



Safety shoe NG



EN | Installation instructions

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Safety first!



- Read the instructions carefully before use.
- The warnings in the instructions are there to warn you of any unexpected dangers. Always heed the warnings.
- Keep the instructions somewhere safe so you can refer to them throughout the product's entire service life.
- Pass the instructions on to every subsequent owner or user of the product.
- Add any supplement received from the manufacturer to the instructions.
- **Observe the information under "Safety" (starting on page 5).**

Conformity



The design type of the product complies with the basic requirements of the following directives:

- 2014/35/EU (LVD)
- 2011/65/EU (RoHS)

The Declaration of Conformity is available in the Downloads section of our website: www.mayser.com.

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About these instructions

These instructions are part of the product.

Mayser accepts no responsibility or warranty claims for damage and consequential damage due to failure to observe the instructions.

Validity These instructions are only valid for the products specified on the title page.

Target group These instructions are intended for the operating company and for specialist and support staff. Specialist staff must be familiar with installation and commissioning. Support staff must have been instructed in the handling of the product.

Other applicable documents ➔ Please also observe the following documents:

- Product information
- Operating instructions for the connected signal processing unit

Symbols used	Symbol	Meaning
	➔ ...	Action with one step or with more than one step where the order is not relevant.
	1. ...	Action with more than one step where the order is relevant.
	• ... - ...	Bullets first level Bullets second level
	(see chapter <i>Installation</i>)	Cross-reference

Danger symbols and information	Symbol	Meaning
	 DANGER	Immediate danger leading to death or serious injury.
	 WARNING	Imminent danger which may lead to death or serious injury.
	 CAUTION	Possible danger which may lead to minor or moderate injuries.
	NOTE	Potential risk of damage to property or the environment. Information on easier and safer working practices.

Dimensions in drawings Unless otherwise stated, all dimensions are in millimetres (mm).

Safety

Intended use

The product has been designed as a pressure-sensitive sensor, usually in linear form. The sensor detects the lowering of an object, such as an aircraft door, through pressure exerted on the effective actuation area. This pressure activates the interior switches. The higher-level control system is informed via the connected signal processing unit.

The sensor is typically used for collision protection on ground support equipment (GSE) as part of a backup sensor system.

The product may only be used as described in these instructions. Any other use is considered improper and may result in personal injury or damage to property.

- Limits**
- The product is designed exclusively for use within the EU.
 - It has a service life of at least 50,000 switching cycles or a minimum of 2 years.

Exclusions There are no known exclusions for this product.

Safety instructions

For your **own safety**, you must adhere to the following safety instructions.

➔ **Keep magnets away from the body**

Type M sensors feature integrated magnets. In close proximity to pacemakers and implanted defibrillators, the magnetic fields can cause life-threatening malfunctions of the implants. Maintain a distance of at least 10 cm from the underside of the sensor and always hold the sensor by its handle.

➔ **Avoid electric shocks**

Before working on electrical systems, disconnect them from the power supply and secure them to prevent them being switched back on to avoid electrical injuries.

➔ **Only use in the correct operating position**

If the sensor is not placed in the correct operating position, it will not be able to perform its function and the backup sensor system will fail. This may result in damage to the sensor, GSE and aircraft. Only use the sensor if it is in the correct operating position.

➔ Avoid trip hazards

Placing the sensor too close to the walkway or routing the cable inside the walkway creates potential trip hazards. Avoid trip hazards by placing the sensor as far away from the walkway as possible and routing the cable neatly.

➔ Do not cover or sheathe the sensor

Outer sleeves and covers adversely affect the sensor's function. Never place the sensor inside an outer sleeve or cover it with other elements.

➔ In the event of a fault, put out of operation

In the event of malfunctions and visible damage, put the product out of operation by decommissioning it.

To prevent irreparable damage to the **product**, you must observe the following safety instructions.

➔ Protect the sensor from sharp edges

Make sure that no sharp-edged objects come into contact with the sensor. Sharp edges can cause lasting damage to the sensor.

➔ Do not throw the sensor around

Throwing the sensor around or otherwise handling it roughly can damage the sensor surface, thereby jeopardising the degree of protection. Always treat the sensor with the same care that you would afford a sensitive piece of measuring equipment.

