



Encoders

Incremental encoders, absolute encoders,
wire draw encoders, linear encoders

Product family overview

Incremental encoders

DBS36	D-26
DBS50	D-36
DKS40	D-44
DFS60	D-52
DGS34/35	D-82
DKV60 measuring wheel encoder	D-92
DFV60 measuring wheel encoder	D-98

Absolute encoders

AFS/AFM60 SSI	E-116
AFS/AFM60 EtherNet/IP	E-156
AFS/AFM60 PROFINET	E-174
AFS/AFM60 EtherCAT®	E-190
A3M60 PROFIBUS	E-208
ATM60 PROFIBUS	E-218
ATM60 SSI	E-226
ATM60 CANopen	E-236
ATM60 DeviceNet	E-244
ATM90 SSI	E-252
ATM90 PROFIBUS	E-258
ARS60 SSI / Parallel	E-266

Wire draw encoders

Ecoline (BCG, PFG)	F-290
Compact (BKS, XKS, PKS)	F-322
HighLine (BTF, PRF)	F-334

Linear encoders

KH53	G-378
TTK70	G-392

Accessories

Connectivity/mounting systems	H-399
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Appendix

Glossary	I-469
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Highspeed Ethernet-Encoder

www.sick.com/ethernet_encoder

Intelligent. Powerful. Precise.





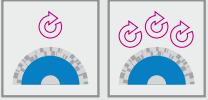
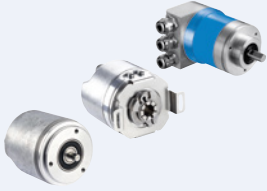
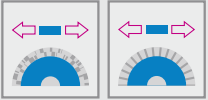
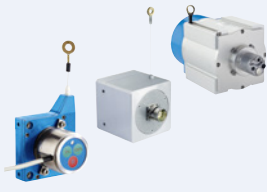
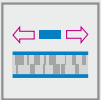


The trend in the market is increasingly moving towards Industrial Ethernet-based fieldbus systems – the rapid technical developments such as Fast Ethernet, dual-port switches and full-duplex transmission have turned the original Ethernet into a powerful communication system. The benefits of using Industrial Ethernet-based fieldbuses make these networks a future standard in factory, logistics and process automation.

As a trendsetter, SICK has therefore added the three most popular Ethernet variants PROFINET, EtherCAT® and EtherNet/IP to its proven absolute single and multiturn encoders AFS60/AFM60.



SICK connects – original connection and mounting system for encoder

A perfectly configured connection and mounting system is essential for the optimal integration of encoders. Only reliable mechanical installation and signal transmission guarantee the best possible measurement results. Furthermore, high-quality components with a long service life help reduce costs in the long term.

	General information About SICK	A
	Industrial communication	B
	Selection guide for encoders	C
	 Incremental encoders DBS36/50, DKS40, DFS60, DGS34/35, DKV60, DFV60	D
	 Absolute encoders AFS60, AFM60, A3M60, ATM60/90, ARS60	E
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	 Accessories	H
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We deliver "Sensor Intelligence."

SICK sensor solutions for industrial automation are the result of exceptional dedication and experience. From development all the way to service: The people at SICK are committed to investing all their expertise in providing with the very best sensors and system solutions possible.

A company with a culture of success

Over 5,800 people are on staff, with products and services available to help SICK sensor technology users increase their productivity and reduce their costs. Founded in 1946 and headquartered in Waldkirch, Germany, SICK is a global sensor specialist with nearly 50 subsidiaries and representations worldwide. Our exemplary corporate culture fosters an optimum

work-life balance, thus attracting the best employees from all over the world. SICK is one of the best employers – we have been among the winners of the prestigious German “Great Place to Work” award for many years in succession.



Innovation for the leading edge

SICK sensor systems simplify and optimize processes and allow for sustainable production. SICK operates at many research and development centers all over the world. Co-designed with customers and universities, our innovative sensor products and solutions are made to give a decisive edge. With an impressive track record of innovation, we take the key parameters of modern production to new levels: reliable process control, safety of people and environmental protection.



A corporate culture for sustainable excellence

SICK is backed by a holistic, homogeneous corporate culture. We are an independent company. And our sensor technology is open to all system environments. The power of innovation has made SICK one of the technology and market leaders – sensor technology that is successful in the long term.



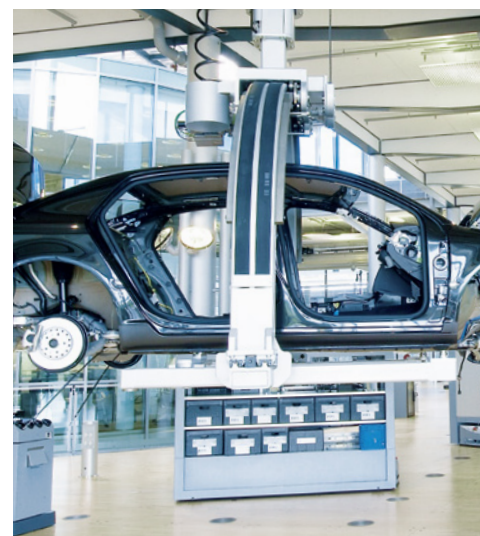
A "Sensor Intelligence." for all requirements

SICK is a renowned expert in many industries, and is entirely familiar with the critical challenges they face. While speed, accuracy and availability take center stage in all industries, technical implementations vary greatly. SICK puts its vast experience to use to provide with precisely the solution you need.

For applications worldwide

Hundreds of thousands of installations and applications go to prove that SICK knows the different industries and their processes inside out. This tradition of uncompromising expertise is ongoing: As we move into the future, we will continue to design,

implement and optimize customized solutions in our application centers in Europe, Asia and North America. You can count on SICK as a reliable supplier and development partner.



