

## SAM

### Inductive proximity sensors

The simple and intelligent way of speed monitoring

## 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

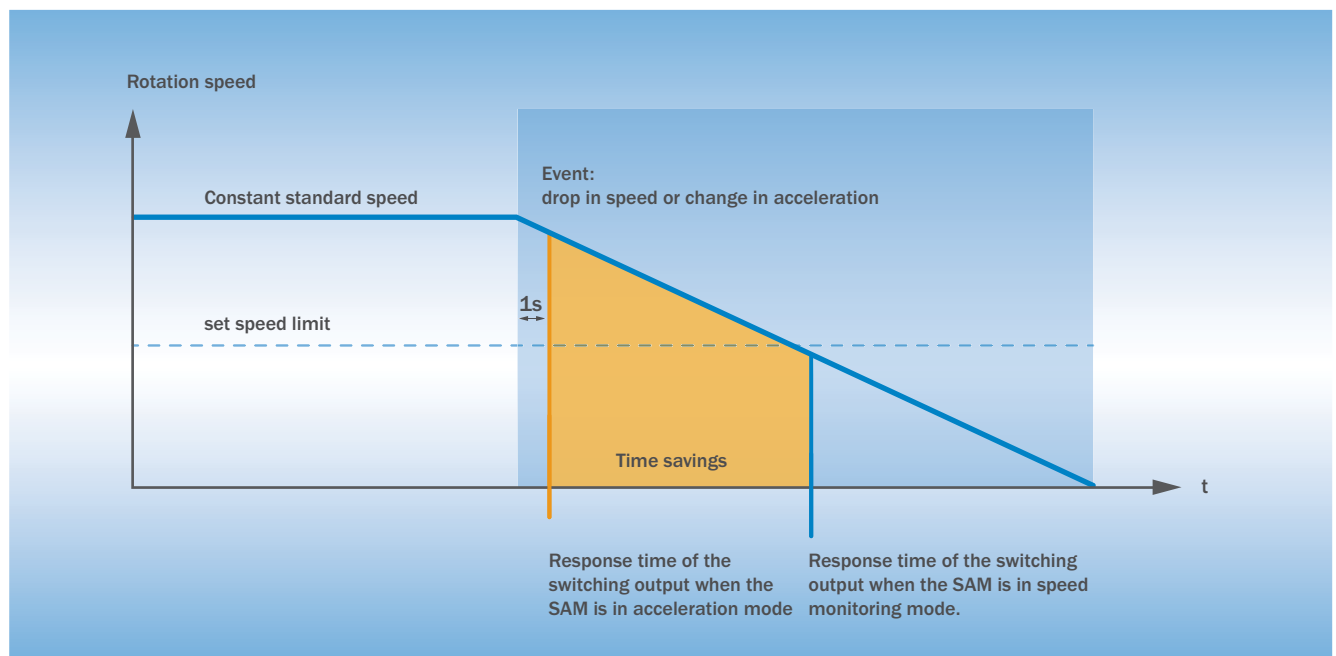
Wherever drives and processes are monitored for pulse sequences, speed or slippage, the new SAM inductive sensor is the ideal solution:

- 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.



## 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/s<sup>2</sup> 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



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### 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.<sup>2</sup>
- 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

→ [www.mysick.com/en/SAM](http://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) <sup>1)</sup>	6 ... 12,000 impulses / min	
Adjustment range acceleration (1 limit value) <sup>2)</sup>	0.1 ... 2 impulses / sec <sup>2</sup>	
Time delay, adjustable	Mode 0: No start-up delay Mode 1: 0 ... 254 sec., adjustable Mode 2: When reaching the upper threshold	
Enclosure rating <sup>3)</sup>	IP 67	

<sup>1)</sup> Up to a max. pulse sequence of 12,000 pulses / min.

<sup>2)</sup> Up to a max. pulse sequence of 1.200 pulses / min.

<sup>3)</sup> 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 <sup>1)</sup>	≤ 35 mA	
Hysteresis <sup>2)</sup>	5 % ... 15 %	
Repeatability <sup>3) 4)</sup>	≤ 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

<sup>1)</sup> Without load.

<sup>2)</sup> Of  $S_n$ .

<sup>3)</sup> Ub and Ta constant.

<sup>4)</sup> Of  $S_r$ .