➔ Do not exert a tensile load on the cable

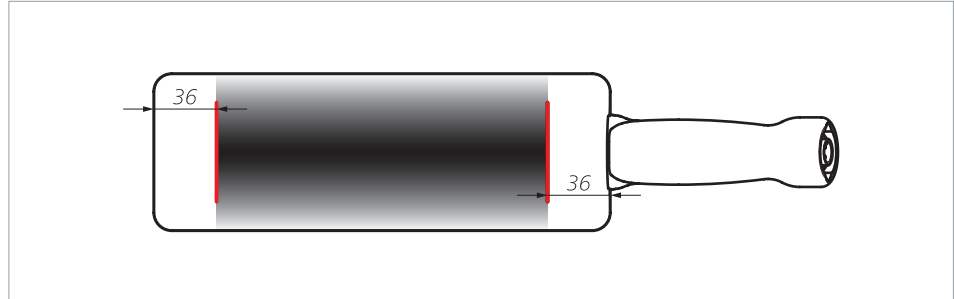
Pulling on the cable or carrying the product by the cable can damage the plug-in connection, thereby jeopardising the degree of protection. Always carry the sensor by its handle.

You can provide strain relief for the plug-in connection by using a connector protection set (optional).

Residual dangers

Non-sensitive areas

The edge areas of the sensor are not sensitive. When a non-sensitive area is actuated, the sensor will not respond.



Parts supplied

The parts supplied are listed on the delivery note.

- ➔ Upon receipt, immediately check the parts supplied to ensure they are complete and in good condition.
- ➔ In the event of any issues, please contact the dealer from whom you purchased the product or ring Mayser Support (+49 731 2061-0).

Storage

- ➔ Store sensors in a dry place inside the original packaging.
- ➔ Observe the storage temperature in accordance with the technical data.

WARNING Magnetic field

Type M sensors contain strong magnets that can affect implanted medical devices.

- ➔ Always keep the magnets at least 10 cm away from the body and, when packaged, 10 cm from the outer wall of the packaging.
- ➔ Store type M sensors in such a way that the "Magnetic field" warning on the packaging always remains visible.
- ➔ If repackaging type M sensors, ensure that the magnetic undersides of the sensors always remain 10 cm from the outer wall of the packaging. Clearly label the packaging with a "Magnetic field" warning.

Installation

This chapter is intended exclusively for specialist staff.

- ➔ Before starting the installation process, refer to the technical data to check that the product is suitable for your application (see *Technical data*).

Overview Install sensors in the following order:

- Prepare for installation
- Assemble the coupling
- Assemble the connector protection (optional)
- Perform a functional test
- Install the cable

Preparing for installation

- ➔ Have the tools and aids you will need for installation to hand.
- 4-core cable (0.5 to 2.5 mm², Ø 6 to 12 mm)
 - CA 3 LD coupling (ID 934 125-100)
 - Connector protection set (optional)
 - Screwdriver, spanner (24 mm, 27 mm), multimeter

Unpacking the product The handling rules contained in chapter *Safety instructions* apply.

 WARNING Magnetic field

Type M sensors contain strong magnets that can affect implanted medical devices.

- ➔ Always keep the magnets at least 10 cm away from the body.

Type M sensors are identifiable from the type plate: SafetyShoeNG - xx - **M** - yy.

1. Lay out the sensor and installation accessories at the installation location.
2. Check that you have all the required parts and that they are in good condition.

Assembling the coupling

The handling rules contained in chapter *Safety instructions* apply.

 WARNING Magnetic field

Type M sensors contain strong magnets that can affect implanted medical devices.

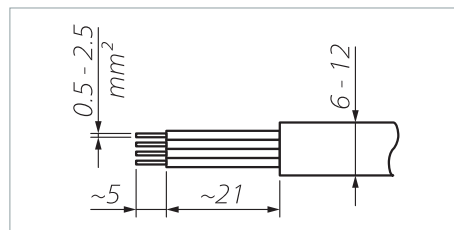
- ➔ Always keep the magnets at least 10 cm away from the body.

Type M sensors are identifiable from the type plate: SafetyShoeNG - xx - **M** - yy.

To achieve the IP67 degree of protection, the safety shoe must be terminated with a CA 3 LD coupling. The CA 3 LD coupling (ID 934 125-100) must be ordered separately.

