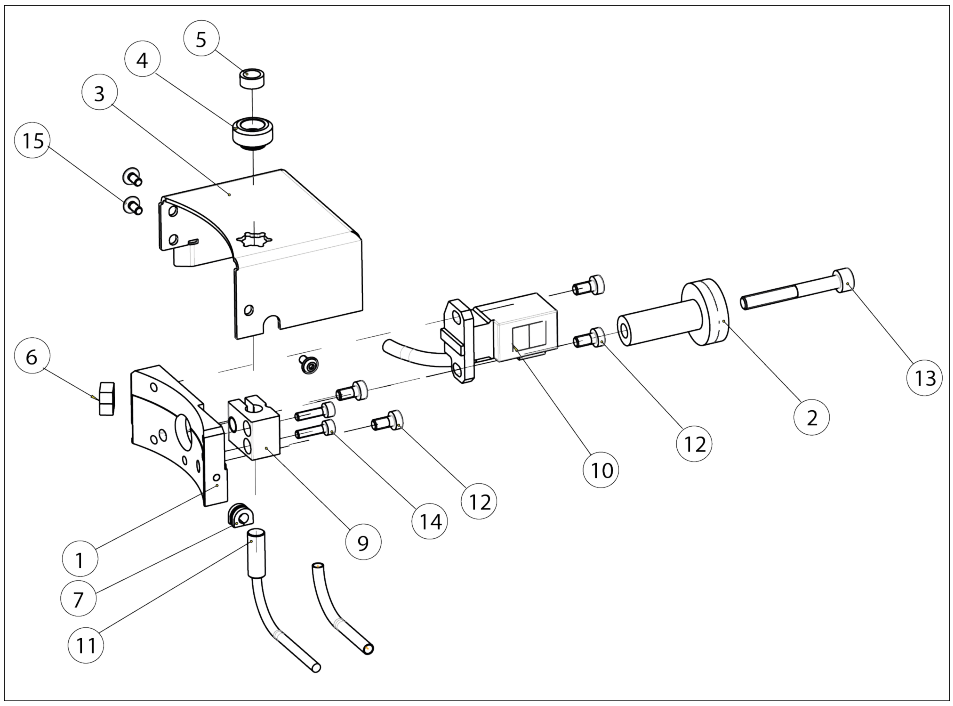
Item	Description	Quantity
1	Bracket	1
2	Monitoring rod	1
3	Protective cover	1
4	Cover cap	1
5	Sealing bush	1
6	Grommets	1
7	Nozzle for cable bushing	1
9	Proximity switch bracket	1
10	Inductive position measuring system	1
11	Inductive proximity switches	1
12	Cylindrical screw	4
13	Cylindrical screw	1
14	Cylindrical screw	2
15	Flat oval head screw	3

AFS3 138 MMS (ID no. 1325646)

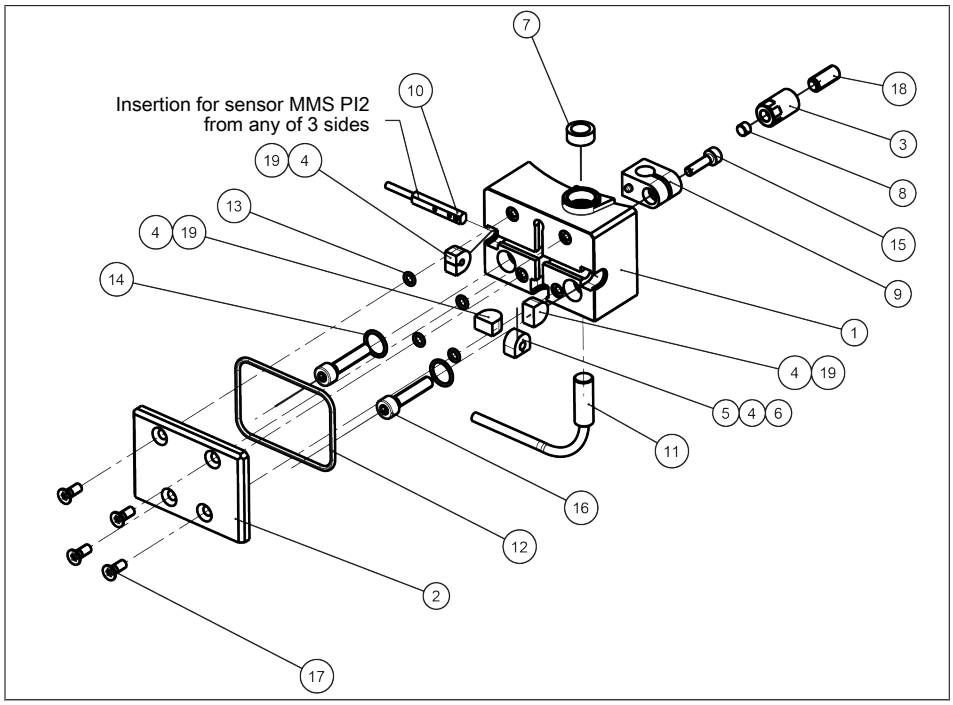
Item	Description	Quantity
1	Housing	1
2	Cover	1
3	Adapter piece	1
4	Sealing insert	3
5	Grommets	2
6	Grommets	2
7	Sealing bush	1
8	Round magnet	1
9	Sensor bracket	1
10	Electronic magnet switch MMS PI2	1
11	Inductive proximity switches	1
12	O-ring Ø 42 x 1.5	1
13	O-ring Ø 3 x 1	4
14	O-ring Ø 8 x 1	2
15	Cylindrical screw	1
16	Cylindrical screw	2
17	Countersunk screw	4
18	Set-screw	1
19	Grommets	2