For your specific industry

With a track record of proven expertise in a great variety of industries, SICK has taken quality and productivity to new heights. The automotive, pharmaceutical, electronics and solar industries are just a few examples of sectors that benefit from our know-how. In addition to increasing speed and improving traceability in warehouses and distribution centers, SICK solutions provide accident protection for automated guided vehicles. SICK system solutions for analysis and flow measurement of gases and liquids enable environmental protection and sustainability in, for example, energy production, cement production or waste incineration plants.

For performance across the board

SICK provides the right technology to respond to the tasks involved in industrial automation: measuring, detecting, monitoring and controlling, protecting, networking and integrating, identifying, positioning. Our development and industry experts continually create groundbreaking innovations to solve these tasks.

www.sick.com/industries



A

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 plant walk-through 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.



The benefit of SICK services

Each of our products and solutions is accompanied by a comprehensive range of services tuned precisely to the requirements of the product or solution – along its entire life cycle. Backed by extensive industry expertise and more than 60 years

of experience, LifeTime Services stand for maximum availability and an exceptional service life of our products and solutions.





Consulting & Design

- Plant walk-through
- Risk assessment
- Safety concept
- Feasibility studies
- Software and hardware design



Verification & Optimization

- Inspection
- Maintenance
- Barcode checks
- Accident investigation
- Stoptime measurement
- Machine safety inspection



Training & Education

- User training
- Seminars
- WebTraining



Product & System Support

- Commissioning
- Exchange units and repairs
- Remote support
- Hotline



Upgrade & Retrofits

- Machine conversion
- Sensor upgrades
- Retrofitting of technology

www.sick.com/services



A Versatile product range for industrial automation

From the simple acquisition task to the key sensor technology in a complex production process: With every product from its broad portfolio, SICK offers a sensor solution that best combines cost effectiveness and safety.

www.sick.com/products

Photoelectric sensors



- Miniature photoelectric sensors
- Small photoelectric sensors
- Compact photoelectric sensors
- Fiber-optic sensors and fibers
- Cylindrical photoelectric sensors
- MutliTask photoelectric sensors

Proximity sensors



- Inductive proximity sensors
- Capacitive proximity sensors
- Magnetic proximity sensors

Magnetic cylinder sensors



- Analog positioning sensors
- Sensors for T-slot cylinders
- Sensors for C-slot cylinders
- Sensor adapters for other cylinder types

Identification solutions



- Bar code scanners
- Image-based code readers
- Hand-held scanners
- RFID

Detection and ranging solutions



- Laser measurement technology

System solutions



- Volume measurement systems
- Code reading systems
- Dimension weighing scanning systems
- Vision systems

Fluid sensors



- Level sensors
- Pressure sensors
- Flow sensors
- Temperature sensors

Registration sensors



- Contrast sensors
- Color sensors
- Luminescence sensors
- Fork sensors
- Array sensors
- Register sensors
- Markless sensors

Distance sensors



- Short range distance sensors (displacement)
- Mid range distance sensors
- Long range distance sensors
- Linear measurement sensors
- Ultrasonic sensors
- Double sheet detector
- Optical data transmission
- Position finders

A

Automation light grids



- Advanced automation light grids
- Standard automation light grids
- Smart light grids

Vision



- Vision sensors
- Smart cameras
- 3D cameras

Opto-electronic protective devices



- Safety laser scanners
- Safety camera systems
- Safety light curtains
- Multiple light beam safety devices
- Single-beam photoelectric safety switches
- Mirror and device columns
- Upgrade kits

Safety switches



- Electro-mechanical safety switches
- Non-contact safety switches
- Safety command devices

sens:Control – safe control solutions



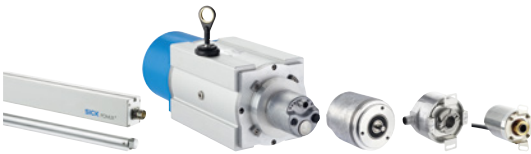
- Safety relays
- Safety controllers
- Network solutions

Motor feedback systems



- Interfaces: incremental, HIPERFACE® and HIPERFACE DSL®
- Safety motor feedback systems
- Rotary and linear motor feedback systems for asynchronous, synchronous motors and linear motors

Encoders



- Absolute encoders
- Incremental encoders
- Linear encoders
- Wire draw encoders

Analyzers and systems



- Gas analyzers
- Dust measuring devices
- Analyzer systems
- Liquid analyzers
- Data acquisition systems
- Tunnel sensors

Gas flow measuring devices



- Gas flow meters
- Mass flow meters
- Volume flow measuring devices

Software



- Safexpert® safety software

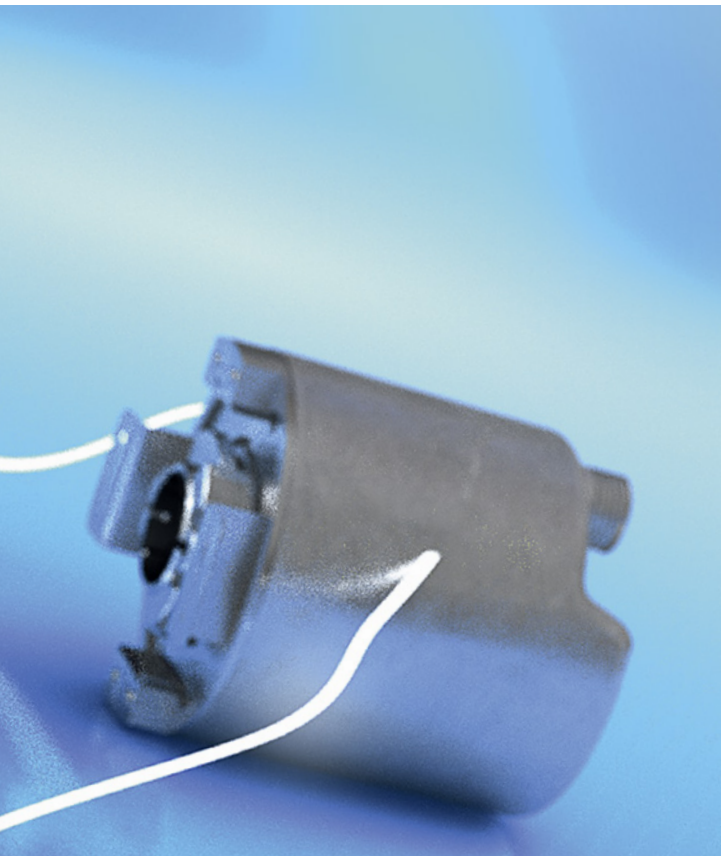


Industrial communication

Innovation is our driving force

With customer-oriented products and innovations, SICK has for five decades been a trendsetter and indispensable partner for industry. The complex, high-tech encoders and motor feedback systems measure angles, positions and speeds all over the world.

