PRODUCT OVERVIEW

ENCODERS AND INCLINATION SENSORS

PATH-, ANGLE- AND SPEED MEASUREMENT IN PEPRFECTION

**Incremental encoders, Absolute encoders, Safety encoders,
Linear encoders, Wire draw encoders, Measurement wheel encoders,
Inclination sensors**

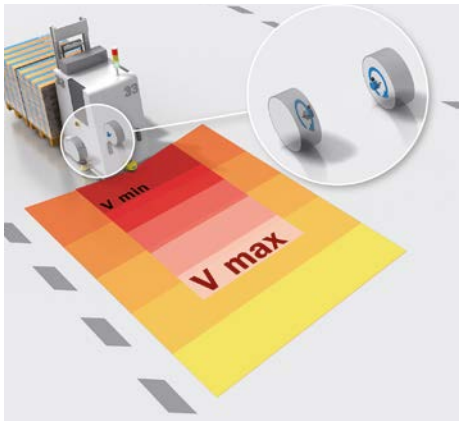
SICK
Sensor Intelligence.

ENCODERS AND INCLINATION SENSORS

Paths, position, angle – an encoder is the ideal solution when it comes to precise position detection in industrial automation.

The same applies to measuring revolutions and rpm as well as speed and acceleration. High-resolution optical encoders and extremely rugged magnetic encoders complement one another perfectly and permit exact measurements in all kinds of applications. Rotary encoders are available as incremental and absolute encoders. Wire draw encoders and linear encoders with a measuring element are available in linear measuring technology.

The range is capped off by inclination sensors that enable non-contact detection of angles in one or two axes.

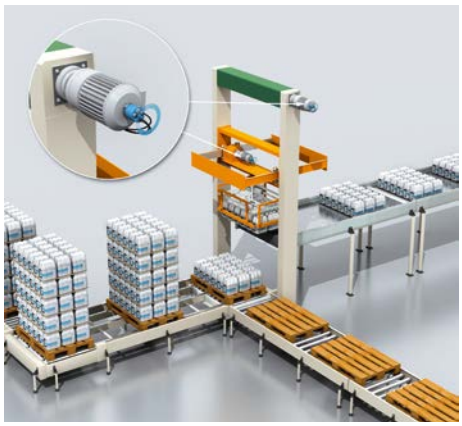


Industrial trucks and forklifts – positioning in storage and transport halls

INCREMENTAL ENCODER

Incremental encoders are used to detect speed, position, or angle. Thanks to their versatility, they are used in various applications in factory, logistics, and process automation.

The incremental encoder provides information on the direction of travel and the speed of the automated guided vehicle system (AGV system). The encoder can either be directly mounted on the motor, on an axle (see figure), or on a revolving wheel.
Solid shaft encoders are normally used in this context. The speed that is measured is used to calculate the position and to ensure the security field is observed using..


Palletizer system – positioning the gripper

ABSOLUTE ENCODER

Absolute encoders can be used in any factory and logistics automation setting, where shaft rotational movement requires absolute detection. Depending on the protocol of each interface, additional information, such as speed or diagnostic data, can also be provided.

For example, plastic bottles are stacked in multiple layers on pallets in a palletizer system. The gripper of the pallet handling machine must be positioned in the X and Y directions. An absolute encoder is used to determine the position of the gripper.
Multiturn absolute encoders with an Ethernet-based interface from the AFM60 product family can be used for this type of application. Or alternatively, you could also used an encoder with a SSI interface, such as the AFM60 SSI.

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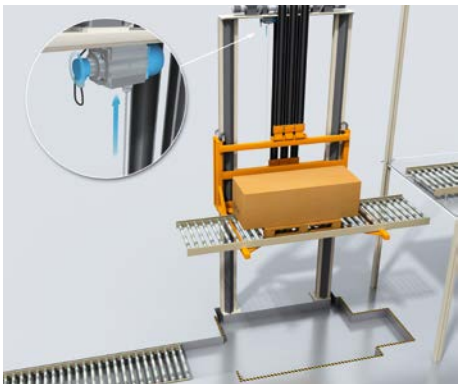
Safety functions in stationary machines

SAFETY ENCODER

Incremental encoders for functional safety generate information about position, angle, and revolution counts. When combined with a safe evaluation unit, this enables users to meet the safety function requirements set out in IEC61800-5-2. Safety encoders can be used in a variety of applications in factory and logistics automation.

Stationary machines are often equipped with mechanical solutions, such as doors or flaps, to separate the user from hazardous points. When working on machines in maintenance or setup mode, the safe speed monitor reduces the risk of injury and increases productivity. To achieve this, the machine speed is reduced and monitored for safety, enabling the operator to conduct manual work safely in the hazardous area.
The DFS60S Pro safety encoder provides information on the speed and rotational direction of the axis and enables the corresponding safety functions to be carried out.



Lifts - flush placement of platform and target level

WIRE DRAW ENCODER

Within logistics processes, such as in the automotive industry, levels often have to be passed over to continue to convey goods. Lifts are used for this purpose, and their platforms must be accurately positioned flush to the target level.

This positioning is primarily carried out with SICK wire draw encoders. The HighLine product family is suited for measuring lengths over 10 m. Through its rugged design and high reproducibility, particularly accurate positioning is possible. Like the EcoLine product family, it is suited for measuring lengths over 10 m.

Positioning the hydraulic cylinder in semi-automated work processes

LINEAR-ENCODER

Positioning the individual hydraulic cylinders of the excavator arm enables partial automation of work processes. This makes it possible to strip a slope, for example.

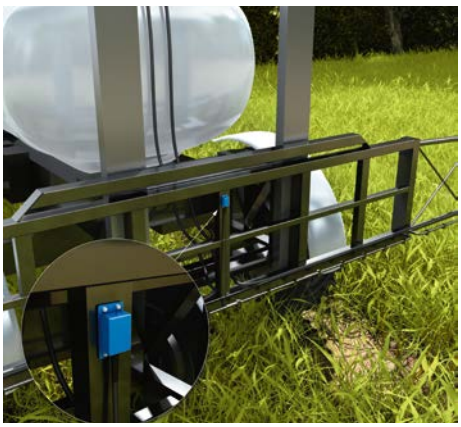
Rugged MAX linear encoders - integrated into the hydraulic cylinder of the excavator arm - first detect the actual position. The target position is then approached by the hydraulic control.

Printing machines – positioning of printed images

MEASURING WHEEL ENCODER

Measuring wheel systems use a wheel to record linear movements, which they then convert to speed or position values. These systems do not require a reference point on the surface to be measured, making them well-suited to measuring a wide range of surfaces. The integrated spring ensures that the wheel exerts a consistent pressure on the surface, thereby guaranteeing slip-free measurement.

Measuring wheel encoders detect the speed of the print media and provide key information on the correct position for the print and the quality of the printed image. Whether you require clearly legible bar codes or high resolution printed check cards, gift cards, or brochures – accurate speed monitoring ensures print quality.



Leveling of the field spray linkage

INCLINATION SENSORS

Inclination sensors take a non-contact measurement of the inclination angle of an object in relation to the earth's gravity. Thanks to the use of capacitive MEMS technology, inclination sensors are both highly precise and extremely reliable. One-dimensional sensors measure the inclination of an axis to 360°, whereas two-dimensional sensors are able to measure two axes simultaneously to ±90°.