11 Assembly Drawings

11.1 AFS3 138 PMI



11.2 AFS3 138 MMS



12 Sensor for presence monitoring of the clamping pallet

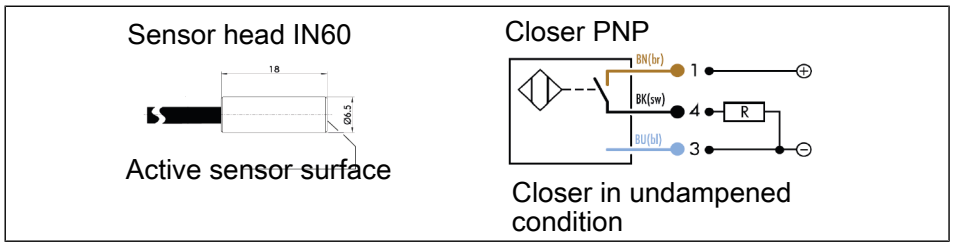
Both monitoring systems are equipped with an inductive proximity switch for monitoring the presence monitoring of a clamping pallet or workpiece.

Information on handling sensors is available at **www.de.schunk.com** or from SCHUNK contact persons. Technical data for the sensors can be found in the data sheets (included in the scope of delivery or under **www.de.schunk.com**). The used proximity and magnetic switches are protected against polarity reversal and short-circuit-proof.

For the proper use of the proximity switches and sensors, observe the following:

- Do not pull on the cable of the sensor.
- Do not dangle the sensor from the cable.
- Do not excessively tighten the mounting screws or clips.
- Do not exceed the permissible bending radius of the cable (☞ catalog specifications).
- Prevent proximity switch from coming into contact with hard objects or with chemicals; in particular, nitric, chromic or sulfuric acid
- Proximity switches are electronic components which can react sensitively to high-frequency interference or electromagnetic fields.
- Check that the cable is correctly connected and installed.
- There must be sufficient distance between the switches and sources of interference and their supply cables.

12.1 Assembly, connection, technical data proximity switch IN60



Technical data

Sensor IN-60-M8 with circular plug M8: ID no.: 0301485

Optional accessories

- Angular plug with feeder cable WK 3-M8 plug connection 3 meter cable length (individual): ID: 0301594
- Angular plug with feeder cable WK 5-M8 plug connection 5 meter cable length (Individual): ID: 0301502

Characterization	Value / description
Switching function	Closer
Type of switching	PNP
Switching distance [mm]	1.5
Ambient temperature [°C]	-25 to +70
IP rating (sensor)	67
IP rating (sensor, connected)	67
LED display at sensor	no
Type of voltage	DC
Rated voltage [V]	24
min. voltage [V]	10
max. voltage [V]	30
max. current on contact [A]	0.2
Cable diameter [mm]	3.5
min. bending radius (dynamically) [mm]	35
min. bending radius (statically) [mm]	17.5
Number of cores	3
Length of the connection cable [mm]	300
Connecting plug	M8

H.-D. SCHUNK GmbH & Co.
Spanntechnik KG

Lothringer Str. 23
D-88512 Mengen
Tel. +49-7572-7614-0
info@de.schunk.com
schunk.com

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