



# Magnetic sensors for position monitoring of block cylinders and pneumatic swing clamps



## 1 Description of the product

Electronic magnetic sensors allow position monitoring of the pistons of cylinders with non-magnetisable housings (aluminium or bronze). A permanent ring magnet is fixed to the piston, and the magnetic electronic sensor detects its magnetic field. The magnetic sensors are fixed outside in the lengthwise slots of the cylinder housing. The switching points are adjustable by displacement of the magnetic sensors in the lengthwise slots of the housing.

## 2 Validity of the documentation

This documentation is valid for the magnetic sensors with the following part numbers:

- 3829234
- 3829240

## 3 Target group of this document

- Specialists, fitters and set-up men of machines and installations with expert knowledge in electrical engineering.

## Table of contents

<b>1 Description of the product</b>	1	<b>Qualification of the personnel</b>
<b>2 Validity of the documentation</b>	1	<b>Expert knowledge</b> means that the personnel must
<b>3 Target group of this document</b>	1	<ul style="list-style-type: none"><li>• be in the position to read and completely understand technical specifications such as circuit diagrams and product-specific drawing documents,</li></ul>
<b>4 Symbols and signal words</b>	2	<ul style="list-style-type: none"><li>• have expert knowledge (electric, hydraulic, pneumatic knowledge, etc.) of function and design of the corresponding components.</li></ul>
<b>5 For your safety</b>	2	<b>2</b> An <b>expert</b> is somebody who has due to its professional education and experiences sufficient knowledge and is familiar with the relevant regulations so that he
<b>6 Application</b>	2	<ul style="list-style-type: none"><li>• can judge the entrusted works,</li></ul>
<b>7 Installation</b>	4	<ul style="list-style-type: none"><li>• can recognize the possible dangers,</li></ul>
<b>8 Technical characteristics</b>	5	<ul style="list-style-type: none"><li>• can take the required measures to eliminate dangers,</li></ul>
<b>9 Accessory</b>	5	<ul style="list-style-type: none"><li>• knows the acknowledged standards, rules and guidelines of the technology.</li></ul>
<b>10 Disposal</b>	5	<ul style="list-style-type: none"><li>• has the required knowledge for repair and mounting.</li></ul>
<b>11 EC-Declaration of conformity</b>	5	

## 4 Symbols and signal words

### Hazardous to the environment



The symbol stands for important information for the proper handling with materials that are hazardous to the environment.

Ignoring these notes can lead to heavy damages to the environment.

### NOTE

This symbol stands for tips for users or especially useful information. This is no signal word for a dangerous or harmful situation.

## 5 For your safety

### 5.1 Basic information

The operating instructions serve for information and avoidance of dangers when installing the products into the machine as well as information and references for transport, storage and maintenance.

Only in strict compliance with these operating instructions, accidents and property damages can be avoided as well as trouble-free operation of the products can be guaranteed.

Furthermore, the consideration of the operating instructions will:

- avoid injuries
- reduce down times and repair costs,
- increase the service life of the products.

### 5.2 Safety instructions

The product was manufactured in accordance with the generally accepted rules of the technology.

Observe the safety instructions and the operating instructions given in this manual, in order to avoid personal damage or material damage.

- Read these operating instructions thoroughly and completely, before you work with the product.
- Keep these operating instructions so that they are accessible to all users at any time.
- Pay attention to the current safety regulations, regulations for accident prevention and environmental protection of the country in which the product will be used.
- Use the ROEMHELD product only in perfect technical condition.
- Observe all notes on the product.
- Use only accessories and spare parts approved by the manufacturer in order to exclude danger to persons because of not suited spare parts.
- Respect the intended use.
- You only may start up the product, when it has been found that the incomplete machine or machine, in which the product shall be mounted, corresponds to the country-specific provisions, safety regulations and standards.
- Perform a risk analysis for the incomplete machine, or the machine.

Due to the interactions between the product and the machine/fixtures or the environment, risks may arise that only can be determined and minimized by the user, e.g.:

- generated forces,
- generated movements,
- Influence of hydraulic and electrical control,
- etc.