With the SSI interface and universal HIPERFACE® and HIPERFACE DSL® interfaces for motor feedback systems, SICK sets global standards.



2011 – HIPERFACE® goes digital: With HIPERFACE DSL®, technology leader SICK presents a purely digital protocol that uses a minimum of connection cables between the frequency converter and motor feedback system.

The result: HIPERFACE DSL®. This “digital servo link” interface enables an entirely new architecture for the servo drive with completely new options, as it is now purely digital instead of hybrid (analog/digital).

With SSI and HIPERFACE® we have succeeded in setting new industry standards. And HIPERFACE DSL® is currently in the process of establishing itself as a premium system.

In the open world of bus technology as well, our encoders offer a complete range.

The trend in the market is moving more and more towards industrial Ethernet-based fieldbus systems – rapid technical developments such as fast Ethernet, dual-port switches and full-duplex transmission have turned the original Ethernet into a powerful communication system. The advantages resulting from the use of industrial Ethernet-based fieldbuses will make these networks a future standard in factory, logistics and process automation.

As a trendsetter, SICK has therefore expanded its tried and tested AFS/AFM60 absolute singleturn and multiturn encoders with the three most popular Ethernet versions – PROFINET, EtherCAT® and EtherNet/IP.

Expertise with interfaces is part of our tradition. SICK has regularly been setting trends in this field for many years.

1985: With the patented synchronous serial interface (SSI), SICK-STEGMANN GmbH created an interface which established itself as an undisputed standard in industrial environments.

In 1996, with the innovative universal HIPERFACE® interface, SICK-STEGMANN set another global standard: there was now only one interface on the speed controller for all applications and only one type of signal line between the speed controller and feedback system.

In addition to its own industry standards SSI, HIPERFACE® and HIPERFACE DSL®, SICK also supports standardized Ethernet and fieldbus systems.

B



SICK standards



SSI: With the patented synchronous serial interface (SSI), SICK-STEGMANN GmbH has created an interface which offers users a range of advantages.

This synchronous serial interface is used in both single-turn and multiturn encoders.

HIPERFACE® motor feedback systems are used as a standard interface by almost all well-known manufacturers of drive technology.

The HIPERFACE® interface offers motor manufacturers, amongst other things, unprecedented savings on cabling and connectors.

HIPERFACE DSL® – With HIPERFACE DSL®, technology leader SICK presents a strictly digital protocol.

The omission of the motor feedback connectors results in significant cost savings and increased performance.

SICK fieldbus systems



DeviceNet – is a fieldbus specified by ODVA, based on the CIP protocol, which is used in international markets. As a global player, SICK offers DeviceNet in various different devices.

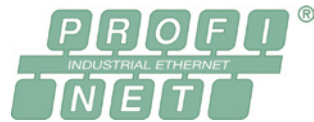
More detailed information about DeviceNet can be found at www.odva.org

PROFIBUS – is a fieldbus specified by the PNO and is used in global automation markets. SICK offers PROFIBUS devices of the PROFIBUS DP version.

More detailed information about PROFIBUS is available at www.profibus.com

CANopen – is a communication protocol based on CAN. It is mainly used in automation technology and for networking within complex devices.

More detailed information about CANopen is available at www.can-cia.org



SICK Ethernet systems

EtherCAT® is registered trademark and patent technology, licensed by Beckhoff Automation GmbH, Germany.

EtherNet/IP – based on standard TCP and UDP, EtherNet/IP supports the continuity between the office network and the system to be controlled. EtherNet/IP terminals support DHCP in the allocation of IP address and device-level ring functionality.

More detailed information about EtherNet/IP can be found at www.odva.org

PROFINET – is the open industrial Ethernet standard for automation. TCP/IP and IP standards are used. PROFINET is realtime Ethernet-capable. Fieldbus systems can be integrated.

More detailed information about PROFINET can be found at www.profinet.com

EtherCAT® – is an Ethernet-based fieldbus that supports network topologies such as line, ring, tree, star and combinations thereof. The open protocol is suitable for realtime requirements in automation technology.

More detailed information about EtherCAT® can be found at www.ethercat.org



SICK incremental systems

TTL RS 422 – in a transistor-transistor logic, both the logical status and the amplification are done by transistors. That's where the name comes from.

Detailed information can be found in the glossary.

HTL Push Pull – High voltage transistor logic functions with an energy supply in the range from 10 to 30 V DC, with 24 V DC being most common.

“Low” is defined as an output of between 0 V and 3 V and “high” as between $V_{cc} - 3.5$ V and V_{cc} .

Sin/cos interface – unlike conventional pulse signals, sine-cosine signals are emitted in sine-wave form.

These signals can be emitted in a higher resolution, as there is also an option to sample the signals using an analog-digital converter.


Detailed information can be found in the glossary.

We raise the relevant questions and give the appropriate answers.

Very often the differences between two encoders seem to be marginal. With the help of this document you are in the position to find these differences quickly and easily enabling you to choose the right encoder product family.

What is the difference between ...?

