SAM
Inductive proximity sensors

The simple and intelligent way of speed monitoring

SICK
Sensor Intelligence.

SAM MultiTask inductive sensor: simple and intelligent pulse monitoring

Whether as a classic speed monitor or innovative acceleration monitor, the SAM MultiTask inductive sensor simplifies the monitoring of speed-dependent processes with a fast response time, large monitoring range, and intelligent start-up delay. Due to acceleration monitoring, the SAM sensor is able to detect changes faster.
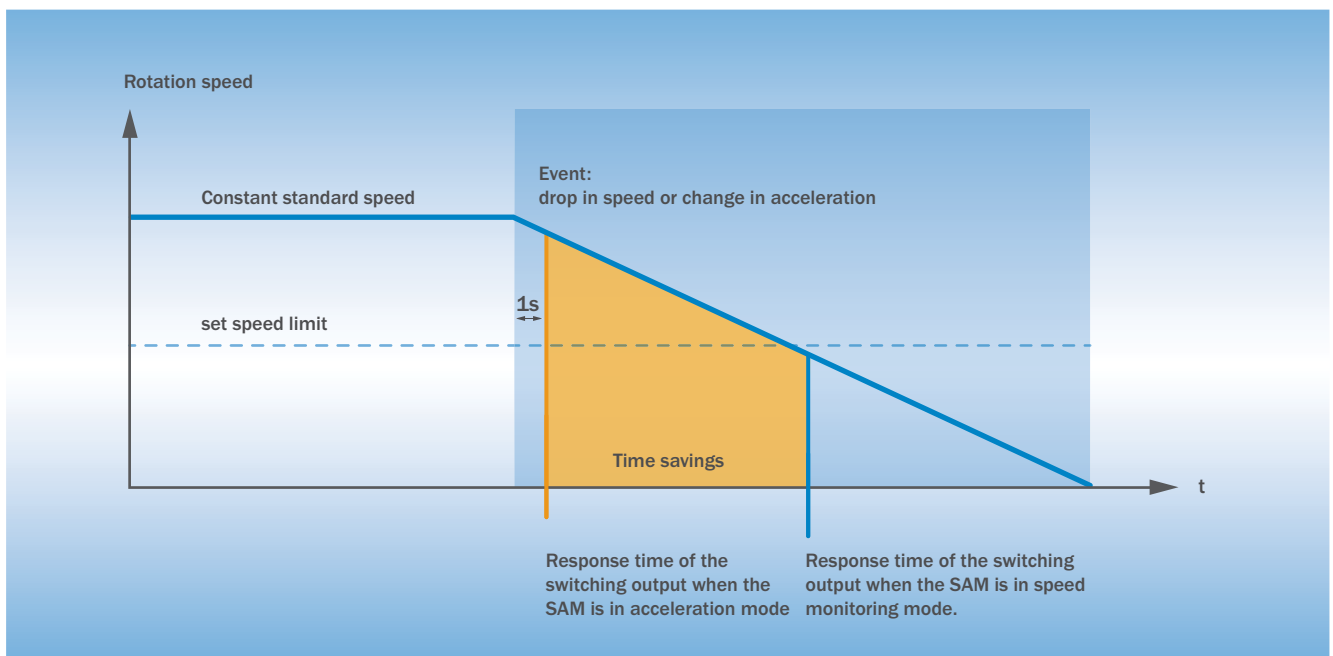
Versatile:
pulse and acceleration monitoring

Wherever drives and processes are monitored for pulse sequences, speed or slippage, the new SAM inductive sensor is the ideal solution:
- Wire break monitoring in wire manufacturing machines
- V-belt monitoring in fans
- Speed monitoring of spindles
- Thread break monitoring on sewing machines
- Torn belt monitoring on conveyor belts

Integrated:
evaluation for direct monitoring

The SAM inductive sensor monitors speed and acceleration using metal targets for a non-contact solution. The pulse sequence produced is compared to an adjustable threshold directly in the sensor and a switching signal output to the control if the threshold is not reached.
The PLC is not involved in signal processing and does not require an expensive counter board. As a result, low-cost, efficient monitoring is ensured even for fast processes with high pulse sequences.

Rotation speed

Constant standard speed

Event: drop in speed or change in acceleration

set speed limit

1s

Time savings

Response time of the switching output when the SAM is in acceleration mode

Response time of the switching output when the SAM is in speed monitoring mode.

t

Speed and acceleration: always under control

Tried and tested: classic pulse monitoring

When the speed monitoring mode is used, SAM's high performance allows it to evaluate a range of 6 to 12,000 pulses/min, which is perfect for even the fastest processes. Individual adaptations of the switching thresholds ensure a reliable output signal and help to produce extremely reliable monitoring, which enhances safety.

Fast: innovative acceleration monitoring

When used as an acceleration monitor, SAM is always one step ahead. This sensor doesn't monitor the speed of a pulse sequence, but instead monitors the deceleration in the range 0.1 to 2 pulses/s² up to a maximum pulse sequence of 1,200 pulses/min. As a result, it detects changes in the process as soon as they occur. In the past, the speed of a monitored flywheel had to drop to the set threshold before it could be detected if a V-belt broke. Now, the SAM sensor detects the deceleration of the flywheel immediately and instantly issues an alarm. This saves valuable seconds when stopping the machine and prevents costly rejects and damage.
Format and speed changes in machines are simple due to the acceleration monitoring mode. Since SAM only monitors changes in the process but not the absolute speed of the pulse sequence, no threshold values need to be adapted when the speed changes. This results in time and cost savings, as well as increased flexibility.