## 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/sec <sup>2</sup> 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 / sec <sup>2</sup>	Cd-226	IMC18-07BPDZC0SA05	1061987

## SAM30

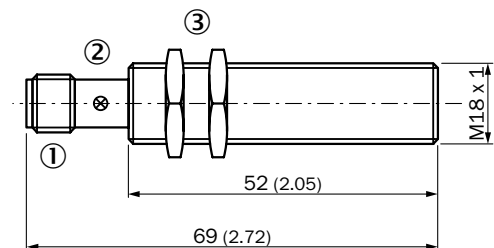
- Output function: NO
- Output type: PNP
- Connection: Connector M12, 4-pin

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 / sec <sup>2</sup>	Cd-226	IMC30-10BPDZC0SA05	1061704

## Dimensional drawings

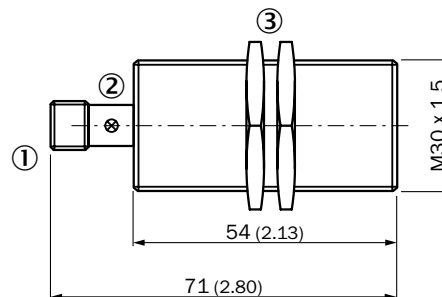
dimensions in mm (inch)

### SAM18



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

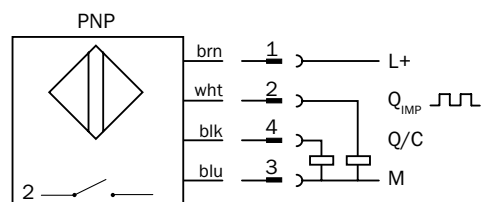
### SAM30



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

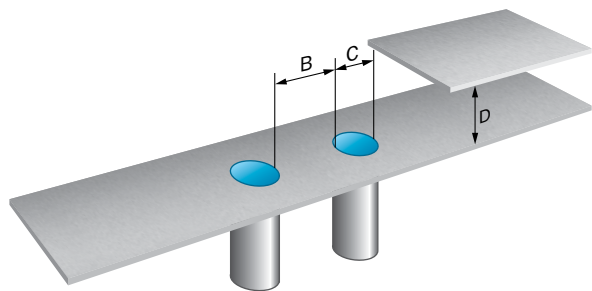
## Connection diagram

### Cd-226

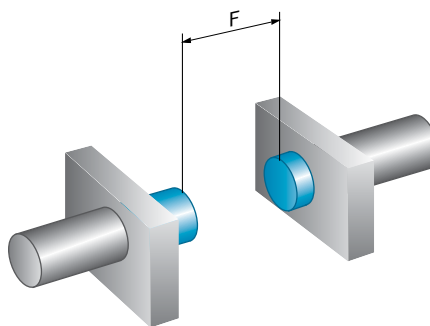


## Installation note

### Flush installation



### Opposite installation

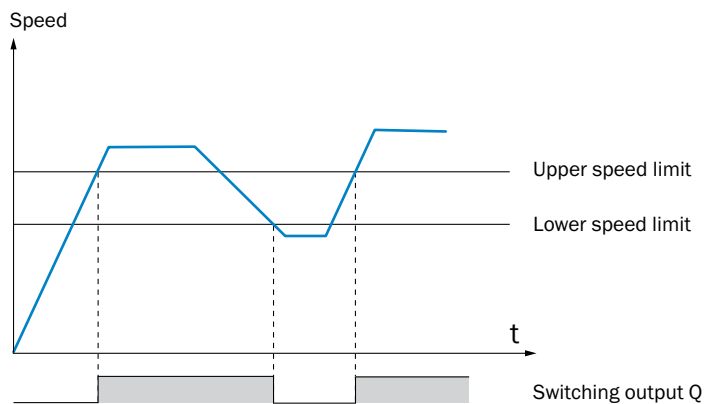


	Installation type	Electrical wiring	B	C	D	F
IMC18-07BPDZC0SA05	Bündig	DC 4-wire	18 mm	18 mm	18 mm	56 mm
IMC30-10BPDZC0SA05	Bündig	DC 4-wire	30 mm	30 mm	30 mm	80 mm

Configuration	
Operating mode	<ul style="list-style-type: none"> <li>Speed monitoring</li> <li>Acceleration monitoring</li> </ul>
Start-up delay modes	<ul style="list-style-type: none"> <li>Off</li> <li>Time delay</li> <li>Upper limit</li> </ul>
Limit values	<ul style="list-style-type: none"> <li>Upper speed limit</li> <li>Lower speed limit</li> <li>Acceleration</li> </ul>