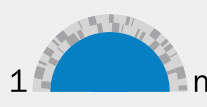
Incremental



- Counts pulses from 1 to n
- Reference run (zero pulse) necessary to obtain position value
- The number of pulses defines the resolution


and

Absolute



- Measures the absolute position from 1 to n
- Every measuring step is defined by a unique (absolute) code pattern
- The number of steps defines the resolution


Singleturn



- Variant of an absolute encoder
- Measures the absolute position from 1 to n within one revolution

and

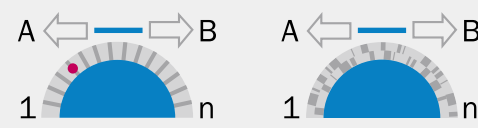
Multiturn



- Variant of an absolute encoder
- Measures the absolute position from 1 to n within one revolution
- In addition measures the number of revolutions

And between ...?

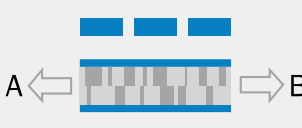
Wire draw encoders



- Measures lengths between A and B
- Consists of an rotary encoder and a wire draw mechanism
- The wire is mounted to the moving part
- The encoder is fixed

and

Linear encoders



- Measures lengths between A and B
- Consists of read head and scale
- The read head is mounted to the moving part
- The measuring element is fixed

What should be measured? Angle or distance?

The question seems to be easy. However, the correct answer is the basis used when entering the selection guide on the next two pages. There we distinguish between “rotary” and “linear”.

Angle = rotary encoders (selection guide page C-18)

Incremental encoders









Absolute encoders singleturn

Absolute encoders multiturn



AFS60
SSI



AFS60
Ethernet



ARS60



A3M60
PROFIBUS



AFM60
Ethernet



AFM60
SSI



ATM60




ATM90


Distance = linear encoders (selection guide page C-19)

Wire draw encoders


Linear encoders with scale or magnetic tape




EcoLine




Compact




HighLine



KH53



KH53A



TTK70

Rotary encoders

C

		Incremental encoders							Absolute encoders singleturn		Absolute encoders multiturn			
		DBS36	DBS50	DFS60	DKS40	DKV60	DFV60	DGS34/35	AFS60	ARS60	A3M60	AFM60	ATM60	ATM90
Should an absolute position always be measured?	> Yes								■	■	■	■	■	■
	> No	■	■	■	■	■	■	■						
How many absolute turns should be measured?	> No absolute measurement	■	■	■	■	■	■	■						
	> 1								■	■				
	> 2 or more										■	■	■	■
Which Interface connection is required?	> TTL/HTL	■	■	■	■	■	■	■						
	> Open Collector	■	■		■			■						
	> SIN/COS 1 V _{PP}			■										
	> Parallel									■				
	> SSI								■			■	■	■
	> PROFIBUS										■		■	■
	> CANopen												■	
	> DeviceNet												■	
	> EtherNet/IP								■			■		
	> PROFINET								■			■		
	> EtherCAT®								■			■		
What is the maximum diameter available?	> Up to 36 mm	■												
	> Up to 40 mm	■			■									
	> Up to 50 mm	■	■		■									
	> Up to 60 mm	■	■	■	■				■	■	■	■	■	■
	> Up to 90 mm	■	■	■	■			■	■	■	■	■	■	■
What type of mounting shaft is required?	> Face mount flange solid shaft	■	■	■	■				■	■	■	■	■	
	> Servo flange solid shaft			■					■	■	■	■	■	
	> Blind hollow shaft	■		■				■	■	■	■	■	■	
	> Through hollow shaft			■				■	■	■		■		■
Should a measuring wheel be used to measure the position?	> Yes					■	■							
	> No	■	■	■	■			■	■	■	■	■	■	■
Is a shaft diameter > 16 mm required?	> Yes						■							
	> No	■		■				■	■	■	■	■	■	
What resolution is required (pulses/steps)?	> Up to 2,500	■	■	■	■	■	■	■	■	■	■	■	■	
	> Up to 8,192			■			■	■	■	■	■	■	■	
	> > 8,192			■			■	■	■	■	■			
	> > 32,768			■			■	■			■			
Is a solution enabling programming by the customer required (resolution, zero-pulse ...)?	> Yes			■				■ ¹⁾		■ ¹⁾	■ ¹⁾	■ ¹⁾	■ ¹⁾	
	> No	■	■	■	■	■	■	■	■	■	■	■	■	

¹⁾ Programming by programming tool (SSI) or controller of the relevant bus interface.

Linear encoders

		Wire draw encoders			Linear encoders with measuring element or magnetic type		
		EcoLine	Compact	HighLine	KH53	KH53A	TTK70
Maximum number of measuring cycles?	> Up to 1,000,000	■	■	■			
	> Infinite				■	■	■
Which type of distance measurement is required?	> Absolute	■	■	■	■	■	■
	> Incremental	■	■	■			■
Which interface connection is required?	> TTL/HTL	■	■	■			
	> Analog	■		■			
	> HIPERFACE®	■	■	■ ²⁾			■
	> SSI	■	■	■	■	■	■
	> PROFIBUS	■		■	■	■	
	> CANopen	■		■			
	> DeviceNet	■		■			
	> EtherNet/IP	■		■			
	> PROFINET	■		■			
	> EtherCAT®	■		■			
Is a continuous mounting surface available along the total measuring length?	> Yes	■	■	■	■	■	■
	> No	■	■	■			
How are the mounting tolerances?	> Low	■	■	■	■		■
	> Middle	■	■	■	■	■	
	> High					■	
What measuring length is required?	> ≤ 5 m	■	■	■	■	■	■
	> ≤ 10 m	■		■	■	■	
	> ≤ 50 m			■	■	■	
	> ≤ 548 m				■	■	
	> ≤ 1,700 m				■		
What resolution is required?	> ≤ 0.1 mm	■	■	■	■	■	
	> ≤ 0.05 mm	■	■	■			
	> ≤ 1 µm		■				■
How robust should the measuring system be?	> Low	■	■	■	■	■	■
	> Middle		■	■	■	■	■
	> High			■	■	■	
Which frame size can be used?	> Small	■					■
	> Middle		■	■			
	> Large			■	■	■	

²⁾ On demand.