Straightforward: mounting, programming and application

The additional pulse output always indicates the actuation state of the sensor – mounting is simple and quick to perform.
An intelligent start-up delay mode adapts automatically to the start-up time that the machine requires. This simplifies commissioning and automatically compensates for changes in the machine start-up time.
The factory-set acceleration monitoring mode works independently from the process speed. This means that SAM is ideally pre-configured for a variety of applications. Simply connect and get started.
Application-specific adaptations for operating modes, limits or start-up delay are easy to perform using a PC – even duplicating sensor settings takes only a few seconds.

Flexible: SAM is made for the future

Whether it is used as a simple "stand-alone" device or integrated in an IO-Link environment, SAM combines all capabilities in a single unit. It can operate as a classic speed monitor device today and output the measurement data via IO-Link tomorrow. Embedded in an IO-Link environment, SAM can even transfer speed and acceleration values. SAM makes visionary solutions a reality today.

The simple and intelligent way of speed monitoring

Product description

The SAM sensor is the simple and intelligent way of speed monitoring with an additional IO-Link interface. SAM can be used as a classic speed monitor or innovative acceleration monitor with a revolutionary speed-independent monitoring function. It checks if an adjustable speed or acceleration threshold is crossed and provides a switching signal. SAM is setting new standards and revolutionizing commissioning tasks and fields of application thanks to its fast response time, monitored range of up to 12,000 pulses per minute and intelligent start-up delay.

At a glance

- Speed and acceleration monitoring
- Monitoring range: 6 to 12,000 pulses/min. and 0.1 to 2 pulses/sec.²
- Switching and pulse output
- Intelligent start-up delay
- Speed monitoring can be flexibly configured via two thresholds
- Flexible sensor settings, monitoring, extended diagnostics, and visualization thanks to IO-Link
- Types M18 and M30
- Sensing ranges of up to 10 mm flush

Your benefits

- Speed-independent detection of speed changes
- Faster detection of speed changes than conventional speed monitors
- No readjustment after speed changes necessary
- Precise and convenient configuration via software
- IO-Link provides easy data access from the PLC
- No time-consuming, individual configuration of start-up delay feature necessary
- Reliable output signal thanks to adjustable speed thresholds (hysteresis)
- No expensive counter cards necessary in PLC

Additional information

→ **www.mysick.com/en/SAM**

For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.

Detailed technical data

Features

	SAM18	SAM30
Housing	Cylindrical	
Thread size	M18 x 1	M30 x 1.5
Sensing range S_n	7 mm	10 mm
Assured sensing range S_a	5.6 mm	8.1 mm
Installation type	Flush	
Output type	PNP	
Output function	NO	
Output Q $_{Imp}$	Pulse output (The pulse sequence corresponds to the damping frequency)	
Output Q	Output type (dependant on the adjusted threshold)	
Electrical wiring	DC 4-wire	
Adjustment range speed (2 limit values) [1]	6 ... 12,000 impulses / min	
Adjustment range acceleration (1 limit value) [2]	0.1 ... 2 impulses / sec^2	
Time delay, adjustable	Mode 0: No start-up delay Mode 1: 0 ... 254 sec., adjustable Mode 2: When reaching the upper threshold	
Enclosure rating [3]	IP 67	

[1] Up to a max. pulse sequence of 12,000 pulses / min.
[2] Up to a max. pulse sequence of 1.200 pulses / min.
[3] According to EN 60529.

Mechanics/electronics

	SAM18	SAM30
Supply voltage	10 V DC ... 30 V DC	
Ripple	≤ 10 %	
Voltage drop	≤ 2.5 V	
Current consumption [1]	≤ 35 mA	
Hysteresis [2]	5 % ... 15 %	
Repeatability [3] [4]	≤ 2 %	
Temperature drift (of S_r)	± 10 %	
EMC	According to EN 60947-5-2	
Output current I_a	≤ 100 mA	
Connection type	Connector M12, 4-pin	
Short-circuit protection	✔	
Reverse polarity protection	✔	
Power-up pulse protection	✔	
Shock/vibration	30 g, 11 ms/10 Hz ... 55 Hz, 1 mm	
Status indicator Q_{Imp}	LED, yellow	
Status indicator Q	LED, blau	
Ambient operating temperature	−25 °C ... +75 °C	
Housing material	Metal, Nickel-plated brass	
Housing cap material	Plastic, PA6	
Tightening torque, max.	≤ 40 Nm	≤ 100 Nm

[1] Without load.
[2] Of S_n.
[3] Ub and Ta constant.
[4] Of Sr.