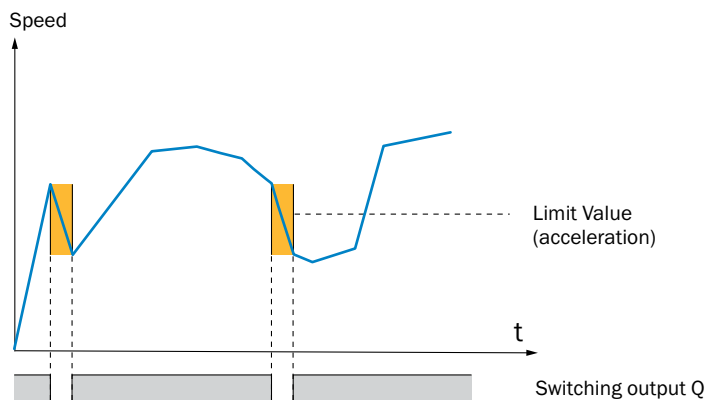
## Speed monitoring

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.

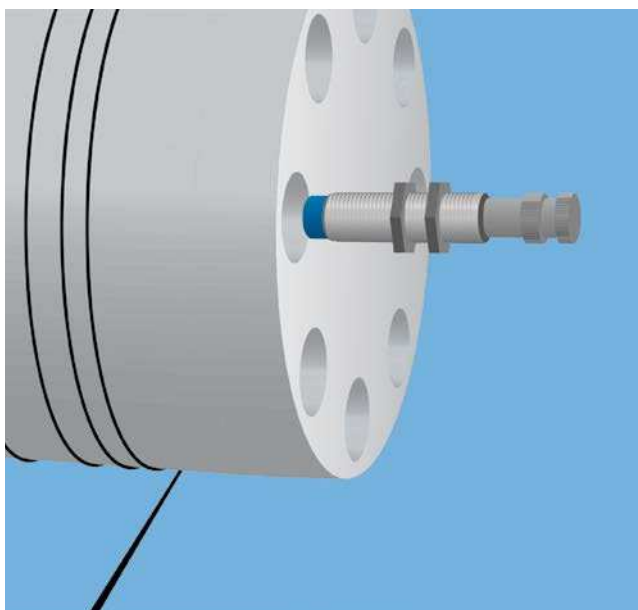
### Acceleration:

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 <sup>1)</sup>	1061790	●	●

<sup>1)</sup> 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 reinforced	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

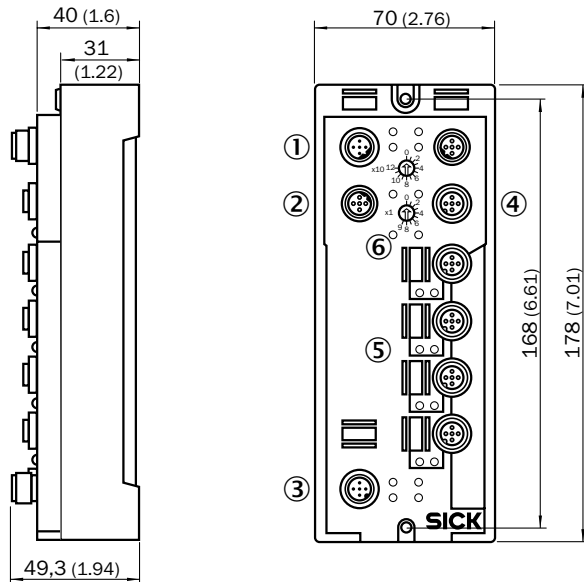
Figure	Connection type head A	Connection type head B	Model name	Part no.	SAM18	SAM30
	Female connector, M12, 4-pin, straight	Screw-type terminals	DOS-1204-G	6007302	●	●
	Female connector, M12, 4-pin, angled	Screw-type terminals	DOS-1204-W	6007303	●	●

## Dimensional drawings accessories

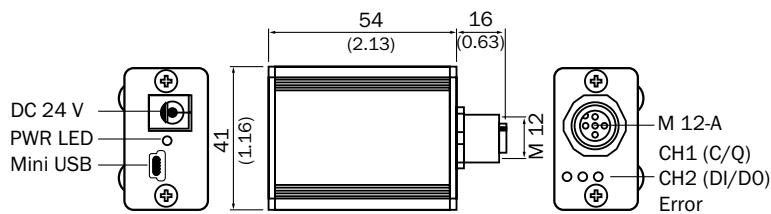
dimensions in mm (inch)