Versatile, compact and flexible – Incremental encoders

Incremental encoders are used when retention of absolute position upon power loss is not required. These encoders provide information about the position, angle and number of revolutions. The number of pulses per revolution determines the resolution. The current position can be determined by counting these pulses from a reference point. Upon activating the machine, a reference run to the reference point is required to determine the absolute position of the encoder.

Your benefits





- Increased machine availability due to robust, reliable design
- Precise determination of position and speed due to high resolution of up to 65,536 lines
- Perfect adaptation to application-specific requirements due to large number of variants
- Small type encoders allow compact system design
- Reduced time and costs due to standardization by means of programming function i.e. fewer part numbers, less warehouse stock and minimization of downtime






D

Incremental encoders

Applications	D-22
Product family overview	D-24

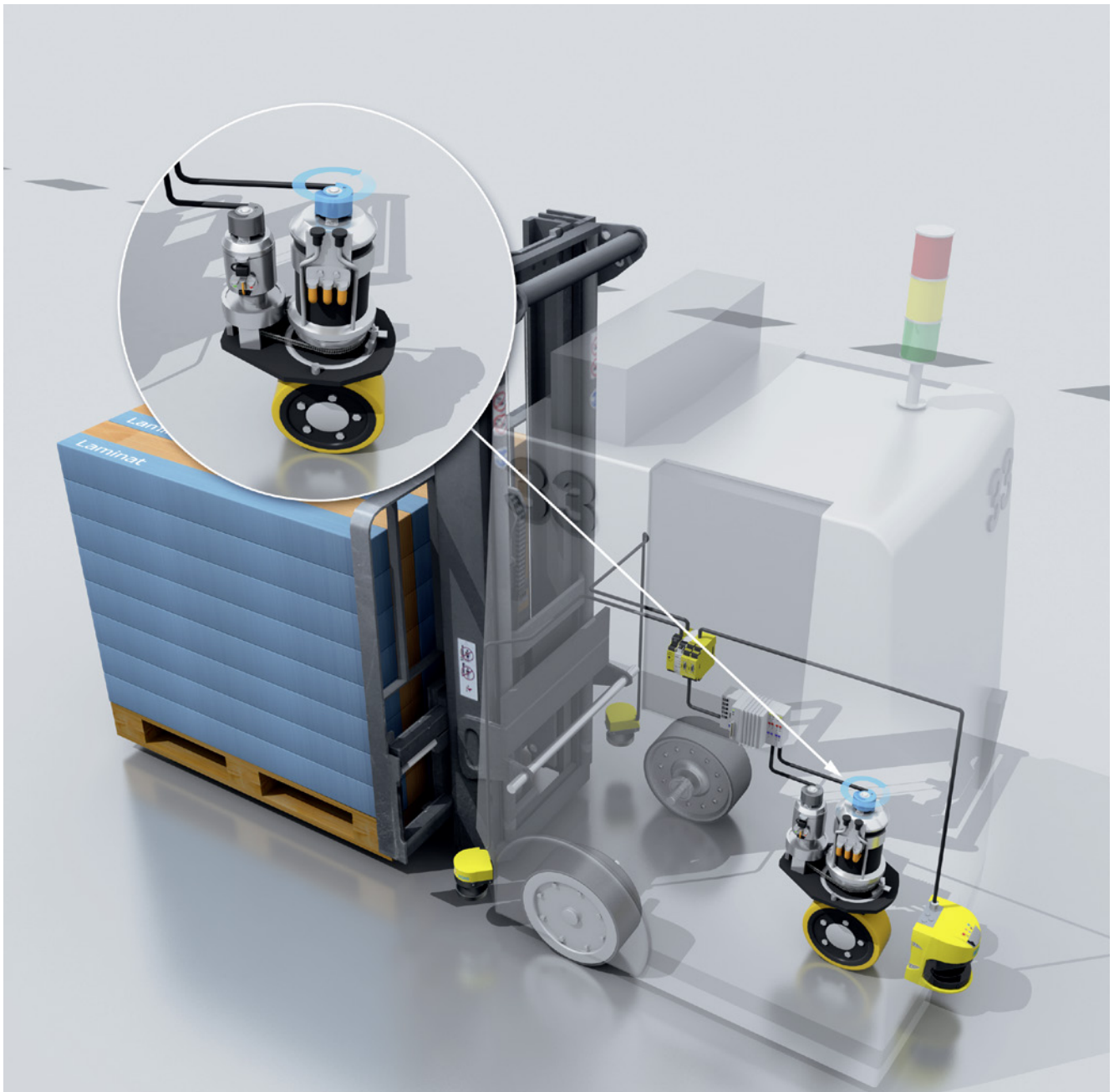
	DBS36 D-26 EASIMA®: The MultiFit Incremental Encoder
	DBS50 D-36 EASIMA®: The MultiFit Incremental Encoder
	DKS40 D-44 Rugged, high-performance incremental encoder
	DFS60 D-52 High-resolution, programmable encoder for sophisticated applications

	DGS34/DGS35 D-82 Large hollow shaft encoders for rough environmental conditions
	DKV60 measuring wheel encoder. D-92 Rugged, high-performance measuring wheel incremental encoder
	DFV60 measuring wheel encoder. D-98 High-resolution, programmable measuring wheel incremental encoder

Typical incremental encoders applications

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.