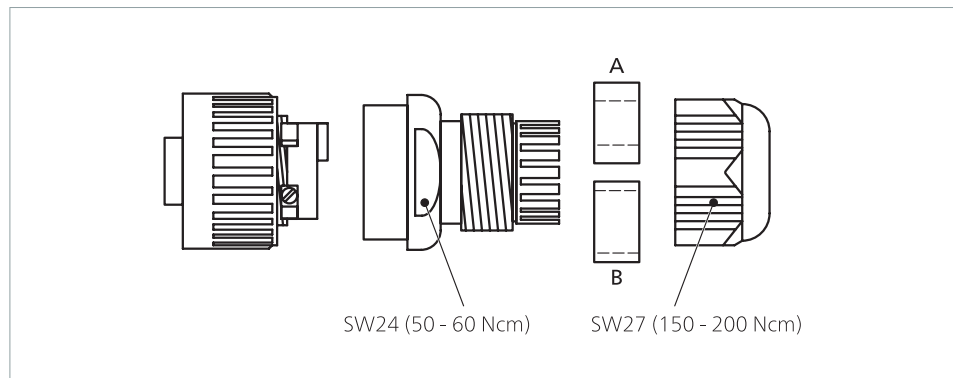
Tip: The CA 3 LD coupling is included as part of connector protection set V1 (ID 2204557).

1. Prepare the cable.
 - Cut to length
 - Slide on strain relief sleeve (optional)
 - Strip insulation

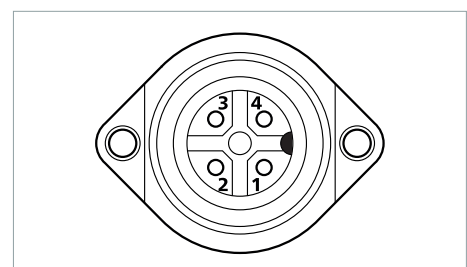


We also recommend using wire end ferrules.

2. Select the appropriate sealing ring.
 - Type A for cables with a diameter of 6 to 9 mm
 - Type B for cables with a diameter of 9 to 12 mm



3. Slide the cable gland, sealing ring and union nut onto the prepared cable.
4. Tighten the contacts to a torque of 30 to 35 Ncm.
5. Screw the coupling parts together.
6. Fit the prepared coupling onto the circular connector at end of the safety shoe handle. There is a lug inside the connector to help you align it.



7. Press the coupling onto the connector as far as it will go.
8. Tighten the coupling as much as possible using the knurled grip.

The safety shoe is now fully assembled.

For long-term protection, we recommend the use of connector protection.

Assembling the connector protection (optional)

The handling rules contained in chapter *Safety instructions* apply.

WARNING Magnetic field

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➔ Always keep the magnets at least 10 cm away from the body.

Type M sensors are identifiable from the type plate: SafetyShoeNG - xx - **M** - yy.

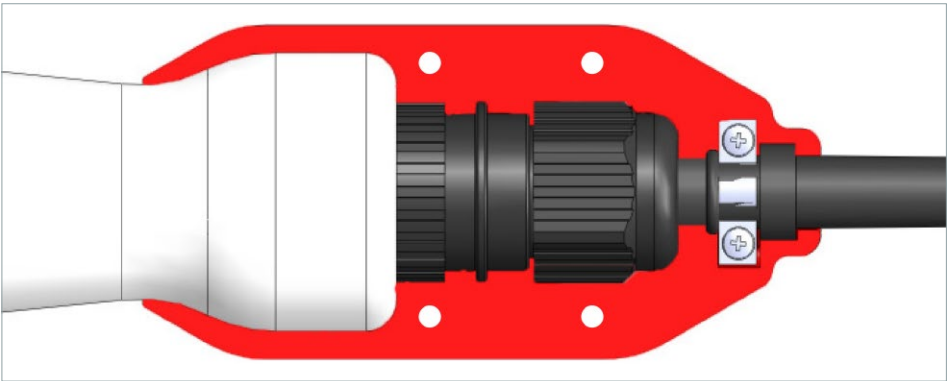
Optional connector protection is advisable. This ensures the long-term protection of the sensor output interface, even in the event of rough handling.