## 6 Application

### 6.1 Intended use

Magnetic sensors are used for position monitoring of block cylinders and pneumatic swing clamps of the following data sheets:

- Block cylinders with bronze housing B1.553
- Block cylinders with aluminium housing B1.554
- Block cylinders with guide housing B1.738
- Pneumatic swing clamps J7.202

### 6.2 Misapplication

The use of magnetic sensors is not admitted:

- For domestic use.
- For other use on products such as those described.
- If due to vibrations or other physical/chemical effects damages of the products can be caused.
- In machines, on pallets or machine tool tables that are used to change the characteristics of the material (magnetise, radiation, photochemical procedures, etc.).
- In case of deviating operating and environmental conditions (see technical characteristics)

## 7 Installation

### 7.1 Functional principle

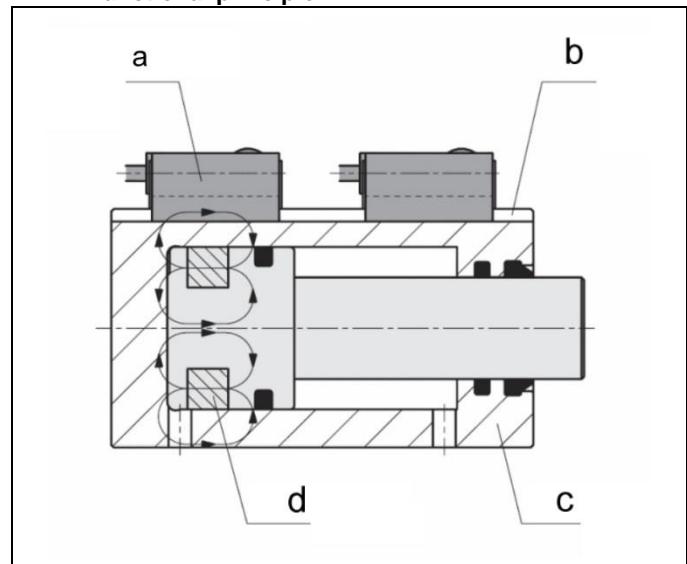


Figure 1: Functional principle

a Magnetic sensor	c Aluminium housing
b Lengthwise slot	d Ring magnet

### 7.2 Description/Function

Electronic magnetic sensors allow position monitoring of the pistons of cylinders with non-magnetisable housings (aluminium or bronze).

A permanent ring magnet is fixed to the piston, and its magnetic field is detected by the magnetic electronic sensor.

The magnetic sensors are fixed outside in the lengthwise slots of the cylinder housing. The switching points are adjustable by displacement of the magnetic sensors in the lengthwise slots of the housing.

### 7.3 Demands on voltage supply

Frequently a simple two-phase bridge connection is used, as it is often used for contactor or relay control. Such a connection is not suitable for voltage supply of position monitorings! In the figure "Functional principle" the progression of the output voltage of such a connection is represented over time. You can recognise that the voltage obtains temporarily the zero point. An electronic system could not function correctly in this case. In addition, you see that the peak values of the voltage exceed considerably their mean value.

Too high peak spikes can destroy the electronics.

Usually voltmeters or multimeters measure the mean value of the voltage. The peak value is increased approx. by factor 1.5. A measure of quality of a DC voltage is the residual ripple. An ideal DC voltage, as it is generated by a battery, has a residual ripple of 0%, the above described two-phase bridge connection obtains a residual ripple of 48%. 10% is admissible!

The residual ripple can be improved by topping a sufficiently-designed capacitor. This is called "smoothing" of the voltage. Thereby, the mean value of the DC voltage is increased. Therefore it is recommended to provide a "smoothed" voltage supply when planning an installation.