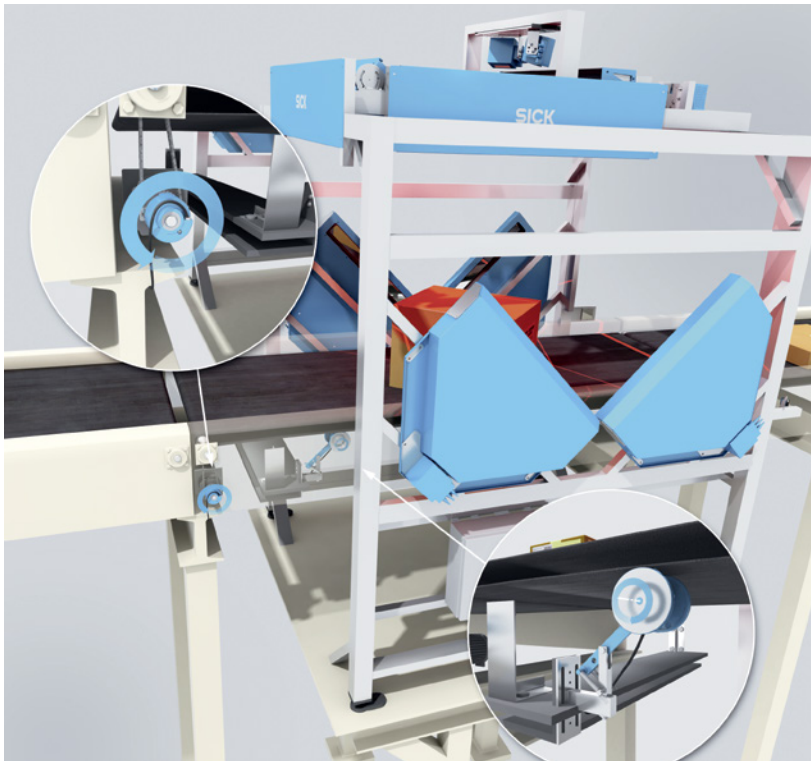
Industrial trucks and forklifts – positioning in storage and transport halls



The incremental encoder provides information on the speed of the motor and thus the speed of the vehicle. The encoder can either be directly mounted on the motor (see Figure), or mounted on an axle or revolving wheel.

Hollow shaft encoders are normally used in this context. The speed that is measured is used to calculate position and to ensure the security field is observed using safety laser scanners.

Conveyor belts – positioning of transport material



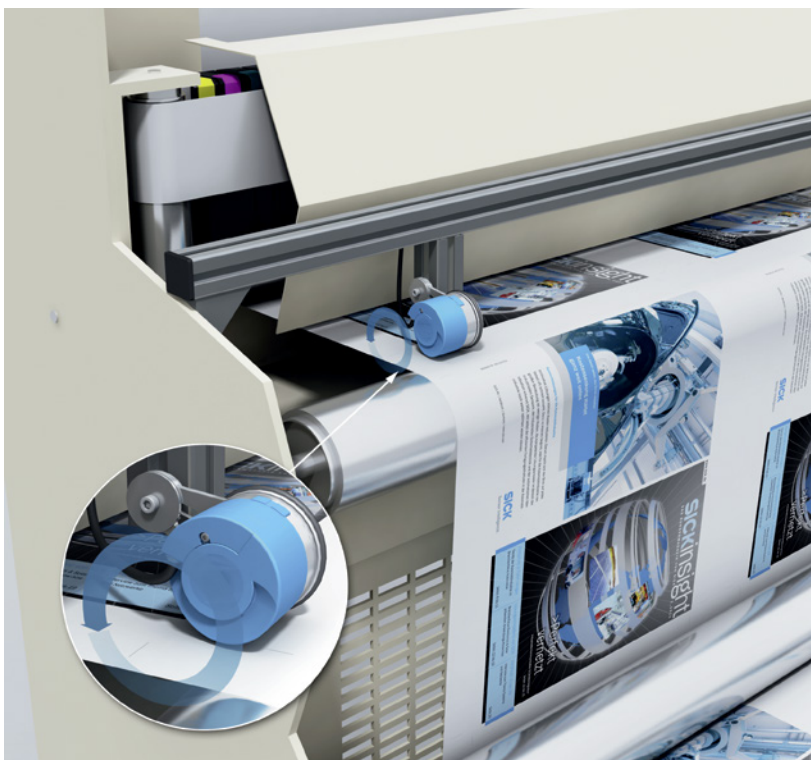
The incremental encoder detects the speed of the conveyor belt and the objects transported on it. Using this information, the speed of other conveyor belts can be synchronized - for example, to control bar code scanners and label printers.

The speed is monitored on the drive roller, on the follower roller, or directly on the conveyor belt.

Measuring wheel encoders, such as the DFV60, may be useful in this context. They are made up of an encoder, a measuring wheel and a universal mounting arm. The measuring wheel is pressed by spring force onto the conveyor and measures the exact velocity of the moving object, without any potential slippage between the drive roller and the conveyor belt.

D

Printing machines – positioning of printed images



Incremental 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.

For these types of application, the measuring wheel is used along with the DFS60 incremental encoder. You can easily program the DFS60 using the hand-held PGT-10-S display programmer and the RS485 control system interface, making it easy to adapt the encoder based on the print media.

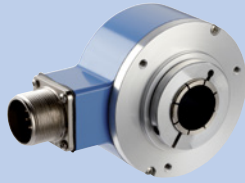
Product family overview

				
	DBS36	DBS50	DKS40	DFS60
	EASIMA®: The MultiFit Incremental Encoder	EASIMA®: The MultiFit Incremental Encoder	Rugged, high-performance incremental encoder	High-resolution, programmable encoder for sophisticated applications