Connector protection set (optional)	V1	V2
Part number	2204557	2204558
Connector protection (2-piece)	1×	1×
CA 3 LD coupling	1×	–
Strain relief sleeve	1×	–
Metal clamp (4-piece)	1×	1×
M4×25 hexagon bolt	4×	–
M4 wing nut	4×	–
M4 hexagon nut	–	4×
M4×25 hex socket bolt	–	4×

The metal clamp provides strain relief for the cable.

1. Attach the metal clamp approximately 5 to 8 mm from the coupling, ensuring that it can still slide along the cable.
 - V1: attach to the designated groove on the strain relief sleeve
 - V2: attach to the cable itself
2. Place the first half-shell of the connector protection around the handle, coupling and cable.
3. Slide the metal clamp along the cable until it slots into the recess in the connector protection.

4. Now secure the metal clamp fully.



5. Fit the second half-shell of the connector protection and secure the connector protection with the four screws.
- V1: hexagon bolt plus wing nut
 - V2: hexagon nut plus hex socket bolt

Performing a functional test

➔ Check the electrical resistance between the cable ends. Are the target values met?

Sensor		Not activated	Activated
Circuit 2 (1k/4k3)			
	Pin 1, pin 2	1k ±60 ohms	4k3 ±250 ohms
	Pin 3, pin 4	1k ±60 ohms	4k3 ±250 ohms
Circuit 3 (NC)			
	Pin 1, pin 2	< 2 ohms	> 1 megohm
	Pin 3, pin 4	< 2 ohms	> 1 megohm
Circuit 4 (NO)			
	Pin 1, pin 2	> 1 megohm	< 2 ohms
	Pin 3, pin 4	> 1 megohm	< 2 ohms
Circuit 5 (358/1k5)			
	Pin 1, pin 2	358 ±20 ohms	1k5 ±90 ohms
	Pin 3, pin 4	—	—

If your values deviate greatly from those given above, refer to chapter *Trouble-shooting and remedies*.

Installing the cable

1. Route the cable up to the signal processing unit.
While doing this, take care not to create any trip hazards.
2. Connect the cable to the signal processing unit (see the operating instructions for the signal processing unit).

NOTE

Cables can become damaged if laid incorrectly.

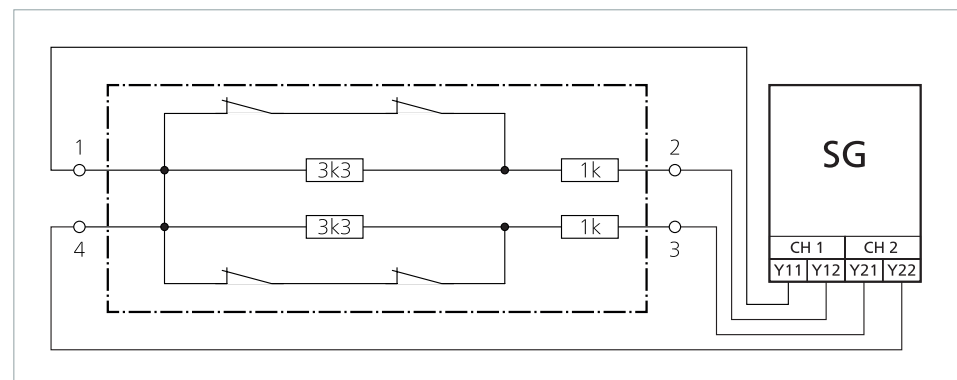
- ➔ Make sure that cables are neither bent nor crushed.
- ➔ Make sure that cables are laid free of tension.