IO-Link

Minimum response time	Mode acceleration monitoring 1 sec Mode speed monitoring 50 ms
Factory setting	Operating mode: acceleration monitoring Threshold acceleration: 1 pulse/sec² Start-up delay mode: time delay Upper/lower threshold speed: 200/300 pulses/min Time delay: 5 sec
Fieldbus integration	IO-Link V1.0
Mode	COM 2 (38k4)
Cycle time	5 ms
Process data length	16 Bit
Process data structure	1 bit pulse output, 1 bit switching output, 14 bit measured value

Reduction factors

Note	The values are reference values which may vary
Carbon steel St37 (Fe)	1
Stainless steel (V2A, 304)	0.8
Aluminum (Al)	0.45
Copper (Cu)	0.4
Brass (Br)	0.4

Ordering information

SAM18

- **Output function:** NO
- **Output type:** PNP
- **Connection:** Connector M12, 4-pin

Sensing range S_n	Speed range	Acceleration range	Connection diagram	Model name	Part no.
7 mm	6 ... 12,000 impulses / min	0.1 ... 2 impulses / sec²	Cd-226	IMC18-07BPDZC0SA05	1061987

SAM30

- **Output function:** NO
- **Output type:** PNP
- **Connection:** Connector M12, 4-pin

Sensing range S_n	Speed range	Acceleration range	Connection diagram	Model name	Part no.
10 mm	6 ... 12,000 impulses / min	0.1 ... 2 impulses / sec²	Cd-226	IMC30-10BPDZC0SA05	1061704

Dimensional drawings

dimensions in mm (inch)

SAM18
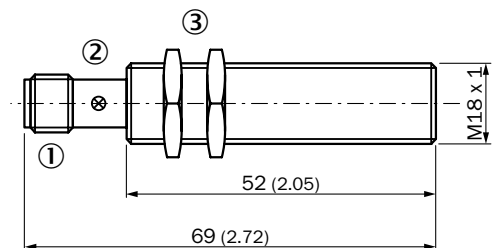
① Connection
② LED indicator
③ Fastening nuts (2 x); 24 mm hex, metal

SAM30
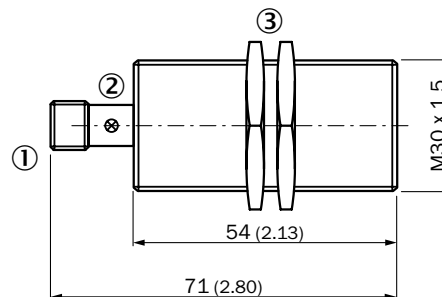
① Connection
② LED indicator
③ Fastening nuts (2 x); 36 mm hex, metal
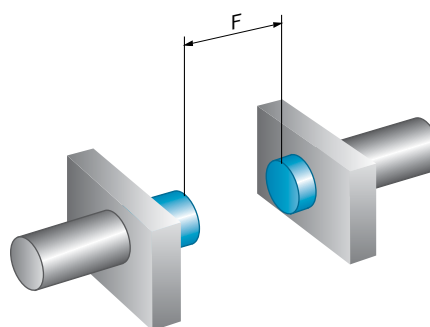
Connection diagram

Cd-226
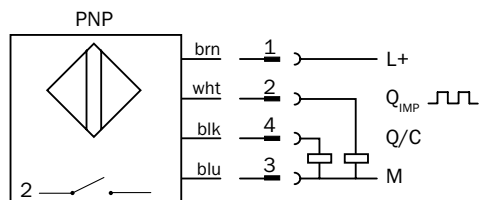
## Installation note

Flush installation
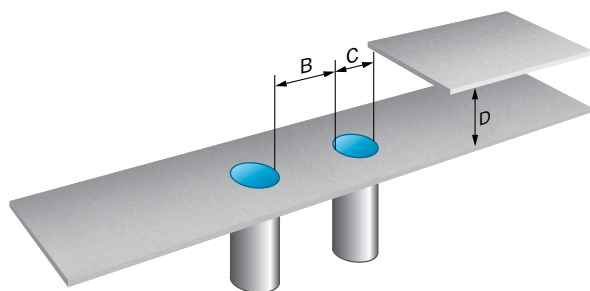
Opposite installation

	Installation type	Electrical wiring	B	C	D	F
IMC18-07BPDZC0SA05	Bündig	DC 4-wire	18 mm	18 mm	18 mm	56 mm
IMC30-10BPDZC0SA05	Bündig	DC 4-wire	30 mm	30 mm	30 mm	80 mm

Configuration	
Operating mode	• Speed monitoring • Acceleration monitoring
Start-up delay modes	• Off • Time delay • Upper limit
Limit values	• Upper speed limit • Lower speed limit • Acceleration

Speed monitoring

Switching signal is activated when the upper speed threshold set for the pulse sequence is exceeded.
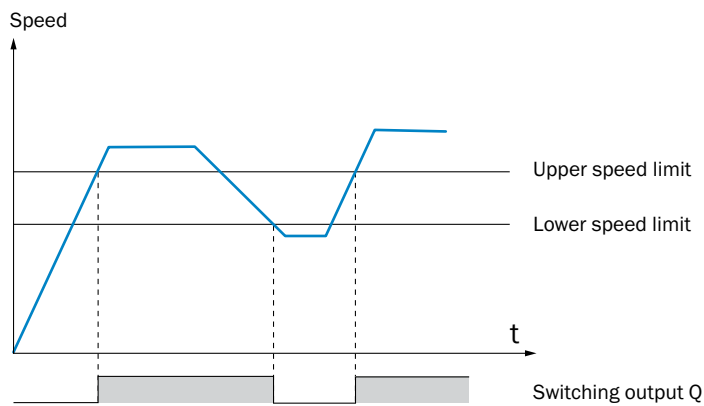
Acceleration monitoring