The inclination sensors from the TMS/TMM Dynamic product family are setting new standards with respect to signal quality and response time. Thanks to an intelligent sensor fusion filter, not only are they extremely quick to respond – they are also highly precise, even when influenced by external accelerations.

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Incremental encoders	DBS36 Core	DBS50 Core	DBS60 Core	DBS60 Inox	DFS60	DFS60 Inox	DKS40	DGS34/ DGS35	DFS60S Pro
Which interface connection is required?									
TTL	■	■	■	■	■	■	■	■	
HTL	■	■	■	■	■	■	■	■	
TTL/HTL Universal			■	■	■	■			
Open Collector	■	■					■	■	
Sin/Cos					■	■			■
What is the maximum amount of space available for installation (diameter)?									
Up to 37 mm	■								
Up to 40 mm	■						■		
Up to 50 mm	■	■					■		
Up to 60 mm	■	■	■	■	■	■	■		■
Up to 90 mm	■	■	■	■	■	■	■	■	■
Which type of flange or shaft is required?									
Face mount flange	■	■	■	■	■	■	■		■
Servo flange	■		■		■	■			■
Square flange				■		■			■
Blind hollow shaft	■		■		■	■		■	■
Through hollow shaft			■		■			■	■
Measuring wheel system									
What hollow shaft diameter is required?									
Up to 6 mm				■					■
Up to 8 mm	■		■	■	■	■			■
Up to 10 mm			■	■	■	■			■
Up to 12 mm			■	■	■	■			■
Up to 14 mm				■		■			■
Up to 15 mm			■	■	■	■			■
Up to 1/2“						■			■
Up to 3/8“						■			■
Up to 5/8"			■		■	■			■
> 5/8"								■	
What resolution is required (pulses per revolution/steps per revolution)?									
Up to 2.500	■	■	■	■	■	■	■	■	
Up to 5.000			■	■	■	■		■	
Up to 8.192					■	■		■	
Up to 16.384					■	■		■	
> 16.384					■	■			
1.024 sin/cos periods					■	■			■
Should programming/configuration be performed by the customer?									
Yes, using a hand-held device					■	■			
Yes, using software and PC tool					■	■			
Yes, via RS-485					■	■			
No	■	■	■	■	■	■	■	■	■
Is a safety certificate required for the encoder?									
Yes									■
No	■	■	■	■	■	■	■	■	

Absolute encoders	Singleturn											
	ACS36	AFS60					AHS36				ARS60	
	Analog	SSI	Inox	EtherNet/IP	EtherCAT®	PROFINET	SSI	IO-Link	IO-Link Inox	CANopen	SSI	Parallel
How many revolutions are to be absolutely measured?												
≤ 1	■	■	■	■	■	■	■	■	■	■	■	■
> 1												
Which interface connection is required?												
Analog 4 ... 20 mA / Analog 0 ... 10 V	■											
Parallel												■
SSI		■	■				■				■	
SSI + incremental												
SSI + Sin/Cos												
IO-Link								■	■			
Fieldbus/Ethernet				■	■	■				■		
What is the maximum amount of space available for installation (diameter)?												
Up to 36 mm	■						■	■	■	■		
Up to 40 mm	■						■	■	■	■		
Up to 50 mm	■						■	■	■	■		
Up to 60 mm	■	■	■	■	■	■	■	■	■	■	■	■
Up to 90 mm	■	■	■	■	■	■	■	■	■	■	■	■
Which type of flange or shaft is required?												
Face mount flange		■	■	■	■	■	■	■	■	■	■	■
Servo flange	■	■	■	■	■	■	■	■	■	■	■	■
Square flange			■					■	■			
Blind hollow shaft		■	■	■	■	■	■			■	■	■
Through hollow shaft		■									■	■
What hollow shaft diameter is required?												
Up to 8 mm		■	■	■	■	■	■	■	■	■	■	■
Up to 10 mm		■	■	■	■	■	■	■	■	■	■	■
Up to 12 mm		■	■	■	■	■					■	■
Up to 15 mm		■	■	■	■	■						
Up to5/8"		■	■	■	■	■						
> 5/8"												
What resolution is required (pulses per revolution/steps per revolution)?												
1.024	[1]											
Up to 2.500	[1]	■	■	■	■	■	■	■	■	■	■	■
Up to 5.000	[1]	■	■	■	■	■	■	■	■	■	■	■
Up to 8.192	[1]	■	■	■	■	■	■	■	■	■	■	■
Up to 16.384	[1]	■	■	■	■	■	■	■	■	■	■	■
> 16.384	[1]	■	■	■	■	■					■	■
Should programming/configuration be performed by the customer?												
Yes, using a hand-held device		■	■				■					
Yes, using software and PC tool		■	■				■	■	■			
Yes, via RS-485		■	■				■					
Yes, via controller (Fieldbus, Ethernet, IO-Link Master)								■	■	■		
Yes, via a web server				■								
Yes, using the teach-in function on the encoder	■											
No	■[2]	■	■	■[2]	■[2]	■[2]	■	■[2]	■[2]	■[2]	■	■

[1] Analog resolution dependent on programmed measuring range.

[2] Encoders can in principle be programmed/configured, but can also be used with the default factory settings without configuration.

Absolute encoders	Multiturn																	
	A3M60	ACM36	ACM60	AFM60					AHM36				ATM60				ATM90	
	PROFIBUS	Analog	Analog	SSI	Inox	EtherNet/IP	EtherCAT®	PROFINET	SSI	IO-Link	IO-Link Inox	CANopen	SSI	PROFIBUS	CANopen	DeviceNet	SSI	PROFIBUS
How many revolutions are to be absolutely measured?																		
≤ 1																		
> 1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Which interface connection is required?																		
Analog 4 ... 20 mA / Analog 0 ... 10 V		■	■															
Parallel																		
SSI				■	■				■				■				■	
SSI + incremental				■	■													
SSI + Sin/Cos				■	■													
IO-Link										■	■							
Feldbus/Ethernet	■					■	■	■				■		■	■	■		■
What is the maximum amount of space available for installation (diameter)?																		
Up to 36 mm		■							■	■	■	■						
Up to 40 mm		■							■	■	■	■						
Up to 50 mm		■							■	■	■	■						
Up to 60 mm	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
Up to 90 mm	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Which type of flange or shaft is required?																		
Face mount flange	■			■	■	■	■	■	■	■	■	■	■	■	■	■		
Servo flange	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
Square flange					■						■							
Blind hollow shaft	■			■		■	■	■	■	■	■	■	■	■	■	■		
Through hollow shaft				■													■	■
What hollow shaft diameter is required?																		
Up to 8 mm	■			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Up to 10 mm	■			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Up to 12 mm	■			■	■	■	■	■					■	■	■	■	■	■
Up to 15 mm	■			■	■	■	■	■					■	■	■	■	■	■
Up to 5/8"	■																■	■
> 5/8"																	■	■
What resolution is required (pulses per revolution/steps per revolution)?																		
1.024		[1]	[1]															
Up to 2.500	■	[1]	[1]	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Up to 5.000	■	[1]	[1]	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Up to 8.192	■	[1]	[1]	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Up to 16.384	■	[1]	[1]	■	■	■	■	■	■	■	■	■						
> 16.384		[1]	[1]	■		■	■	■										
Should programming/configuration be performed by the customer?																		
Yes, using a hand-held device				■	■				■									
Yes, using software and PC tool				■	■				■	■	■		■				■	
Yes, via RS-485				■	■				■									
Yes, via controller (Fieldbus, Ethernet, IO-Link Master)	■					■	■	■				■		■	■	■		■
Yes, via a web server						■												
Yes, using the teach-in function on the encoder		■	■															
No	■[2]	■[2]	■[2]	■	■	■[2]	■[2]	■[2]	■	■[2]	■[2]	■[2]	■[2]	■[2]	■[2]	■[2]	■[2]	■[2]

[1] Analog resolution dependent on programmed measuring range.