Key to the following wiring diagrams

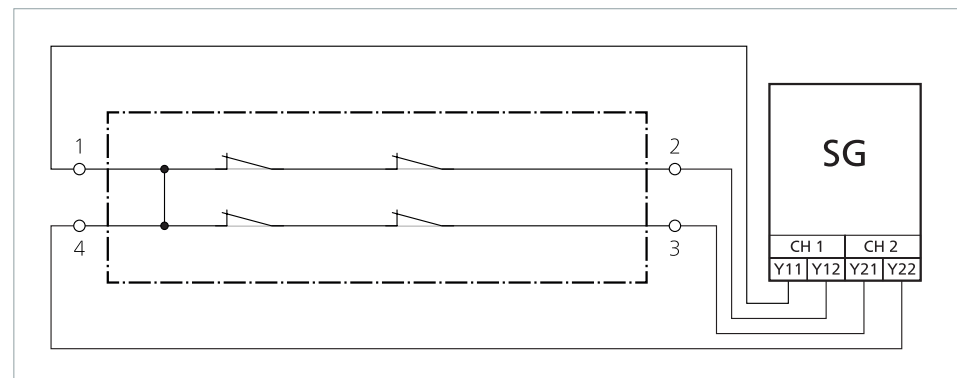
SG Signal processing

CH Channel

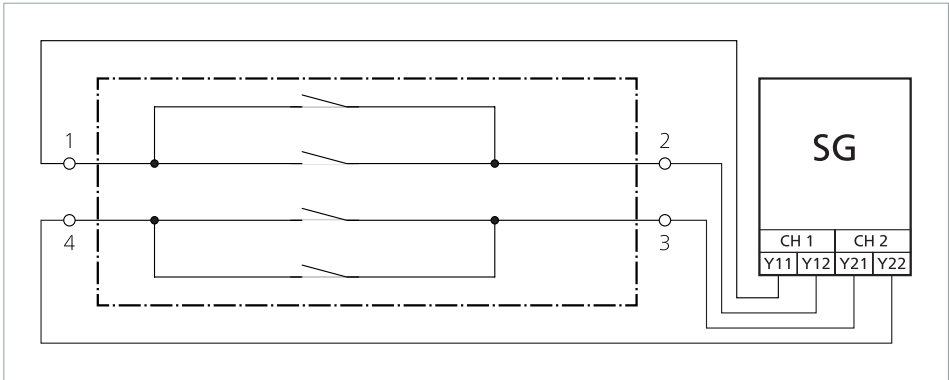
Operational principle of circuit 2 (1k/4k3)



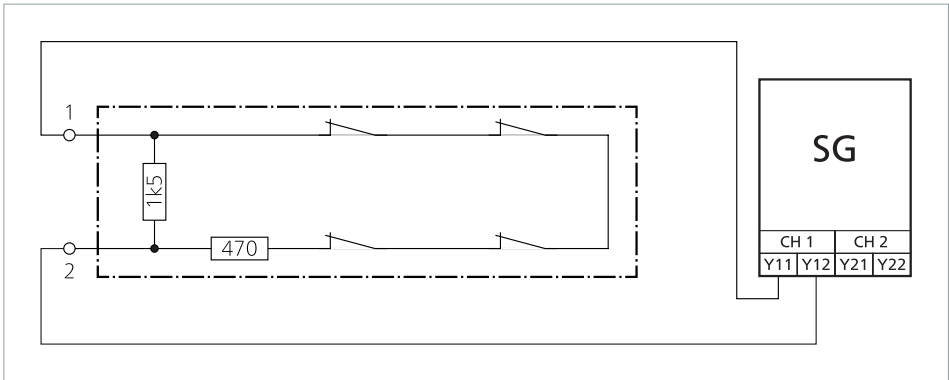
Operational principle of circuit 3 (NC)



Operational principle
of circuit 4
(NO)



Operational principle
of circuit 5
(358/1k5)



The signal processing unit is shown generically in the circuit diagrams. Depending on the operational principle, the signal processing unit must be configured internally.

Electrical operating conditions				
Operational principle	1k/4k3	NC	NO	358/1k5
Switching operations (min.)	50,000			
Switching voltage	DC 10 V to DC 24 V	Max. AC 230 V DC 30 V	Max. AC 230 V DC 30 V	DC 6 V to DC 24 V
Switching current (min.)	–	10 mA	10 mA	–
Switching current (max.)	25 mA	200 mA	200 mA	70 mA
Resistance (ohms)				
Sensor not activated	1k ±6%	< 2	> 1M	358 ±6%
Sensor activated	4k3 ±6%	> 1M	< 2	1k5 ±6%

Commissioning

This chapter is intended exclusively for specialist staff.

The handling rules contained in chapter *Safety instructions* apply.

WARNING Magnetic field

Type M sensors contain strong magnets that can affect implanted medical devices.

➔ Always keep the magnets at least 10 cm away from the body.

Type M sensors are identifiable from the type plate: SafetyShoeNG - xx - **M** - yy.