Switching signal is activated when the acceleration threshold set for the change in pulse sequences is exceeded.
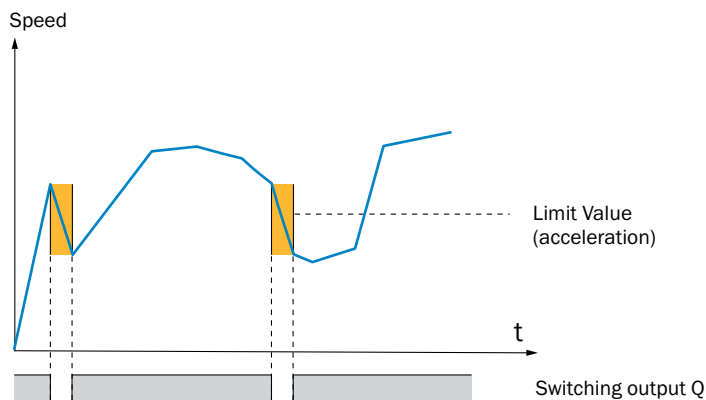
Start-up delay

The start-up delay is activated when the operating voltage is applied.

Off:
Start-up delay is not active.

Time delay:
The start-up delay activates the switching output for a time delay within a programmable range from 0 to 254 s.

Upper limit:
The start-up delay activates the switching output until the upper speed threshold is reached.

Limit values

Upper speed limit:
Switching output Q is activated when the upper threshold value is exceeded. The lower threshold value can range from 6 to 12,000 pulses/min.

Lower speed limit:
Switching output Q is activated when the deceleration value is exceeded. The lower threshold value can range from 6 to 12,000 pulses/min.

Acceleration:
Switching output Q is activated when the deceleration value is exceeded. The deceleration value can range from 0.1 to 2 pulses/min.

Example applications
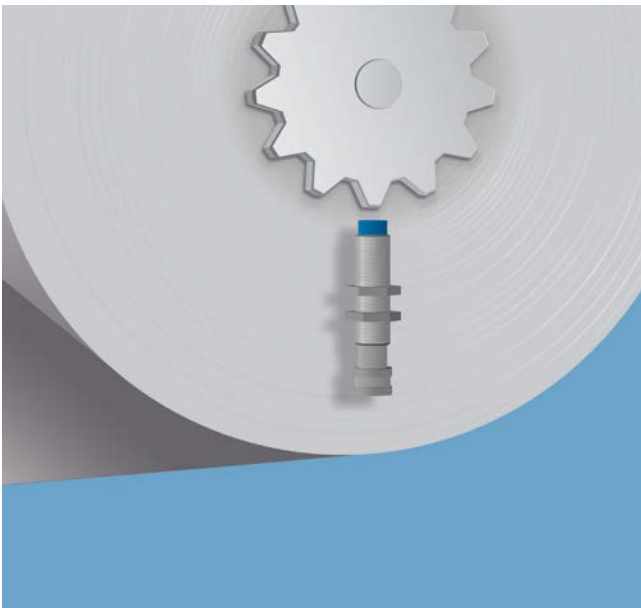
SAM monitors conveyor belt speeds
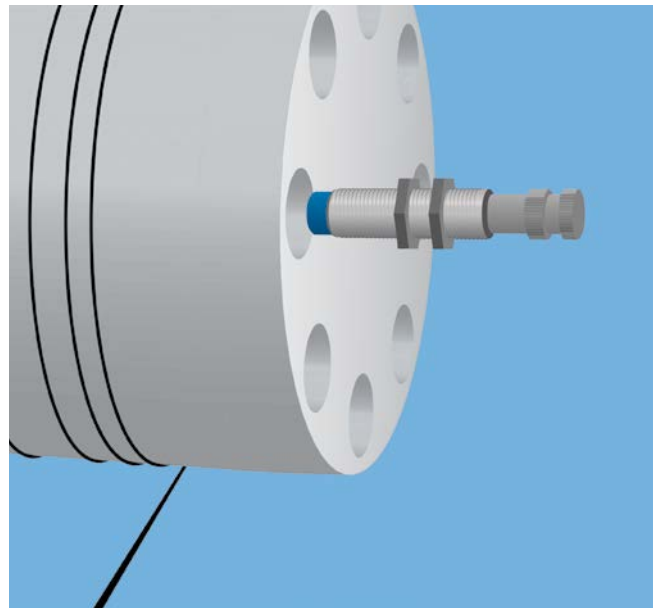
SAM works as a wire break monitor on a wire manufacturing machine

Recommended Accessories

IO-Link module

Figure	Description	Model name	Part no.	SAM18	SAM30
	IO-Link-Master, IO-Link field module, DC 18 V … 30 V, IP 65, IP 67	IOLSHPB-P3104R01	6039728	●	●
	USB Master for IO-Link V1.1 with Power supply and USB cable	IOLA2US-01101 [1]	1061790	●	●

[1] Available from 12/2013.