[2] Encoders can in principle be programmed/configured, but can also be used with the default factory settings without configuration.

Wire draw encoders			
	EcoLine	Compact	HighLine
How many measuring cycles are needed?			
Up to 1.000.000	■	■	■
Unlimited			
What kind of position measurement is required?			
Absolute	■	■	■
Incremental	■	■	■
Which interface connection is required?			
TTL	■	■	■
HTL	■		■
Analog	■		■
HIPERFACE®	■ [1]	■	■ [1]
SSI	■	■	■
SSI + Sin/Cos	■ [1]		■ [1]
PROFIBUS	■		■
CANopen	■		■
DeviceNet	■		■
EtherNet/IP	■		■
PROFINET	■		■
EtherCAT®	■		■
Is a consistent mounting surface available over the measuring distance?			
Yes	■	■	■
No	■	■	■
What are the mounting tolerances like?			
Low	■	■	■
Medium	■	■	■
High			
What measuring length is required?			
≤ 4 m	■	■	■
≤ 5 m	■	■	■
≤ 10 m	■		■
≤ 50 m			■
≤ 548 m			
≤ 1.700 m			
What resolution is required?			
≤ 0,1 mm	■	■	■
≤ 0,05 mm	■	■	■
≤ 1 µm		■	
How reliable does the measuring system need to be?			
Low	■	■	■
Medium		■	■
High			■
Which installation size can be used?			
Small	■		
Medium		■	■
Large			■

[1] Available upon request.

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	Linear encoders		
	MAX48	**KH53**	**TTK70**
How many measuring cycles are needed?			
Up to 1.000.000			
Unlimited	■	■	■
What kind of position measurement is required?			
Absolute	■	■	■
Incremental			■
Which interface connection is required?			
TTL			
HTL			
Analog	■		
HIPERFACE®			■
SSI		■	■
SSI + Sin/Cos			■
PROFIBUS		■	
CANopen	■		
DeviceNet			
EtherNet/IP			
PROFINET			
EtherCAT®			
SAE J1939[9]	■		
PWM	■		
Is a consistent mounting surface available over the measuring distance?			
Yes		■	■
No			
What are the mounting tolerances like?			
Low	■	■	■
Medium	■	■	
High			
What measuring length is required?			
≤ 2,5	■		
≤ 4 m		■	■
≤ 5 m		■	
≤ 10 m		■	
≤ 50 m		■	
≤ 548 m		■	
≤ 1.700 m		■	
What resolution is required?			
≤ 0,1 mm	■	■	
≤ 0,05 mm			
≤ 1 µm			■
How reliable does the measuring system need to be?			
Low		■	■
Medium	■	■	■
High	■	■	
Which installation size can be used?			
Small			■
Medium	■		
Large		■	

Incremental encoders				
	DUV60	DBV50 Core	DKV60	DFV60
Which interface connection is required?				
TTL		■	■	■
HTL		■	■	■
TTL/HTL Universal	■			■
Open Collector		■		
Sin/Cos				
What is the maximum amount of space available for installation (diameter)?				
Up to 37 mm				
Up to 40 mm				
Up to 50 mm				
Up to 60 mm				
Up to 90 mm				
Which type of flange or shaft is required?				
Face mount flange				
Servo flange				
Blind hollow shaft				
Through hollow shaft				
Measuring wheel system	■	■	■	■
What hollow shaft diameter is required?				
Up to 8 mm				
Up to 10 mm				
Up to 12 mm				
Up to 15 mm				
Up to 5/8"				
> 5/8"				
What resolution is required (pulses per revolution/steps per revolution)?				
Up to 2.400	■			
Up to 2.500		■	■	■
Up to 5.000				■
Up to 8.192				■
Up to 16.384				■
> 16.384				■
1.024 sin/cos periods				
Should programming/configuration be performed by the customer?				
Yes, using a hand-held device				■
Yes, using software and PC tool				■
Yes, via RS-485				■
Yes, via DIP switch	■			
No		■	■	■

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	Inclination sensors					Dynamic inclination sensors	
	TMM55	TMS61	TMM61	TMS88	TMM88	TMS88 Dynamic	TMM88 Dynamic
On how many axes should the measurement take place?							
1		■		■		■	
2	■		■		■		■
How to measure?							
permanently	■	■	■	■	■		
dynamic						■	■
Should access to sensor raw data be possible?							
Yes						■	■
No	■	■	■	■	■	■	■
Which interface connection is required?							
0...10 V	■			■	■		
4....20 mA	■			■	■		
CANopen		■	■	■	■	■	■
SAE J1939						■	■
Which housing material is required?							
Plastic	■	■	■	■	■	■	■
Aluminum				■	■	■	■
Should programming/configuration be performed by the customer?							
Yes, using a hand-held device		■	■	■	■	■	■
No	■	■	■	■	■	■	■
Which size for installation can be used?							
Small	■						
Medium		■	■				
Large				■	■	■	■

			
	DBS36 Core	**DBS50 Core**	
	The MultiFit Incremental Encoder	The MultiFit Incremental Encoder	
Technical data overview			
Number of lines/ pulses from to	10 ... 2.500	10 ... 2.500	
Mechanical design	Blind hollow shaft Solid shaft, face mount flange Solid shaft, with key seat, servo flange	Solid shaft, face mount flange	
Electrical interface	4,5 ... 5,5 V, TTL/RS422 7 ... 30 V, TTL/RS422 7 ... 30 V, HTL/Push pull 7 ... 27 V, HTL/Push pull, 3 channel 4,5 ... 5,5 V, Open Collector NPN, 3 channel 4,5 ... 30 V, Open Collector NPN, 3 channel	4,5 ... 5,5 V, TTL/RS422 7 ... 30 V, TTL/RS422 7 ... 30 V, HTL/Push pull 7 ... 27 V, HTL/Push pull, 3 channel 4,5 ... 5,5 V, Open Collector NPN, 3 channel 4,5 ... 30 V, Open Collector NPN, 3 channel	
Permissible shaft loading (solid shaft)	20 N (axial) 40 N (radial)	30 N (axial) 50 N (radial)	
Enclosure rating up to	IP65	IP65	
Programmable	–	–	
Maximum output frequency	≤ 300 kHz	≤ 300 kHz	
Ambient temperature	–20 °C ... +85 °C –20 °C ... +70 °C	–20 °C ... +85 °C –20 °C ... +70 °C	
At a glance			
	• Connection with universal cable outlet • Designs with blind hollow shaft or face mount flange with solid shaft • Face mount flange with 6 mounting hole patterns and servo groove • Hollow shaft with universal stator coupling • Compact housing diameter of 37 mm with compact construction depth, • Electrical interfaces: TTL/RS422, HTL/Push pull and Open Collector NPN • Number of lines: 10 to 2,500 • Temperature range: –20 °C ... +85 °C • Enclosure rating: IP65	• Connection with universal cable outlet • Face mount flange with 8 mm solid shaft • Face mount flange with 2 mounting hole patterns and servo groove • Compact housing diameter of 37 mm with compact construction depth, flange diameter 50 mm • Various electrical interfaces: TTL/RS422, HTL/Push pull and Open Collector NPN • Number of lines from 10 to 2,500 possible • Temperature range: –20 °C ... +85 °C • Enclosure rating: IP65	
Detailed information	➜ www.sick.com/DBS36_Core	➜ www.sick.com/DBS50_Core	