Technical data overview				
Number of lines/pulses	100 ... 2500	100 ... 2500	2.048	Eco 100 ... 2048 Basic 1 ... 10000 Advanced 1 ... 65536
Mechanical interface	Solid shaft, face mount flange / blind hollow shaft	Solid shaft, face mount flange	Solid shaft, face mount flange	Solid shaft, face mount flange/ solid shaft, servo flange/ blind hollow shaft/ through hollow shaft
Electrical interface	4.5 V ... 5.5 V, Open Collector NPN, 4.5 V ... 5.5 V, TTL/RS-422, 7 V ... 30 V, TTL/RS-422, 7 V ... 30 V, HTL/push pull,	4.5 V ... 5.5 V, Open Collector NPN, 4.5 V ... 5.5 V, TTL/RS-422, 7 V ... 30 V, TTL/RS-422, 7 V ... 30 V, HTL/push pull,	4.5 ... 5.5 V, Open Coll. NPN, 10 ... 30 V, Open Coll. NPN, 4.5 ... 5.5 V, TTL/RS422, 10 ... 30 V, HTL,	4.5 ... 5.5 V, TTL/RS422 10 ... 32 V, TTL/RS422 10 ... 32 V, HTL/Push pull 4.5 ... 32 V, TTL/HTL programmable
Ambient temperature	-20 °C ... +85 °C	-20 °C ... +85 °C	-40 °C ... +70 °C	-30 °C ... +100 °C
Permissible shaft loading (solid shaft)	20 N axial/40 N radial	30 N axial/50 N radial	20 N axial/40 N radial	40 N axial/80 N radial
Enclosure rating up to	IP 65	IP 65	IP 64	IP 67
Programmable	-	-	-	✓
Maximum output frequency	≤ 300 kHz	≤ 300 kHz	50 kHz / 200 kHz	820 kHz

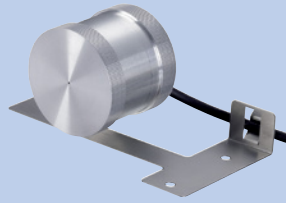
At a glance				
	<ul style="list-style-type: none"> • Compact diameter of 37 mm • Hollow shaft with universal stator coupling • Face mount flange with 3 mounting hole patterns and servo groove • Versions with blind hollow shaft or face mount flange with solid shaft • Connection with universal cable outlet 	<ul style="list-style-type: none"> • Compact housing diameter of 37 mm, flange diameter: 50 mm • Face mount flange with 2 mounting hole patterns and servo groove • Face mount flange with 8 mm solid shaft • Connection with universal cable outlet 	<ul style="list-style-type: none"> • Compact housing • Durable, low-cost design • Interfaces: Open collector NPN, TTL/RS-422 or HTL/push pull. • Connection via cable outlet, for radial or axial use with open ends or fitted with an M12 connector 	<ul style="list-style-type: none"> • 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
Detailed information	→ D-26	→ D-36	→ D-44	→ D-52

D



DGS34/DGS35

Large hollow shaft encoders for rough environmental conditions



DKV60 measuring wheel encoder

Rugged, high-performance measuring wheel incremental encoder



DFV60 measuring wheel encoder

High-resolution, programmable measuring wheel incremental encoder

	120 ... 16384	1 ... 2000	1 ... 65536
	Blind hollow shaft	Measuring drum, knurled surface / Measuring drum, O-ring surface	2 measuring wheels, O-ring surface
	5 V, TTL 5 ... 15 V, HTL/TTL 8 ... 24 V, HTL 8 ... 24 V, Open Collector	4.5 ... 5.5 V TTL/RS422 10 ... 30 V HTL/push pull	TTL/HTL programmable
	-20 °C ... +70 °C	-40 ... +70 °C	-20 °C ... +100 °C
	-	-	-
	IP 66	IP 65	IP 65
	-	-	✓
	≤ 600 kHz	-	≤ 820 kHz
	<ul style="list-style-type: none"> • Incremental encoder with 3.5" diameter • Pulses per revolution: 120 ... 16,384 • Choice of various electric interfaces: TTL / RS-422, HTL/push pull or open collector • High enclosure rating: IP 66 • Blind hollow shaft for shaft diameters of up to 30 mm or 1-1/8" • Connection via cable outlet or 10-pin MIL connector 	<ul style="list-style-type: none"> • 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/RS-422 or HTL/push pull. • Connection via cable outlet, for radial or axial use with open ends or fitted with an M12 connector 	<ul style="list-style-type: none"> • 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: 5 V & 24 V TTL/RS-422, 24 V HTL/push pull • Remote zero setting possible
	→ D-82	→ D-92	→ D-98

D

EASIMA®: The MultiFit Incremental Encoder



D



Additional information

Detailed technical data. D-27
 Ordering information. D-29
 Dimensional drawings D-32
 Proposed fitting. D-33
 PIN assignment. D-34
 Recommended accessories. D-35

Product description

The EASIMA® incremental encoder DBS36E stands out due to its high mechanical flexibility, outstanding technical features and many possible variations. A blind hollow-shaft design with 8 mm shaft diameter and a face mount flange with 6 mm solid shaft are available. The design with face mount flange offers 3 different mounting hole patterns and a servo groove for mounting with servo

clamps. The hollow-shaft design has a universal stator coupling that can be used for many typical mounting hole patterns. All models have compact dimensions and a universal cable outlet that make it possible to run the cable in the axial or radial direction. The DBS36E incremental encoder is fully compatible with the DDS36E incremental encoder.

At a glance

- Connection with universal cable outlet
- Versions with blind hollow shaft or face mount flange with solid shaft
- Face mount flange with 3 mounting hole patterns and servo groove
- Hollow shaft with universal stator coupling
- Compact diameter of 37 mm
- Electrical interfaces: TTL/RS-422, HTL/push pull and Open Collector NPN
- Available PPR: 100 to 2,500
- Temperature range: -20 °C ... +85 °C
- Enclosure rating: IP 65

Your benefits

- The universal cable outlet allows use in tight spaces and makes flexible cable routing possible
- Face mount flange with various mounting hole patterns provides flexibility when mounting in new or existing applications
- Face mount flange with servo groove makes mounting with servo clamps possible
- The DBS36E's universal stator coupling ensures easy device replacement without changing the application
- The high flexibility of the encoders' mechanical interface and the available accessories make it possible to use one design in many applications
- Compatibility with the DDS36E series makes it easy to replace this series in existing applications