The sensor can only be put into operation (commissioned) in conjunction with a suitable signal processing unit. Commissioning is described in the operating instructions for the signal processing unit.

Decommissioning

The sensor must be taken out of operation (decommissioned) together with the connected signal processing unit. Decommissioning is described in the operating instructions for the signal processing unit.

Recommissioning

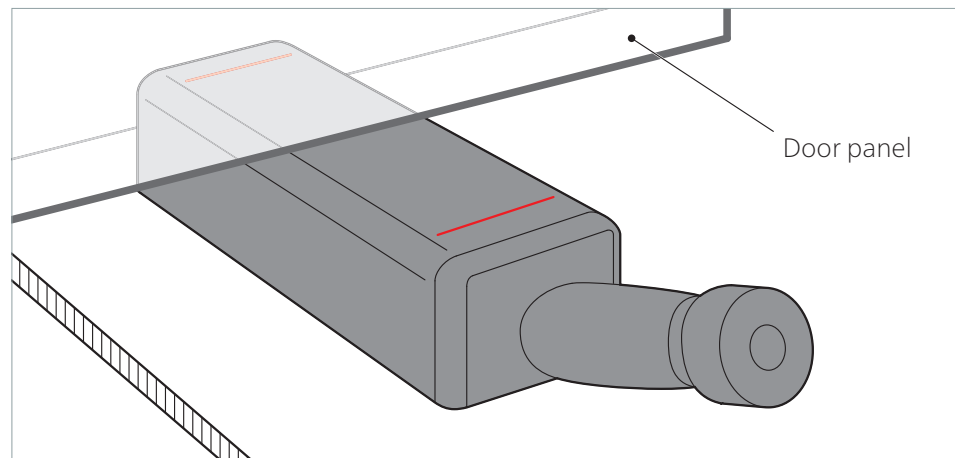
The sensor can only be put back into operation (recommissioned) in conjunction with a suitable signal processing unit. Recommissioning is described in the operating instructions for the signal processing unit.

Using the product

Rules applicable to all safety shoes

The handling rules contained in chapter *Safety instructions* apply.

- ➔ Always hold and carry the safety shoe by its handle.
Never pull on or hold the cable unless the connector protection is fitted.
- ➔ Place the safety shoe under the open aircraft door:
 - In the operating position
 - At right angles to the door panel
 - With the door panel inside the markings on the safety shoe
 - Without creating a trip hazard for passengers and personnel



Operating position

The side with the two markings must face upwards.

The underside of the sensor is the surface that makes contact with the floor.

The object to be detected must touch the safety shoe inside the markings.



Rules applicable to magnetic safety shoes

Type M sensors feature integrated magnets designed to hold the safety shoe in place.

The integrated neodymium magnets generate strong magnetic fields that may pose a hazard.

Type M sensors are identifiable from the type plate: SafetyShoeNG - xx - **M** - yy.

WARNING Danger to life from magnetic fields

In close proximity to pacemakers and implanted defibrillators, the magnetic fields can cause life-threatening malfunctions of the implants.

- ➔ Maintain a distance of at least 10 cm from the underside of the sensor.
- ➔ Only hold the sensor by its handle.
- ➔ Warn people with such devices not to approach the magnets.

CAUTION Risk of hearing loss for hearing aid users

In close proximity to hearing aids, the magnetic fields may temporarily interfere with their operation.

- ➔ Maintain a distance of at least 10 cm from the underside of the sensor.
- ➔ Do not carry the sensor on your shoulder.
- ➔ Warn people with such devices not to approach the magnets.

NOTE

Strong magnetic fields can damage TVs, laptops, hard drives, storage media, credit and debit cards, mechanical watches and speakers.

- ➔ Keep the magnetic safety shoe at least 10 cm away from any devices or objects that could be damaged by strong magnetic fields.
- ➔ Inform any members of staff who are likely to go near a safety shoe.

Below is a summary of the rules of conduct that must be followed to control the hazards posed by magnetic fields:

- ➔ Always hold and carry the sensor by its handle.
- ➔ Always keep the sensor at least 10 cm away from the body.
- ➔ Communicate the hazards to others.

Maintenance and cleaning

The handling rules contained in chapter *Safety instructions* apply.

WARNING Magnetic field

Type M sensors contain strong magnets that can affect implanted medical devices.