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	DBS60 Core	DBS60 Inox
		
	Rugged, versatile incremental encoder for industrial applications	Rugged incremental encoder made of stainless steel for challenging application conditions
	4 ... 5.000 6.000 ... 10.000	4 ... 5.000
	Blind hollow shaft Through hollow shaft Through hollow shaft, rear clamping Solid shaft, face mount flange Solid shaft, servo flange	Blind hollow shaft Solid shaft, face mount flange Solid shaft, square flange
	4,5 V ... 5,5 V, TTL/RS422 4,5 V ... 30 V, TTL/RS422 10 V ... 30 V, TTL/RS422 10 V ... 27 V, HTL/Push pull 4,5 V ... 30 V, TTL/HTL universal	4,5 V ... 5,5 V, TTL/RS422 10 V ... 30 V, TTL/RS422 10 V ... 27 V, HTL/Push pull 4,5 V ... 30 V, TTL/HTL universal
	50 N (axial) 100 N (radial)	40 N (axial) 80 N (radial)
	IP65/ IP67	IP67
	–	–
	≤ 300 kHz	≤ 300 kHz
	–20 °C ... +85 °C –30 °C ... +100 °C –30 °C ... +85 °C	–20 °C ... +85 °C –30 °C ... +100 °C –30 °C ... +85 °C
	• Face mount and servo flange with various hole patterns • Hollow shafts up to 5/8 inches in diameter, optionally insulated, front and rear clamping • Housing diameter 58 mm, compact installation depth • Number of lines up to 10,000 pulses • Cable connection, M12 and M23 male connector, radial • TTL/HTL and TTL interfaces with voltage range 4.5 V DC ... 30 V DC	• Housing, flange, and shaft made from stainless steel • Enclosure rating IP67 thanks to shaft sealing ring • Designs with blind hollow shaft as well as face mount or square flange with solid shaft • Number of lines of up to 5,000 pulses • Radial cable connection or M12 male connector • TTL/RS422 and HTL Push Pull, universal TTL/HTL interface with 4.5 ... 30 VDC
	→ www.sick.com/DBS60_Core	→ www.sick.com/DBS60_Inox

	 **DFS60**	 **DFS60 Inox**
	High-resolution, programmable encoder for sophisticated applications	High-resolution incremental encoder – durable and programmable
Technical data overview		
Number of lines/ pulses from to	100 ... 2.048 1 ... 10.000 1 ... 65.536	1 ... 65.536
Mechanical design	Blind hollow shaft Through hollow shaft Solid shaft, face mount flange Solid shaft, servo flange	Blind hollow shaft Solid shaft, servo flange Solid shaft, face mount flange Solid shaft, square flange
Electrical interface	4,5 V ... 5,5 V, TTL/RS422 10 V ... 32 V HTL/Push pull 10 V ... 32 V, TTL/RS422 4,5 V ... 32 V, HTL/Push pull, 0-Set 4,5 V ... 32 V, TTL/RS422, 0-Set 4,5 V ... 32 V, TTL/HTL programmable 4,5 V ... 32 V, TTL/HTL programmable, 0-Set 4,5 V ... 5,5 V, Sin/Cos 1,0 V_{SS}	4,5 V ... 5,5 V, TTL/RS422 10 V ... 32 V, TTL/RS422 10 V ... 32 V, HTL/Push pull 4,5 V ... 5,5 V, Sin/Cos 1,0 V_{SS} 4,5 V ... 32 V, TTL/RS422, 0-SET 4,5 V ... 32 V, HTL/Push pull, 0-SET 4,5 V ... 32 V, TTL/HTL programmable 4,5 V ... 32 V, TTL/HTL programmable, 0-SET
Permissible Load capacity of shaft (Solid shaft)	40 N (axial) 80 N (radial)	40 N (axial) 80 N (radial)
Enclosure rating up to	IP65/ IP67	IP67
Programmable	– / ✔	– / ✔
Maximum output frequency	≤ 200 kHz ... ≤ 820 kHz	≤ 820 kHz / ≤ 200 kHz
Ambient temperature	0 °C ... +85 °C –40 °C ... +100 °C –30 °C ... +100 °C	–40 °C ... +100 °C –30 °C ... +100 °C
At a glance		
	• Compact installation depth • High resolution up to 16 bits • Optionally programmable: Output voltage, zero pulse position, zero pulse width and number of pulses • Connection: Radial or axial cable outlet, M23 or M12 connector, axial or radial • Electrical interfaces: 5V & 24V TTL/RS422, 24 V HTL/Push pull • Mechanical interfaces: face mount or servo flange, blind or through hollow shaft • Remote zero set possible	• Housing, flange, and shaft made from stainless steel • Face mount flange, servo flange, or square flange with solid shaft and blind hollow shaft • IP67 enclosure rating • Resolution up to 65,536 pulses • Radial cable outlet or M12 male connector • Electrical interfaces: TTL/RS422, HTL/ Push Pull, SinCos 1 Vpp • Can be programmed with the PGT-08-S and PGT-10-Pro as an option
Detailed information	➜ www.sick.com/DFS60	➜ www.sick.com/DFS60_Inox

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	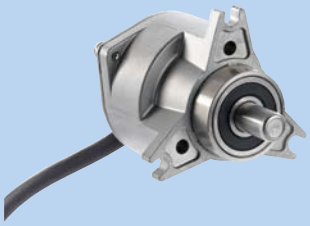 **DKS40**	 **DGS34/DGS35**
	Rugged, high-performance incremental encoder	Large hollow shaft encoders for rough environmental conditions
	1 ... 2.048	120 ... 16.384
	Solid shaft, face mount flange	Blind hollow shaft Through hollow shaft
	4,5 ... 5,5 V, TTL/RS422, 6 channel 10 ... 30 V, HTL/Push pull, 6 channel 4,5 ... 5,5 V, Open Collector NPN, 3 channel 10 ... 30 V, Open Collector NPN, 3 channel	5 V, TTL 5 ... 15 V, HTL/TTL 8 ... 24 V, HTL
	40 N (axial) 20 N (radial)	–
	IP64	IP66
	–	
	≤ 50 kHz / ≤ 200 kHz	≤ 600 kHz
	0 °C ... +60 °C	–20 °C ... +70 °C
	• Compact housing • Durable, low-cost design • Interfaces: Open collector NPN, TTL/RS422 or HTL/Push pull • Connection via cable outlet, for radial or axial use with open ends or fitted with an M12 connector • Face mount flange with solid shaft • Housing for simple clamping ring mounting • Any line count possible from 1 to 2,048	• Incremental encoder Ø 3.5“ • Number of lines: 120 ... 16.384 • Electrical interface: TTL/RS422, HTL/Push pull, Open Collector • Blind hollow shaft Ø 30 mm: 1”, ½”,5/8”, ¾”, 7/8” • Connection type cable 1 m, 1,5 m, 3 m, 5 m, 10 m
	➜ www.sick.com/DKS40	➜ www.sick.com/DGS34 www.sick.com/DGS35