Mounting brackets/plates

Mounting brackets

Figure	Material	Description	Model name	Part no.	SAM18	SAM30
	Steel, zinc coated	Mounting plate for M18 sensors	BEF-WG-M18	5321870	●	–
	Steel, zinc coated	Mounting plate for M30 sensors	BEF-WG-M30	5321871	–	●
	Steel, zinc coated	Mounting bracket, M18 thread	BEF-WN-M18	5308446	●	–
	Steel, zinc coated	Mounting bracket, M30 thread	BEF-WN-M30	5308445	–	●

Terminal and alignment brackets

Alignment brackets

Figure	Material	Description	Model name	Part no.	SAM18	SAM30
	Plastic	Mounting bracket with ball-and-socket	BEF-WN-M18-ST02	5312973	●	–

Terminal brackets

Figure	Material	Description	Model name	Part no.	SAM18	SAM30
	Plastic (PA12), glass-fiber rein-forced	Clamping block for round sensors M18, without fixed stop	BEF-KH-M18	2051481	●	–
		Clamping block for round sensors M18, with fixed stop	BEF-KHF-M18	2051482	●	–

Plug connectors and cables

Connecting cable (female connector-open) M12, 4-pin, PUR, halogen-free

- **Cable material:** PUR, halogen-free
- **Connector material:** TPU
- **Description:** IP 65, IP 68, IP 69K

Figure	Connection type head A	Connection type head B	Connecting cable	Model name	Part no.	SAM18	SAM30
	Female connector, M12, 4-pin, straight	Cable, open conductor heads	2 m, 4-pole	DOL-1204-G02MC	6025900	●	●
			5 m, 4-pole	DOL-1204-G05MC	6025901	●	●
			10 m, 4-pole	DOL-1204-G10MC	6025902	●	●
			15 m, 4-pole	DOL-1204-G15MC	6034749	●	●
			20 m, 4-pole	DOL-1204-G20MC	6034750	●	●
	Female connector, M12, 4-pin, angled	Cable, open conductor heads	2 m, 4-pole	DOL-1204-W02MC	6025903	●	●
			5 m, 4-pole	DOL-1204-W05MC	6025904	●	●
			10 m, 4-pole	DOL-1204-W10MC	6025905	●	●
			20 m, 4-pole	DOL-1204-W20MC	6034753	●	●

Connecting cable (female connector-open) M12, 4-pin, PVC

- **Cable material:** PVC
- **Connector material:** TPU
- **Description:** IP 67

Figure	Connection type head A	Connection type head B	Connecting cable	Model name	Part no.	SAM18	SAM30
	Female connector, M12, 4-pin, straight	Cable, open conductor heads	2 m, 4-pole	DOL-1204-G02M	6009382	●	●
			5 m, 4-pole	DOL-1204-G05M	6009866	●	●
			10 m, 4-pole	DOL-1204-G10M	6010543	●	●
			15 m, 4-pole	DOL-1204-G15M	6010753	●	●
			20 m, 4-pole	DOL-1204-G20M	6034401	●	●
	Female connector, M12, 4-pin, angled	Cable, open conductor heads	2 m, 4-pole	DOL-1204-W02M	6009383	●	●
			5 m, 4-pole	DOL-1204-W05M	6009867	●	●
			10 m, 4-pole	DOL-1204-W10M	6010541	●	●
			15 m, 4-pole	DOL-1204-W15M	6036474	●	●
			20 m, 4-pole	DOL-1204-W20M	6033559	●	●

Female connector (ready to assemble) M12, 4-pin

- **Connector material:** PBT
- **Description:** IP 67

Figure	Connection type head A	Connection type head B	Model name	Part no.	SAM18	SAM30
	Female connector, M12, 4-pin, straight	Screw-type terminals	DOS-1204-G	6007302	●	●
	Female connector, M12, 4-pin, angled	Screw-type terminals	DOS-1204-W	6007303	●	●

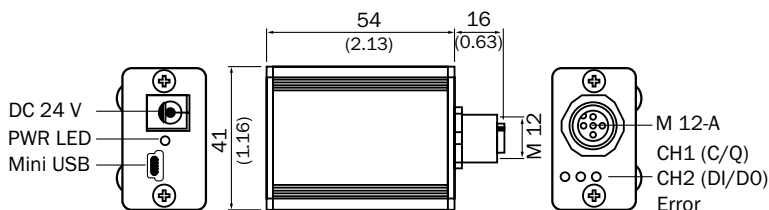## Dimensional drawings accessories
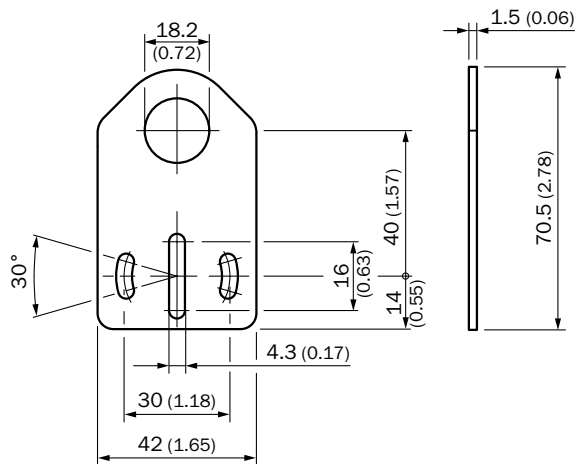
dimensions in mm (inch)