### IO-Link module

#### IOLSHPB-P3104R01

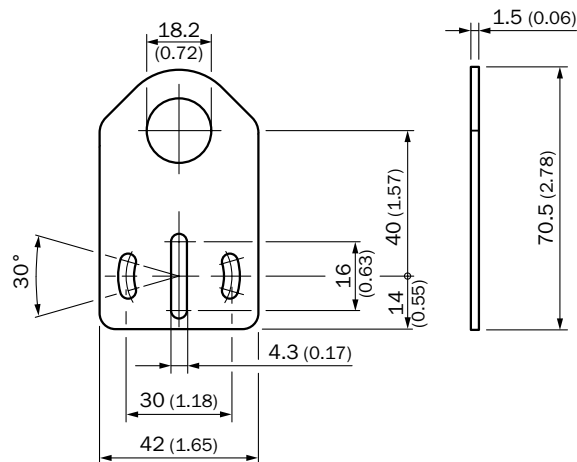


#### IOLA2US-01101

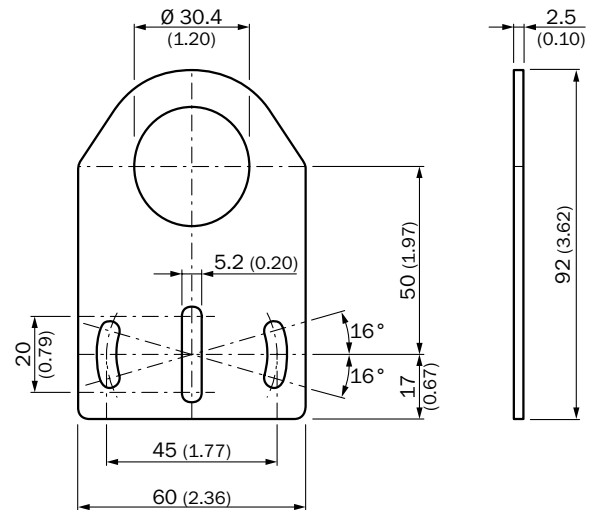


### Mounting brackets/plates

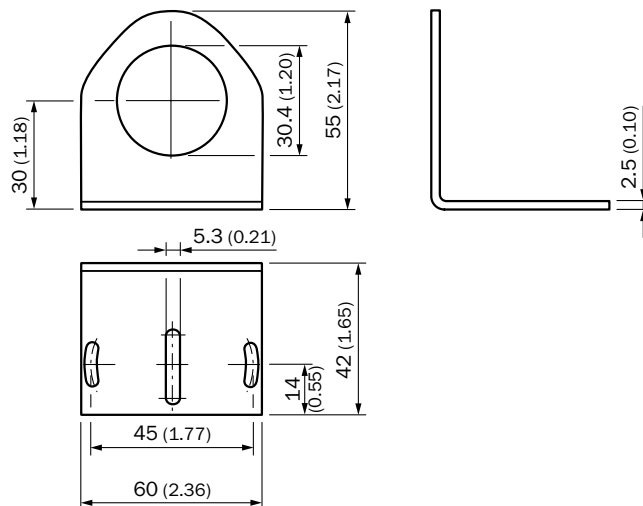
#### BEF-WG-M18



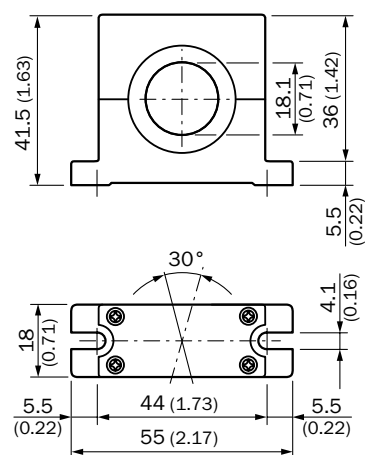
#### BEF-WG-M30



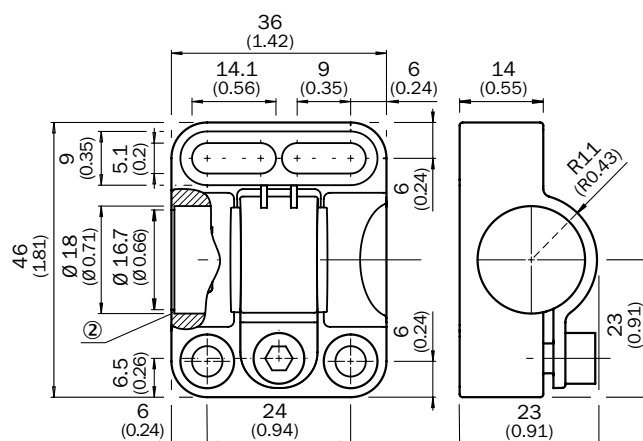
**BEF-WN-M30**



**BEF-WN-M18-ST02**



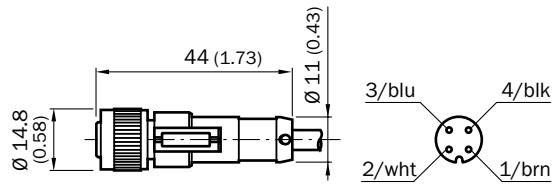
**BEF-KHF-M18**



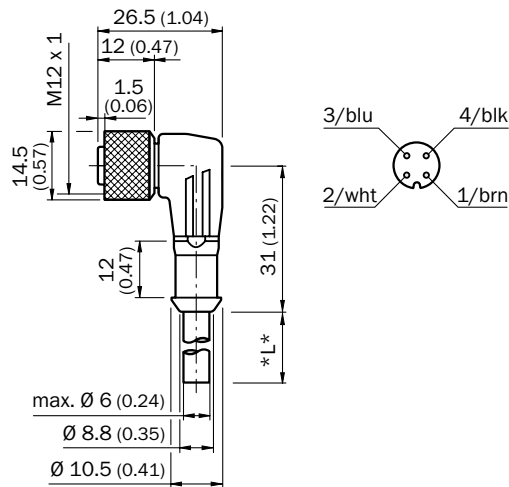
② With fixed stop

## Plug connectors and cables

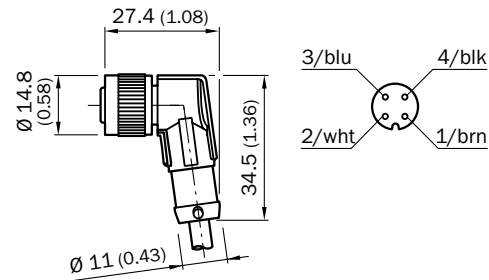
### DOL-1204-GxxM/DOL-1204-GxxMC



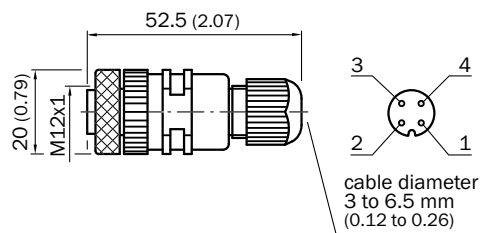