	 **AHS/AHM36 SSI**	 **AHS/AHM36 IO-Link**	
	Flexible, smart, compact	Flexible, smart, compact: Encoders for countless fields of application	
Technical data overview			
Encoder version	Absolute Singleturn / Absolute Multiturn	Absolute Singleturn / Absolute Multiturn	
Communication interface	SSI	IO-Link	
Communication interface detail	–	V1.1, COM3 (230,4 kBaud)	
Mechanical design / shaft diameter	Blind hollow shaft Solid shaft, face mount flange Solid shaft, servo flange	Blind hollow shaft Solid shaft, face mount flange Solid shaft, servo flange	
Max. resolution (singleturn, multiturn)	Up to a maximum of 14-bit singleturn and 12-bit multiturn	Up to a maximum of 12-bit singleturn and 12-bit multiturn	
Connection type	Male connector Cable universal	Male connector Cable universal	
Programmable/configurable	Over handheld programming tool, over SOPAS	Over PLC-Engineering-Tool, over SOPAS	
Smart Sensor	–	Efficient Communication Enhanced Sensing	
At a glance			
	• Compact 36 mm absolute encoder with max. 26 bits (singleturn: 14 bits, multiturn: 12 bits) • Face mount flange, servo flange, blind hollow shaft • Rotatable M12 connector or rotatable cable outlet • SSI interface • Programmable SSI version: Resolution, preset value, etc. can be programmed (depending on the type) • Protection class up to IP67 (depending on the type) • Operating temperature: –40 °C ... +100 °C (depending on the type)	• Compact 36 mm absolute encoder with maximum 24 bits (AHM36) or 12 bits (AHS36) • Face mount flange, servo flange, blind hollow shaft • Rotatable M12 male connector or cable connection • Process data communication via IO-Link • Configuration via IO-Link or SOPAS • IP65 enclosure rating • Operating temperature range: –20 °C ... +70 °C	
Detailed information	→ www.sick.com/AHS_AHM36_SSI	→ www.sick.com/AHS_AHM36_IO-Link	

	 **AHS/AHM36 IO-Link Inox**	 **AHS/AHM36 CANopen**
	Resistant, smart, compact: Encoders for harsh environments	Flexible, smart, compact
	Absolute Singleturn / Absolute Multiturn	Absolute Singleturn / Absolute Multiturn
	IO-Link	CANopen
	V1.1, COM3 (230,4 kBaud)	–
	Blind hollow shaft Solid shaft, face mount flange Solid shaft, servo flange	Blind hollow shaft Solid shaft, face mount flange Solid shaft, servo flange
	Up to a maximum of 14-bit singleturn and 12-bit multiturn	Up to a maximum of 14-bit singleturn and 12-bit multiturn
	Male connector Cable universal	Male connector Cable universal
	Over PLC-Engineering-Tool, over SOPAS	Over handheld programming tool, over PLC-Engineering-Tool
	Efficient Communication Enhanced Sensing	–
	• Compact 36 mm absolute encoder with maximum 26 bits (AHM36) or 14 bits (AHS36) • Housing, flange, shaft made of stainless steel 1.4305 • IP69 enclosure rating • Face mount flange, servo flange, blind hollow shaft • M12 male connector or cable connection • Configuration and process data communication via IO-Link • Operating temperature range: –40 °C ... +85 °C	• Compact 36 mm absolute encoder with max. 26 bits (singleturn: 14 bits, multiturn: 12 bits) • Face mount flange, servo flange, blind hollow shaft • Rotatable M12 connector or rotatable cable outlet • CANopen interface with programmable configuration • Diagnostic functions: temperature, operating time, etc. (depending on the type) • Protection class up to IP 67 (depending on the type) • Operating temperature: –40 °C ... +85 °C (depending on the type)
	→ www.sick.com/AHS_AHM36_IO-Link_Inox	→ www.sick.com/AHS_AHM36_CANopen

			
	AFS/AFM60 SSI	**AFS/AFM60 Inox**	
	Precise, flexible, versatile	Resistant, precise, programmable	
Technical data overview			
Encoder version	Absolute Singleturn / Absolute Multiturn	Absolute Singleturn / Absolute Multiturn	
Communication interface	SSI	SSI	
Communication interface detail	SSI + incremental SSI + Sin/Cos	SSI + incremental SSI + Sin/Cos	
Mechanical design / shaft diameter	Blind hollow shaft Through hollow shaft Solid shaft, face mount flange Solid shaft, face mount flange with servo slot	Blind hollow shaft Solid shaft, face mount flange Solid shaft, servo flange Solid shaft, square flange	
Max. resolution (singleturn, multiturn)	Up to a maximum of 18-bit singleturn and 12-bit multiturn	Up to a maximum of 18-bit singleturn and 12-bit multiturn	
Connection type	Male connector radial Cable radial Cable universal	Male connector radial Cable radial	
Programmable/configurable	Over handheld programming tool, over SOPAS	Over handheld programming tool	
Smart Sensor	–	–	
At a glance			
	• High-resolution absolute encoder with up to 30 bits (AFM60) or 18 bits (AFS60) • Face mount flange, servo flange, blind hollow shaft or through hollow shaft • SSI, SSI + incremental or SSI + Sin/Cos interface • Resolution, offset, etc. can be programmed (depending on the type) • Connectivity: M12 or M23 male connector or cable outlet • Enclosure rating: IP67 (housing), IP65 (shaft) • Operating temperature: –40 °C ... +100 °C (depending on the type)	• Housing, flange, and shaft made from stainless steel • Face mount, servo, or square flange with solid shaft and blind hollow shaft • Enclosure rating: IP67 • Resolution: up to 262,144 steps per revolution and 4,096 revolutions • Electrical interfaces: SSI, SSI + Incremental, SSI + Sin/Cos • Can be optionally programmed with PGT-08-S and PGT-10-Pro	
Detailed information	**→ www.sick.com/AFS_AFM60_SSI**	**→ www.sick.com/AFS_AFM60_Inox**	

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	 **AFS/AFM60 PROFINET**	 **AFS/AFM60 EtherNet/IP**
	Intelligent, powerful, precise	Intelligent, powerful, precise
	Absolute Singleturn / Absolute Multiturn	Absolute Singleturn / Absolute Multiturn
	PROFINET	EtherNet/IP™
	–	–
	Blind hollow shaft Solid shaft, face mount flange Solid shaft, servo flange	Blind hollow shaft Solid shaft, face mount flange Solid shaft, servo flange
	Up to a maximum of 18-bit singleturn and 12-bit multiturn	Up to a maximum of 18-bit singleturn and 12-bit multiturn
	Male connector axial	Male connector axial
	Over PLC-Engineering-Tool	Over web server, over PLC-Engineering-Tool
	• High-resolution 30-bit absolute encoder (18-bit singleturn and 12-bit multiturn) • Face mount flange, servo flange and blind hollow shaft • Connection type: 3 x M12 axial male connector • PROFINET-IO-RT interface • Less than 5 ms data update time • Round axis functionality • Alarms, warnings and diagnostics functions for speed, position, temperature, operating time, etc. • Status display via 5 LEDs	• High-resolution, 30-bit absolute encoder • Integrated web server and FTP server • DLR (Device Level Ring) • Function module • Comprehensive diagnostic functions • IP addressing via software or hard-ware • Round axis functionality (transmission calculation)
	➜ www.sick.com/AFS_AFM60_PROFINET	➜ www.sick.com/AFS_AFM60_EtherNet_IP