IO-Link module
IOLSHPB-P3104R01
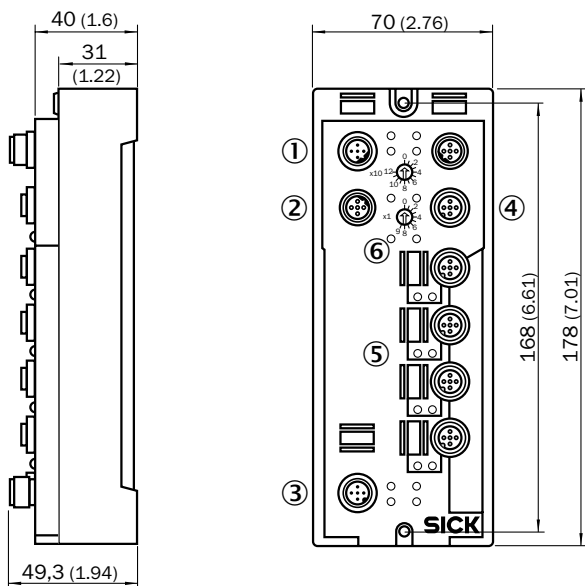
① Bus IN
② Bus OUT
③ Power supply IN
④ Power supply OUT
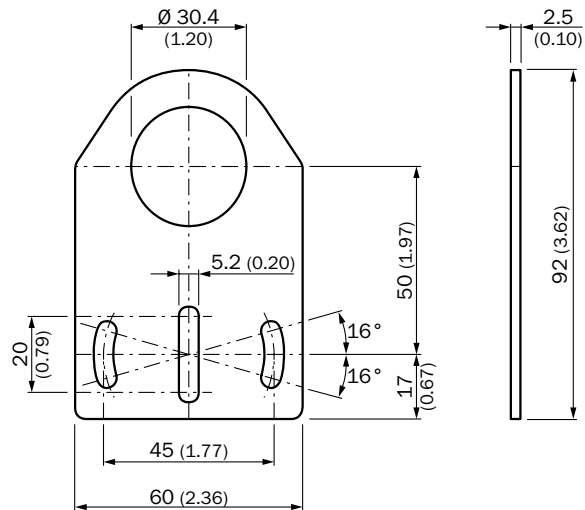⑤ Port 1...4
⑥ Bus adress rotary switch

IOLA2US-01101

DC 24 V
PWR LED
Mini USB

M 12-A
CH1 (C/Q)
CH2 (DI/D0)
Error

Mounting brackets/plates
BEF-WG-M18
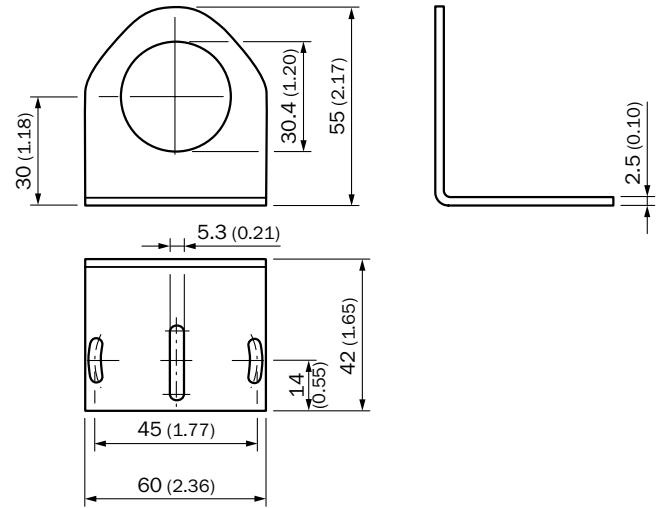
BEF-WG-M30