➔ Always keep the magnets at least 10 cm away from the body.

Type M sensors are identifiable from the type plate: SafetyShoeNG - xx - **M** - yy.

Maintenance

This chapter is intended exclusively for specialist staff.

The sensor is virtually maintenance-free.

WARNING Failure of sensor system

If the sensor is damaged, this could cause the entire sensor system to fail.

➔ Immediately put the sensor system out of operation as soon as damage is detected which could impair safe operation.

Depending on the operational demands, the sensor must be inspected at regular intervals (at least monthly). The operating company must define the inspection interval in accordance with the applicable national regulations.

➔ Test the sensor system by activating it or by applying the relevant test sample.

➔ Visually inspect the sensor for damage.

➔ Manually check the circular connector connection to ensure that it is secure.

Cleaning

➔ If the sensors are dirty, clean them with a mild cleaning product.

➔ After cleaning, remove any remaining fluid.

Troubleshooting and remedies

This chapter is intended exclusively for specialist staff.

The handling rules contained in chapter *Safety instructions* apply.

WARNING Magnetic field

Type M sensors contain strong magnets that can affect implanted medical devices.

➔ Always keep the magnets at least 10 cm away from the body.

Type M sensors are identifiable from the type plate: SafetyShoeNG - xx - **M** - yy.

Fault indication	Possible cause	Remedy
Resistance values do not match specifications	Cable is not connected correctly	➔ Check pins 1 to 4
	Cable is bent or damaged	➔ Replace the cable
	Sensor is faulty	➔ Replace sensor
Cracks in protective coating; the inner foam is saturated with water	Rough handling	➔ Replace sensor
	Ageing	➔ Replace sensor

Fault still cannot be resolved?

➔ Contact Mayser Support: Tel. +49 731 2061-0.

➔ In the event of enquiries, have the information from the type plate to hand.

Type plate

There is a type plate on the end of the sensor opposite the handle for identifying the sensor type.

Replacement parts

CAUTION Failure of sensor system

Failure to use original Mayser parts when replacing parts of the product can impair the function of the sensor system.

➔ Only use original Mayser parts.

Removal

The handling rules contained in chapter *Safety instructions* apply.

WARNING Magnetic field

Type M sensors contain strong magnets that can affect implanted medical devices.

➔ Always keep the magnets at least 10 cm away from the body.

Type M sensors are identifiable from the type plate: SafetyShoeNG - xx - **M** - yy.

The sensor can be removed following decommissioning.

1. Take the sensor system out of operation (see chapter *Decommissioning*).
2. Disassemble and remove the sensor by following the installation steps in reverse order.

Disposal

The handling rules contained in chapter *Safety instructions* apply.

WARNING Magnetic field

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➔ Always keep the magnets at least 10 cm away from the body.

Type M sensors are identifiable from the type plate: SafetyShoeNG - xx - **M** - yy.

The products included in the scope of supply contain the following materials:

- | | |
|---------------|--|
| Sensor | <ul style="list-style-type: none">• Plastics• Copper (inside the sensor, cables)• Steel (inside the sensor, springs)• Magnets (inside the sensor, depending on version) |
|---------------|--|

- | | |
|---------------------------------|--|
| Installation accessories | <ul style="list-style-type: none">• Steel (bolts, metal clamp, contact fitting)• Plastics (connector protection, circular connector connection, strain relief sleeve) |
|---------------------------------|--|

- | | |
|------------------|---|
| Packaging | <ul style="list-style-type: none">• Wood, cardboard, plastics |
|------------------|---|

- ➔ When disposing of the product:
- Ensure compliance with the relevant national disposal regulations and statutory requirements.
 - Ensure that any disposal company you use receives a list of the aforementioned materials along with the product.
 - Ensure that the materials are recycled or disposed of in an environmentally friendly way.

Technical data

Safety shoe NG	Value
IEC 60529: degree of protection	IP67
Actuation force	< 150 N
Effective actuation angle	±15°
Actuation distance	5 ±3 mm
Switching operations (min.)	50,000
Service life (min.)	2 a
Operating temperature	–20 to +45°C
Storage temperature	–20 to +45°C
Size (W × H × D)	450 × 99 × 104 mm
Weight (max.)	1.2 kg

This table is an extract of the full table contained in the product information (see *Technical data* in the product information).