		
	AFS/AFM60 EtherCAT®	**A3M60 PROFIBUS**
	Intelligent, powerful, precise	Compact, robust, powerful
Technical data overview		
Encoder version	Absolute Singleturn / Absolute Multiturn	Absolute Multiturn
Communication interface	EtherCAT®	PROFIBUS DP
Communication interface detail	CoE (CAN over EtherCAT®)	DPV0
Mechanical design / shaft diameter	Blind hollow shaft Solid shaft, face mount flange Solid shaft, servo flange	Blind hollow shaft Solid shaft, face mount flange Solid shaft, servo flange
Max. resolution (singleturn, multiturn)	Up to a maximum of 18-bit singleturn and 12-bit multiturn	Up to a maximum of 14-bit singleturn and 17-bit multiturn
Connection type	Male connector axial	Male connector axial
Programmable/configurable	Over PLC-Engineering-Tool	Over PLC-Engineering-Tool
At a glance		
	• High-resolution 30-bit absolute encoder (18-bit singleturn and 12-bit multiturn) • Face mount flange, servo flange and blind hollow shaft • Connection type: 3 x M12 axial connector • Data transfer speed „ on the fly“ in the range of µs • EtherCAT® interface CoE (CiA DS-301) Device profile (CiA DS-406) • Round axis functionality • Alarms, warnings and diagnostics functions for speed, position, temperature, operating time, etc. • Status display via 5 LEDs • Up to 16 adjustable electronic cam switches	• Rugged absolute multiturn encoder with up to 31 bits (14-bit singleturn and 17-bit multiturn) • Face mount flange, servo flange or blind hollow shaft • Compact design (<70 mm) • Integrated PROFIBUS interface with DP V0, V1, and V2 functionality (depending on type) • Connectivity: 3 x M12 male connector • Protection class up to IP67 • Operating temperature: –30 ... +80 °C (depending on type)
Detailed information	➜ www.sick.com/AFS_AFM60_EtherCAT	➜ www.sick.com/A3M60_PROFIBUS

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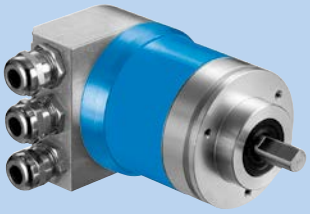
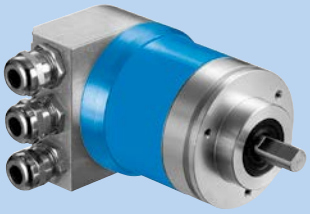
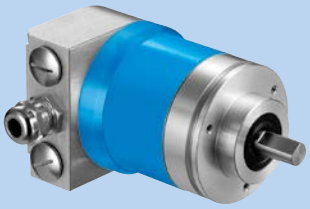
		
ATM60 PROFIBUS	**ATM60 SSI**	**ATM60 CANopen**
Reliable, established and modular	Reliable, established and modular	Reliable, established and modular
Absolute Multiturn	Absolute Multiturn	Absolute Multiturn
PROFIBUS DP	SSI	CANopen
DPV0	–	–
Blind hollow shaft Solid shaft, face mount flange Solid shaft, servo flange	Blind hollow shaft Solid shaft, face mount flange Solid shaft, servo flange	Blind hollow shaft Solid shaft, face mount flange Solid shaft, servo flange
Up to a maximum of 13-bit singleturn and 13-bit multiturn	Up to a maximum of 13-bit singleturn and 13-bit multiturn	Up to a maximum of 13-bit singleturn and 13-bit multiturn
Connection adapter for PROFIBUS	Male connector radial Cable radial	Connection adapter for CANopen
Over PLC-Engineering-Tool	Over programming tool	Over PLC-Engineering-Tool
• Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits • Mechanical interface: face mount flange, servo flange, blind hollow shaft, and extensive adapter accessories • Zero-set and preset functions via hardware or software • No battery required • Electrical interface: PROFIBUS DP as per IEC61158 / RS 485 , electrically isolated. • Electronically adjustable, configurable resolution • Magnetic scanning	• Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 25 bits • Mechanical interface: face mount flange, servo flange, blind hollow shaft, and extensive adapter accessories • Zero-set and preset functions via hardware or software • Electrical interface: SSI with gray or binary code type • Electronically adjustable, configurable resolution • Round axis functionality (optional) also for non-binary resolutions (per revolution) and decimal numbers (number of revolutions) • Magnetic scanning	• Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits • Mechanical interface: face mount, servo flange, blind hollow shaft, adapter accessories • Zero-set and preset functions via hardware/software • No battery • Electrical interface: CAN specification 2. 0B, electrically isolated, DS 301, V4.01, DSP 406, V2.0, Class 2 • Electronically adjustable, configurable resolution • Network status info via duo LED • Magnetic scanning
→ www.sick.com/ATM60_PROFIBUS	→ www.sick.com/ATM60_SSI	→ www.sick.com/ATM60_CANopen

			
	ATM60 DeviceNet	**ATM90 SSI**	
	Reliable, established and modular	Reliable, established and modular	
Technical data overview			
Encoder version	Absolute Multiturn	Absolute Multiturn	
Communication interface	DeviceNet™	SSI	
Communication interface detail	–	–	
Mechanical design / shaft diameter	Blind hollow shaft Solid shaft, face mount flange Solid shaft, servo flange	Through hollow shaft	
Max. resolution (singleturn, multiturn)	Up to a maximum of 13-bit singleturn and 13-bit multiturn	Up to a maximum of 12-bit singleturn and 12-bit multiturn	
Connection type	Connection adapter for DeviceNet	Male connector radial Cable radial	
Programmable/configurable	Over PLC-Engineering-Tool	Over programming tool	
At a glance			
	• Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits • Mechanical interface: face mount, servo flange, blind hollow shaft, and adapter accessories • Zero-set and preset functions via hardware/ software • No battery • Electrical interface: CAN/DeviceNet specification 2.0B, electrically isolated, device profile: Generic [0] • Electronically adjustable, configurable resolution • Network status info via duo LED • Magnetic scanning	• Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits • Mechanical interface: through hollow shaft with shallow installation depth • Zero-set and preset functions via hardware or software • No battery required • Electrical interface: SSI with gray or binary code type • Electronically adjustable, configurable resolution • Magnetic scanning	
Detailed information	→ www.sick.com/ATM60_DeviceNet	→ www.sick.com/ATM90_SSI	