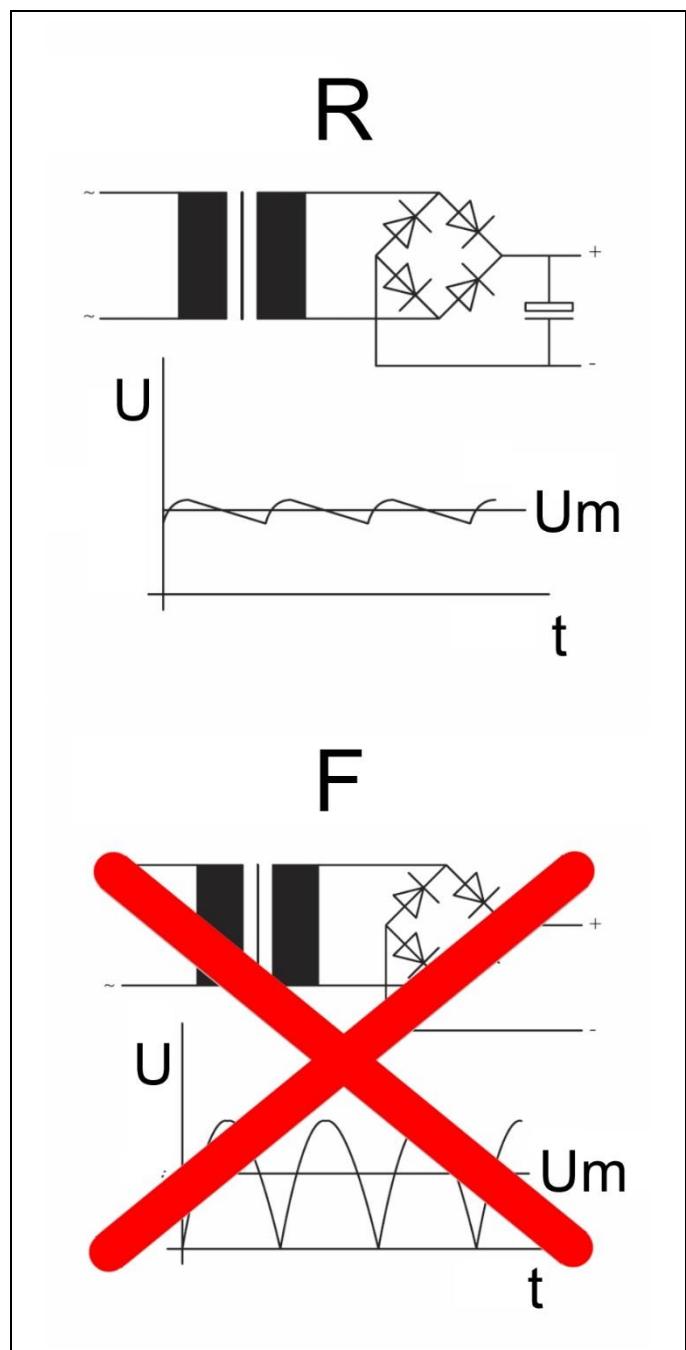


Figure 2: Generation of supply voltage

R	Correct	U <sub>m</sub>	Medium voltage
F	Incorrect		
U	Voltage	t	Time

### 7.4 Spikes

A danger for position monitorings are elements with high inductivity, which are operated with the same voltage supply as the position monitorings. Such elements, as e.g. solenoid valves, contactors and motors can generate high and high-energy peak spikes, which are transmitted by the voltage supply to the position controls.

Therefore critical elements have to be screened. For this purpose recovery diodes or RC-networks are indicated, which are mounted directly at the sources of interference. An alternative solution is the separated voltage supply for position controls and critical consumers.

## 7.5 Monitoring of several positions

In the two lengthwise slots of the cylinder housing several sensors can be fixed (depending on the length of the slot or the stroke).

In one slot, the minimum distance between the switching points is 6 mm; with two slots it is 3 mm.

## 7.6 Influencing the magnetic field

### 7.6.1 with adjacent, magnetisable components (e.g. steel parts)

#### NOTE

To guarantee perfect functioning, it is recommended to maintain a distance of at least 25 to 30 mm between magnetic sensor and magnetisable components. The function is indeed possible with a smaller distance but this depends highly on the individual circumstances for fitting. Thus ordinary steel bolts can also normally be used for fastening the cylinder. In borderline cases, screws of non-magnetisable steel (e.g. VA screws) can cause an improvement in the magnetic field.

### 7.6.2 With adjacent magnetic sensors

#### NOTE

If several cylinders with magnetic sensors are installed directly adjacent to one another, the magnetic sensors can have a reciprocal influence and malfunctions occur. Troubles of functioning can occur. A magnetisable steel sheet can help, placed between the cylinders or magnetic sensors as a shield.

## 7.7 Electric connection

Electrical connection is made as per traditional inductive proximity switches.

Up to four magnetic sensors can be connected in series.

### 7.7.1 Switching hysteresis of approx. 3 mm and path

This has to be considered already when adjusting the magnetic sensors. For static pistons, the magnetic sensor must always be pushed forward to the piston from the opposite direction.

Magnetic sensors with short path are available on request.