BEF-WN-M18
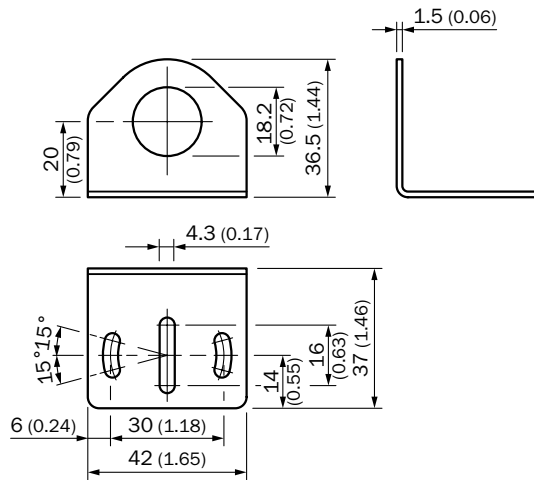
BEF-WN-M30

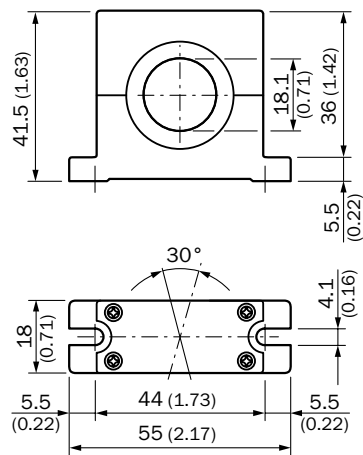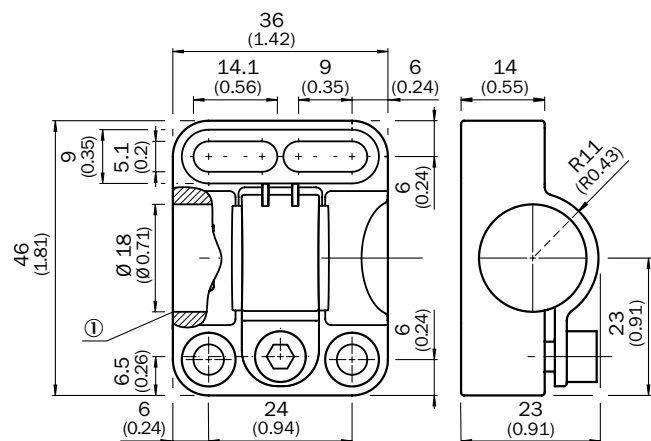## Terminal and alignment brackets

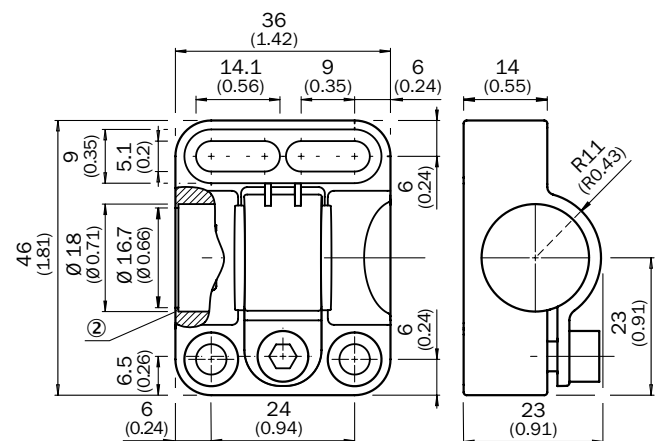**BEF-WN-M18-ST02**

BEF-KH-M18
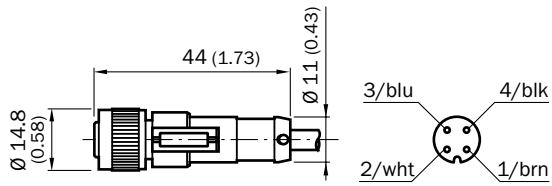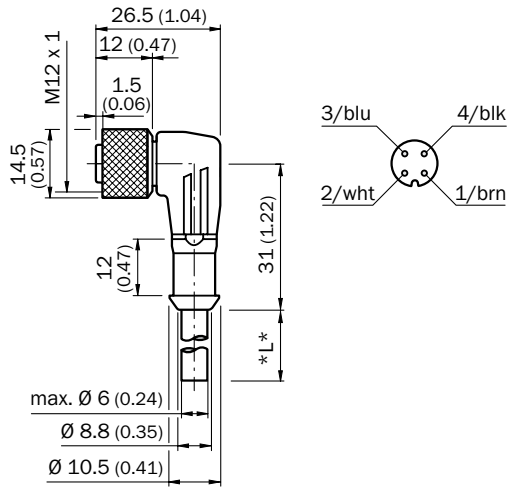

① Without fixed stop

BEF-KHF-M18

② With fixed stop

Plug connectors and cables

DOL-1204-GxxM/DOL-1204-GxxMC

44 (1.73) Ø 11 (0.43)

Ø 14.8 (0.58)

3/blu   4/blk
2/wht   1/brn

DOL-1204-WxxM

26.5 (1.04)
12 (0.47)
M12 x 1
1.5 (0.06)
14.5 (0.57)
12 (0.47)
31 (1.22)
L
max. Ø 6 (0.24)
Ø 8.8 (0.35)
Ø 10.5 (0.41)

3/blu   4/blk
2/wht   1/brn

DOL-1204-WxxMC

27.4 (1.08)
Ø 14.8 (0.58)
34.5 (1.36)
Ø 11 (0.43)

3/blu   4/blk
2/wht   1/brn

DOS-1204-G

52.5 (2.07)
20 (0.79)
M12x1

3   4
2   1

cable diameter
3 to 6.5 mm
(0.12 to 0.26)

DOS-1204-W

35 (1.38)
Ø 20 (0.79)
M12x1
27.5 (1.08)
37.5 (1.48)