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	ATM90 PROFIBUS	**ARS60 SSI/Parallel**
	Reliable, established and modular	Reliable and established
	Absolute Multiturn	Absolute Singleturn
	PROFIBUS DP	SSI / parallel data world
	DPV0	–
	Through hollow shaft	Blind hollow shaft Through hollow shaft Solid shaft, face mount flange Solid shaft, servo flange
	Up to a maximum of 13-bit singleturn and 13-bit multiturn	Up to a maximum of 13-bit
	Male connector radial PG radial	Male connector radial Male connector axial Cable radial Cable axial
	Over PLC-Engineering-Tool	–
	• Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits • Mechanical interface: through hollow shaft with shallow installation depth • Zero-set and preset functions via hardware or software • No battery required • Electrical interface: PROFIBUS DP as per IEC61158 / RS485 , electrically isolated. • Electronically adjustable, configurable resolution • Magnetic scanning	• Absolute singleturn encoder • Resolution: up to 13 bits (32,768 increments) • Electrical interface: SSI with gray code type or gray capped • Electrical interface: Parallel with gray, gray capped, binary, BCD code type • Zero-set function • Mechanical interfaces: face mount flange, servo flange, blind and through hollow shaft • Enclosure rating: Up to IP66
	→ www.sick.com/ATM90_PROFIBUS	→ www.sick.com/ARS60_SSI_Parallel

		
	ACS/ACM36	**ACM60**
	Compact, universal, intuitive	Compact, universal, intuitive
Technical data overview		
Encoder version	Absolute Singleturn / Absolute Multiturn	Absolute Multiturn
Communication interface	Analog	Analog
Communication interface detail	Current / Voltage	Current / Voltage
Mechanical design / shaft diameter	Solid shaft, servo flange	Solid shaft, servo flange
Max. resolution (singleturn, multiturn)	5,4 ... 40,2 µA 2,7 ... 25,1 mV 5,2 µA 2,7 mV	1,5 ... 8,8 µA
Connection type	Cable radial	Male connector radial
Programmable/configurable	Via keypad on the encoder	Via keypad on the encoder
At a glance		
	• Compact 36 mm absolute encoder with up to 3723 steps (for singleturn and multiturn) • Servo flange • Radial cable outlet • Analog interface 4 to 20 mA or 0 to 10 V • Programming via keypad on the encoder • IP65 protection class • Operating temperature: –30 °C ... +80 °C	• Compact 60 mm absolute encoder with up to 13107 steps • Servo flange • Radial connector outlet • Analog interface 4 to 20 mA or 0 to 10 V • Programming via keypad on the encoder • IP68 protection class • Operating temperature: –30 °C ... +80 °C
Detailed information	**➜ www.sick.com/ACS_ACM36**	**➜ www.sick.com/ACM60**

DFS60S Pro

Safe, easy, flexible: Encoders for functional safety

Technical data overview	
Safety integrity level	SIL2 (IEC 61508), SILCL2 (IEC 62061)
Performance level	PL d (EN ISO 13849)
Category	3 (EN ISO 13849)
Encoder interface	4,5 V ... 32 V, SinCos 1,0 V_{ss} (differential)
Connection type	Male connector radial Male connector axial Cable universal
Operating temperature range	–30 °C ... +95 °C
Enclosure rating	IP65 (IEC 60529)

At a glance

- Encoders for functional safety technology: SIL2 (IEC 61508), SILCL2 (EN 62061), PL d (EN ISO 13849)
- Electrical interface: 4.5 V ... 32 V, sine/cosine 1 VPP, 1,024 periods
- Clamping flange or servo flange, blind hollow shaft or through hollow shaft (assembly options with feather key)
- Universal cable outlet, M23 or M12 male connector, axial or radial
- Enclosure rating: IP 65
- Working temperature range: –30°C ... +95°C (depending on type)

Detailed information → www.sick.com/DFS60S_Pro

EcoLine

Modular wire draw encoder in miniature design

Technical data overview	
Sub product family	BCG / PFG
Measuring length	≤ 10 m
Resolution	0,001 mm ... 0,14 mm
Repeatability	≤ 0,2 mm ... ≤ 1 mm
Electrical interface	4 mA ... 20 mA, Analog 0 V ... 10 V, Analog 4,5 V ... 5,5 V, TTL/RS422 4,5 V ... 32 V, TTL/HTL programmable 4,5 V ... 32 V, TTL/HTL programmable, as factory setting customized preprogrammed to HTL
Modularity (wire draw mechanism and encoder)	✔

At a glance

- Measured lengths: 1.25 m ... 10 m
- Modular measuring system with a wide selection of interfaces/measuring lengths
- Very small, slim housing (55 mm ... 190 mm) with spring integrated in the measurement drum
- Light yet shock-proof and temperature-resistant plastic housing
- Analog interface with teach-in function at the encoder

Detailed information → www.sick.com/EcoLine

	Compact	HighLine
		
	Compact	**HighLine**
	Compact design - with integrated encoder	Measuring lengths up to 50 m, rugged design - the heavy-duty wire draw encoder
	BKS XKS PKS	BTF / PRF
	≤ 5 m	≤ 50 m
	–	0,001 mm ... 0,4 mm
	–	≤ 0,2 mm ... ≤ 5 mm
	4,5 V ... 12 V, SSI, HIPERFACE®, TTL/RS422	4 mA ... 20 mA, Analog 0 V ... 10 V, Analog 4,5 V ... 5,5 V, TTL/RS422 10 V ... 32 V, TTL/Push pull 10 V ... 32 V, HTL/Push pull
	–	✔
	• Measuring lengths from 2 m ... 5 m • Integrated measuring system • Compact housing (90 mm x 90 mm x 90 mm) • Incremental and absolute versions • High resolution	• Measuring lengths: 2 m ... 50 m • Modular measuring system with a wide selection of interfaces/measuring lengths • Very rugged system (dirt scraper, integrated brushes) • High-quality winding mechanism and wire input • High enclosure rating • High shock and vibration resistance • Extremely high resolution possible • Expandable using external accessories
	➜ www.sick.com/Compact	➜ www.sick.com/HighLine

MAX48

Integrated cylinder position measurement for mobile machines

Technical data overview	
Measuring range	50 mm ... 2.500 mm
Measuring length	–
Resolution	Typ. 0,1 mm (noise-free)
Repeatability	–
Electrical interface	Analog Digital CANopen SAE J1939 PWM Analog, CANopen, SAE J1939
Connection type	Male connector with cable Cable Without cable
Enclosure rating	IP67 (EN 60529)

At a glance

- Measuring range: 50 to 2,500 mm (1 mm steps), typical resolution 0.1 mm
- Analog, CANopen, SAE J1939 and PWM interfaces are available
- Pressure-resistant housing, designed for hydraulic operating pressure of up to 400 bar
- High operating temperature (electronics) up to +105 °C
- Fluid temperature (hydraulic oil) up to max. +95 °C
- Compact dimensions: 10 mm installation space, 30 mm damping zone
- Position magnet does not need a spacer disk

Detailed information → www.sick.com/MAX48

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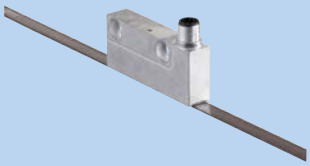
	KH53	TTK70
		