### DOL-1204-WxxM



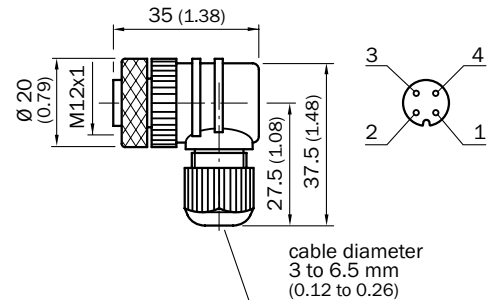
### DOL-1204-WxxMC



### DOS-1204-G

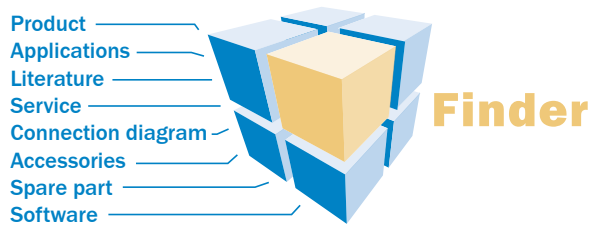


### DOS-1204-W



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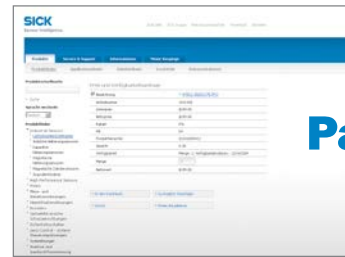


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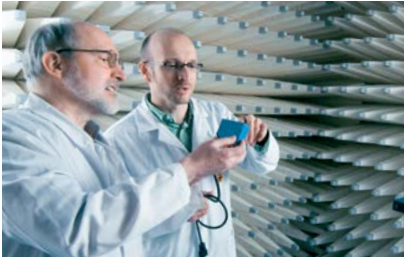
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## SICK at a glance



### 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.



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- 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



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