### 7.7.2 Connecting scheme

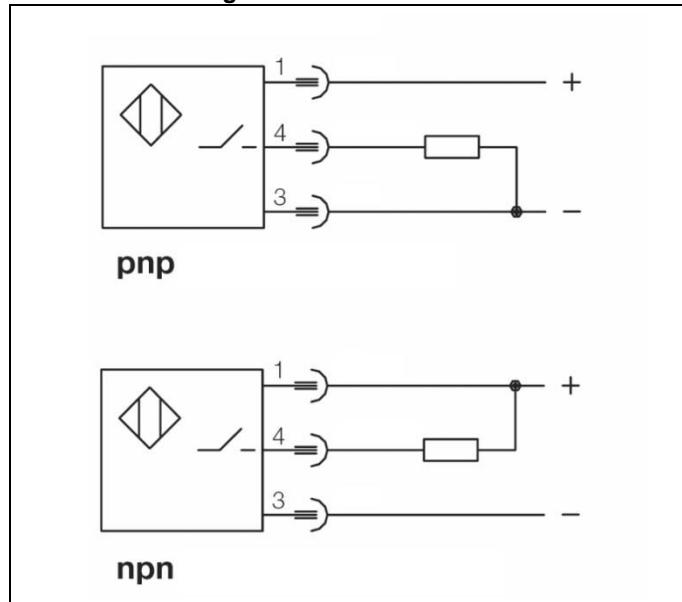


Figure 3: Circuit diagram for pnp and npn

pnp = plus switching

npn = minus switching

Pin	Wire colour
1	brown
3	blue
4	black

## 8 Technical characteristics

Material of housing	aluminium black anodised	
Operating voltage	10 – 30 V DC	
Residual ripple max.	10%	
Current load ILOAD	200 mA – up to 50 °C 150 mA – at 75 °C 100 mA – at 100 °C	
Current consumption	< 15 mA	
Voltage drop (max. load)	< 2 V	
Protected against short circuits	yes	
Protection against reverse battery	installed	
Switching frequency	1 kHz	
Switching hysteresis	3 mm	
Code class as per DIN 40050	IP 67	
Ambient temperature	-25 °C to +100 °C	
Port	M8 plug	
LED	no	
Output (interlock)	pnp	npn
Part no.	3829234	3829240

#### Maximum operating temperature

- Magnetic sensor: + 100°C
- Permanent magnet: + 100°C
- Connecting cable with right angle plug: + 90°C

#### NOTE

Magnetic sensors for an operating temperature up to 120°C are available on request.

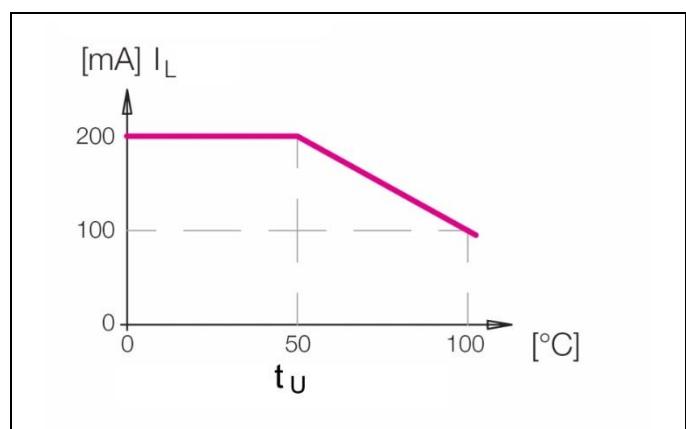


Figure 4: Dependence on ambient temperature  
Functional principle

IL max. load current

tu Ambient temperature

**NOTE**

Further technical data regarding the position monitoring are included in the data sheet.

**9 Accessory****NOTE****Accessories**

- See data sheet.

**10 Disposal****Hazardous to the environment**

Due to possible environmental pollution, the individual components must be disposed only by an authorised expert company.

The individual materials have to be disposed as per the existing regulations and directives as well as the environmental conditions.

Special attention has to be drawn to the disposal of components with residual portions of hydraulic fluids. The instructions for the disposal at the material safety data sheet have to be considered.

For the disposal of electrical and electronic components (e.g. stroke measuring systems, proximity switches, etc.) country-specific legal regulations and specifications have to be kept.

**11 EC-Declaration of conformity****Manufacturer**

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**Declaration of conformity**

We herewith declare that the products described comply with the basic safety and health requirements of the aforementioned EU directives in their design and construction, as well as in the version marketed by us.

**2014/30/EU EMC** - Electromagnetic compatibility [www.eur-lex.europa.eu]

**Commission Delegated Directive 2015/863/EU of 31 March 2015 amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances.** [www.eur-lex.europa.eu]

**2012/19/EU**, WEEE directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) [www.eur-lex.europa.eu]

The technical documents according to the specified guidelines were created for the products.

The manufacturer obligates to provide the special documentation of the products to national authorities on demand.

If the product is modified and not approved by us, this declaration will become invalid.

**List of the applied standards**

**DIN EN 60947-1**; 2015-09, Low-voltage switchgear and control gear - Part 1: General rules

**DIN EN 60947-2**; 2014-01, Low-voltage switchgear and control gear - Part 5-2: Control circuit devices and switching elements - Proximity switches

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