	For the harshest conditions - the heavy-duty linear encoder	Measurement of position and speed with maximum precision
	–	–
	0 m ... 1.700 m	≤ 3.920 mm
	0,1 mm	1 µm
	0,3 mm 1 mm	≤ ± 2 µm < 5 µm
	SSI PROFIBUS DP SSI, PROFIBUS DP	SSI + Sin/Cos SSI HIPERFACE® SSI, HIPERFACE®
	Male connector Cable	Male connector Cable
	IP5/ IP66/ IP67 (EN 60529)	IP67 (EN 60529)
	• Non-contact length measurement – maintenance-free, rugged, long service life • High reproducibility (0.3 mm / 1 mm), high system resolution (0.1 mm) • SSI and PROFIBUS interfaces • Determination of absolute position • Measuring lengths of up to 1,700 m possible • Can be used in harshest ambient conditions • High traversing speeds of up to 6.6 m/s • Distance tolerance between read head and measuring element: up to 55 mm ± 20 mm possible	• Non-contact absolute position and speed recording • With HIPERFACE® or SSI interface • Measurement lengths of up to 4 m • For high traversing speeds of up to 10 m/s • Reliable measurements, even in the event of contamination and condensation on the magnetic tape • Small, compact read head
	➜ www.sick.com/KH53	➜ www.sick.com/TTK70

	 **DUV60**	 **DBV50 Core**	
	Quickly configurable and versatile measuring wheel incremental encoder	Compact measuring wheel system that is highly flexible and easy to mount	
Technical data overview			
Resolution in pulses/mm	1 ... 2.400	0,05 ... 12,5	
Spring deflection spring arm	± 3 mm / ± 10 mm	± 3 mm	
Measuring wheel circumference	300 mm / 12 ″	Without measuring wheel / 200 mm	
Measuring wheel surface	O-ring NBR70 / smooth plastic (urethane)	O-ring NBR70	
Programmable	–	–	
Electrical interface	4,75 V ... 30 V, TTL/HTL DIP switch, selectable output	4,5 V ... 5,5 V, TTL/RS422 7 V ... 30 V, TTL/RS422 7 V ... 30 V, HTL/Push pull 7 V ... 27 V, HTL/Push pull, 3 channel 4,5 V ... 5,5 V, Open Collector NPN, 3 channel 4,5 V ... 30 V, Open Collector NPN, 3 channel	
Connection type	Male connector Cable universal	Cable universal Cable with male connector	
At a glance			
	• Single or dual wheel measuring wheel encoder • DIP switches for programming resolution, signal output, • And counting direction • Universal 4.5 V ... 30 V supply • LEDs that indicate encoder status and output signal. • M12 male connector, 4- or 8-pin, or universal cable outlet • Optional fault output directly from encoder	• Axis distance: 63.5 mm • Measuring wheel circumference: 200 mm • Resolution: 0.08 mm per pulse, 12.5 pulses per mm • Max. spring travel: 14 mm, mechanically limited, max. spring force: 21 N • Encoder rotation in 30° increments • The encoder can be mounted on both spring arm sides, wheel support from top and bottom • Adjustable spring pretension	
Detailed information	➜ www.sick.com/DUV60	➜ www.sick.com/DBV50_Core	

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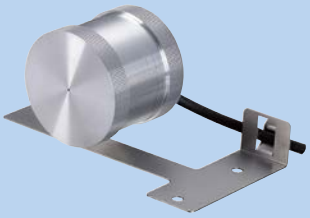
	DKV60	DFV60
		
	Rugged, high-performance measuring wheel incremental encoder	High-resolution, programmable measuring wheel incremental encoder
	0,015 ... 10	1 ... 65.536
	± 1,5 mm	± 10 mm
	200 mm	300 mm
	Knurled / O ring EPDM	O-ring NBR70
	–	✔
	4,5 V ... 30 V, TTL/RS422, HTL/Push pull	5V & 24V TTL/RS422, 24 VHTL/Push pull
	Cable universal Cable with male connector	Male connector radial Cable universal
	• Complete, preassembled measuring system • Measuring wheel with knurl or O-ring for adaptation to the measuring surface • Mounting bracket made from anti-corrosive spring steel • High resolution up to 0.1 mm (1 ... 2.000 pulses/revolution) • Electrical interfaces: Open collector NPN, TTL/RS422 or HTL/Push pull. • Connection via cable outlet, for radial or axial use with open ends or fitted with an M12 connector	• Rotatable spring arm for universal use • 300 mm wheel circumference with o-ring made from NBR70 • Mounting arm and measurement wheels made from aluminum • Programmable output voltage, zero pulse position, zero pulse width and number of pulses • Connection: radial M12 connector outlet or radial/axial cable outlet • Electrical interfaces: 5V & 24V TTL/RS422, 24 V HTL/Push pull • Remote zero setting possible
	➜ www.sick.com/DKV60	➜ www.sick.com/DFV60

			
	TMM55	**TMS/TMM61**	
	Small, light, and rugged.	Precise inclination measurement in a compact design	
Technical data overview			
Number of axis	2	1 / 2	
Communication interface	–	CANopen	
Electrical interface	0...10 V	–	
Measuring range	± 10° ... ± 60°		
1-dimensional	–	360°	
2-dimensional	–	± 90°	
Housing material	Plastic (ABS)	Plastic (ABS)	
Connection type	0.2 m, cable	0.2 m, cable	
Programmable/configurable	–	Over PGT-12-Pro	
permanently/ dynamic	Permanently	Permanently	
At a glance			
	• Compact, two-dimensional inclination sensor • Fixed measuring ranges: ±10°, ±45°, ±60° • Analog current or voltage interface • Resolution as low as 0.01° • Small and easy-to-mount ABS plastic housing • Protection class up to IP67	• Compact inclination sensor with measuring range of 360° (single-axis) or ±90° (dual-axis) • Compensated cross sensitivity and configurable vibration suppression • Convenient CANopen interface • UV-resistant, impact-proof plastic housing • High resolution (0.01°) and accuracy (±0.1° typ.) • Programmable with the PGT-12-Pro	
Detailed information	**➜ www.sick.com/TMM55**	**➜ www.sick.com/TMS_TMM61**	

	TMS/TMM88	TMS/TMM88 Dynamic
		
	High-precision inclination measurement for harsh ambient conditions	Maximum precision in dynamic applications
	1 / 2	1 / 2
	CANopen	CANopen, SAE J1939
	–	–
	360°	360°
	± 90°	± 90°
	Aluminum / Plastic (ABS)	Plastic (PBT) / Aluminum
	Male connector Female connector	Male connector Female connector
	Over PGT-12-Pro	Over PGT-12-Pro
	Permanently	Dynamic
	• Inclination sensor with measuring range of 360° (single-axis) or ±90° (dual-axis) • Compensated cross sensitivity and configurable vibration suppression • Freely configurable current or voltage interface or convenient CANopen interface • Accuracy up to ±0.02° • Plastic or aluminum housing • Programmable with the PGT-12-Pro	• Single-axis (360°) and two-axis (+/-90°) inclination sensors based on a six-axis IMU • Intelligent sensor fusion filter • Highly accurate even with dynamic movements • Interfaces: CANopen, SAE J1939 • Programmable with the PGT-12-Pro • Temperature range: –40 °C ... +80 °C • Shock resistance: 100 g • Enclosure rating: IP67/69
	→ www.sick.com/TMS_TMM88	→ www.sick.com/TMS_TMM88_Dynamic

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SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 8,800 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, SICK is always close to its customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents, and preventing damage to the environment.

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