3   4
2   1

cable diameter
3 to 6.5 mm
(0.12 to 0.26)
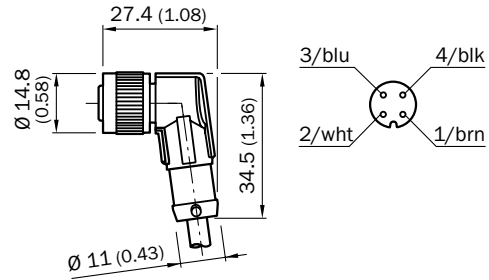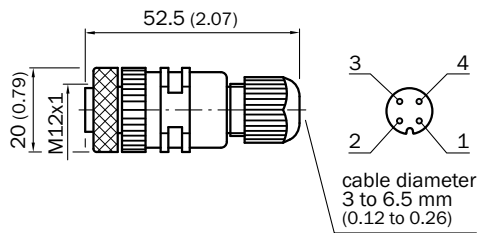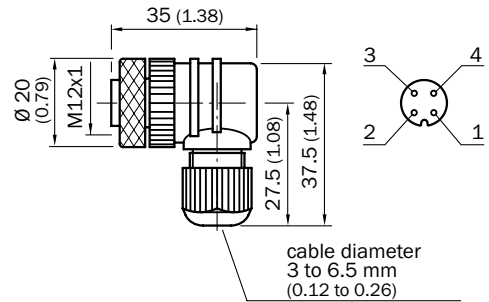
www.mysick.com – search online and order

Search online quickly and safely – with the SICK "Finders"

Product
Applications
Literature
Service
Connection diagram
Accessories
Spare part
Software
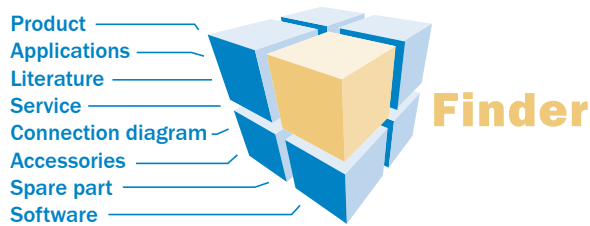
Finder

Product Finder: We can help you to quickly target the product that best matches your application.

Applications Finder: Select the application description on the basis of the challenge posed, industrial sector, or product group.

Literature Finder: Go directly to the operating instructions, technical information, and other literature on all aspects of SICK products.

Efficiency – with the e-commerce tools from SICK
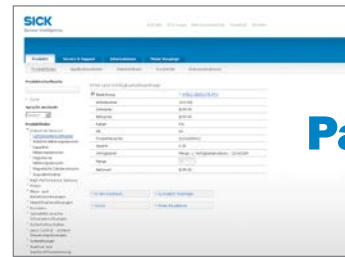
Partner Portal
www.mysick.com

Find out prices and availability: Determine the price and possible delivery date of your desired product simply and quickly at any time.

Request or view a quote: You can have a quote generated online here. Every quote is confirmed to you via e-mail.

Order online: You can go through the ordering process in just a few steps.

For safety and productivity: SICK LifeTime Services

SICK LifeTime Services is a comprehensive set of high-quality services provided to support the entire life cycle of products and applications from system design all the way to upgrades. These services increase the safety of people, boost the productivity of machines and serve as the basis for our customers' sustainable business success.

CONSULT
SUPPORT
CHECK
RETROFIT
TRAIN

SICK LifeTime Services

Consulting & Design
Globally available experts for cost-effective solutions

Product & System Support
Fast and reliable, by telephone or on location

Verification & Optimization
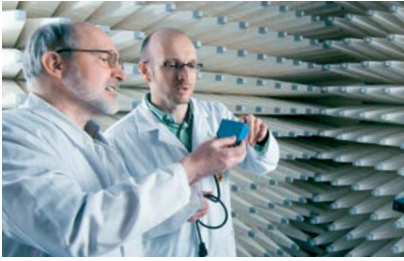Checks and recommendations for increased availability

Upgrade & Retrofits
Uncovers new potential for machines and systems

Training & Education
Employee qualification for increased competitiveness

SICK at a glance

Leading technologies

With a staff of more than 6,000 and over 40 subsidiaries and representations worldwide, SICK is one of the leading and most successful manufacturers of sensor technology. The power of innovation and solution competency have made SICK the global market leader. No matter what the project and industry may be, talking with an expert from SICK will provide you with an ideal basis for your plans – there is no need to settle for anything less than the best.

Unique product range

- Non-contact detecting, counting, classifying, positioning and measuring of any type of object or media
- Accident and operator protection with sensors, safety software and services
- Automatic identification with bar code and RFID readers
- Laser measurement technology for detecting the volume, position and contour of people and objects
- Complete system solutions for analysis and flow measurement of gases and liquids

Comprehensive services

- SICK LifeTime Services – for safety and productivity
- Application centers in Europe, Asia and North America for the development of system solutions under real-world conditions
- E-Business Partner Portal www.mysick.com – price and availability of products, requests for quotation and online orders

Worldwide presence with subsidiaries in the following countries:

Australia
Belgium/Luxembourg
Brasil
Ceská Republika
Canada
China
Danmark
Deutschland
España
France
Great Britain
India
Israel
Italia
Japan

México
Nederland
Norge
Österreich
Polska
România
Russia
Schweiz
Singapore
Slovenija
South Africa
South Korea
Suomi
Sverige
Taiwan
Türkiye
United Arab Emirates
USA

Please find detailed addresses and additional representatives and agencies in all major industrial nations at **www.sick.com**

SICK
Sensor Intelligence.