→ www.mysick.com/en/DBS36

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

Performance

Pulses per revolution	100 ... 2,500
Measuring step deviation	$\pm 18^\circ$ /pulses per revolution
Error limits	$\pm 54^\circ$ /pulses per revolution
Measuring step	90° electronically/pulses per revolution
Initialization time after Power On	< 3 ms

Mechanical data

Mechanical interface	Solid shaft, face mount flange Blind hollow shaft
Shaft diameter	6 mm x 12 mm solid shaft 8 mm blind hollow shaft
Mass	150 g (with connecting cable 1.5 m)
Start up torque	0.5 Ncm (+20 °C)
Operating torque	0.4 Ncm (+20 °C)
Permissible movement axial static/dynamic	± 0.5 mm, ± 0.2 mm
Permissible movement radial static/dynamic	± 0.3 mm, ± 0.1 mm
Permissible shaft loading radial/axial	40 N (radial) (solid shaft) 20 N (axial) (solid shaft)
Operating speed	6,000 /min, ^{1) 2)}
Maximum operating speed	8,000 min ^{-1 3)}
Moment of inertia of the rotor	6 gcm ² (solid shaft) 8 gcm ² (blind hollow shaft)
Bearing lifetime	2 x 10 ⁹ revolutions
Max. angular acceleration	$\leq 500,000$ rad/s ²

¹⁾ Self-warming 3.3 K per 1,000 min⁻¹ (solid shaft).

²⁾ Self-warming 4.7 K per 1,000 min⁻¹ (blind hollow shaft).

³⁾ No permanent operation. Decreasing signal quality.

Electrical data

Electrical interface	4.5 V ... 5.5 V, Open Collector NPN, 4.5 V ... 5.5 V, TTL/RS-422, 7 V ... 30 V, TTL/RS-422, 7 V ... 30 V, HTL/push pull, (depending on type)
Connection type	Cable, 8-pin, universal, 0.5 m Cable, 8-pin, universal, 1.5 m Cable, 8-pin, universal, 3 m Cable, 8-pin, universal, 5 m Cable, 8-pin, universal, 0.5 m with connector M12 (depending on type)
Operating power consumption (no load)	
4.5 V ... 5.5 V, Open Collector NPN	50 mA
4.5 V ... 5.5 V, TTL/RS-422	50 mA
Power consumption (no load)	
7 V ... 30 V, TTL/RS-422	≤ 0.5 W
7 V ... 30 V, HTL/push pull	≤ 0.5 W
Reverse polarity protection	
4.5 V ... 5.5 V, Open Collector NPN	No
4.5 V ... 5.5 V, TTL/RS-422	No
7 V ... 30 V, TTL/RS-422	Yes
7 V ... 30 V, HTL/push pull	Yes
Short-circuit protection of the outputs	
4.5 V ... 5.5 V, Open Collector NPN	Yes
4.5 V ... 5.5 V, TTL/RS-422	Yes
7 V ... 30 V, TTL/RS-422	Yes
7 V ... 30 V, HTL/push pull	Yes
Load current max.	≤ 30 mA (TTL/HTL) ≤ 20 mA (Open Collector)
Maximum output frequency	≤ 300 kHz
Reference signal, number	1
Reference signal, position	90°, electronically, gated with A and B
MTF_D: mean time to dangerous failure ¹⁾	600 years (EN ISO 13849-1) ¹⁾

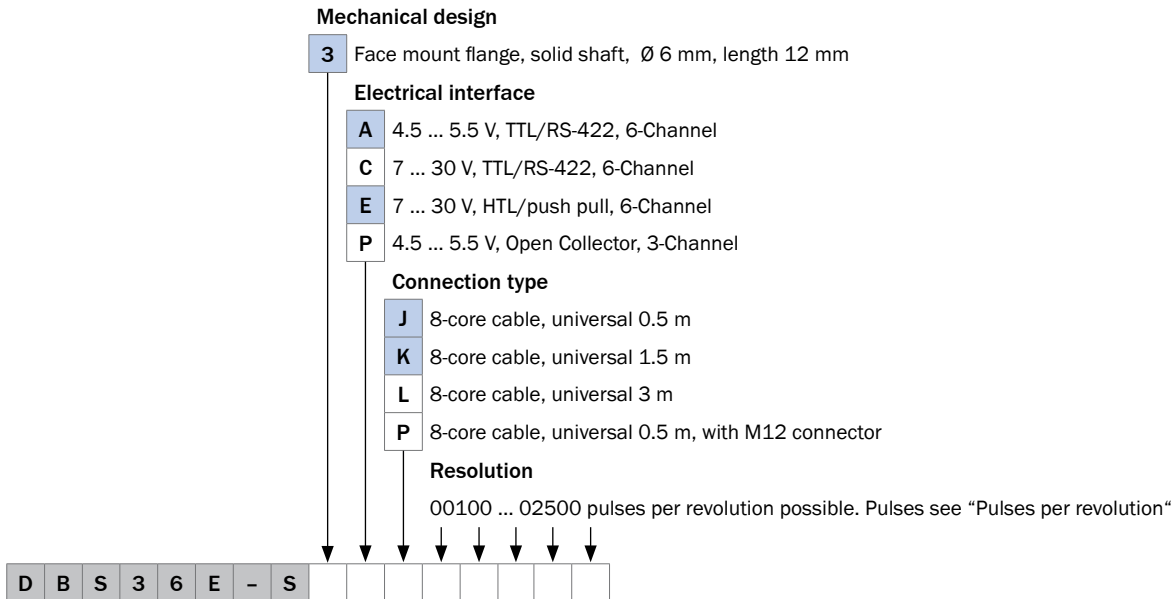
¹⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-4 (Class A)
Enclosure rating	IP 65
Permissible relative humidity	90 % (condensation of the optical scanning not permitted)
Working temperature range	-20 °C ... +85 °C
Storage temperature range	-40 °C ... +100 °C, without package
Resistance to shocks	100 g (EN 60068-2-27)
Resistance to vibration	20 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

Ordering information

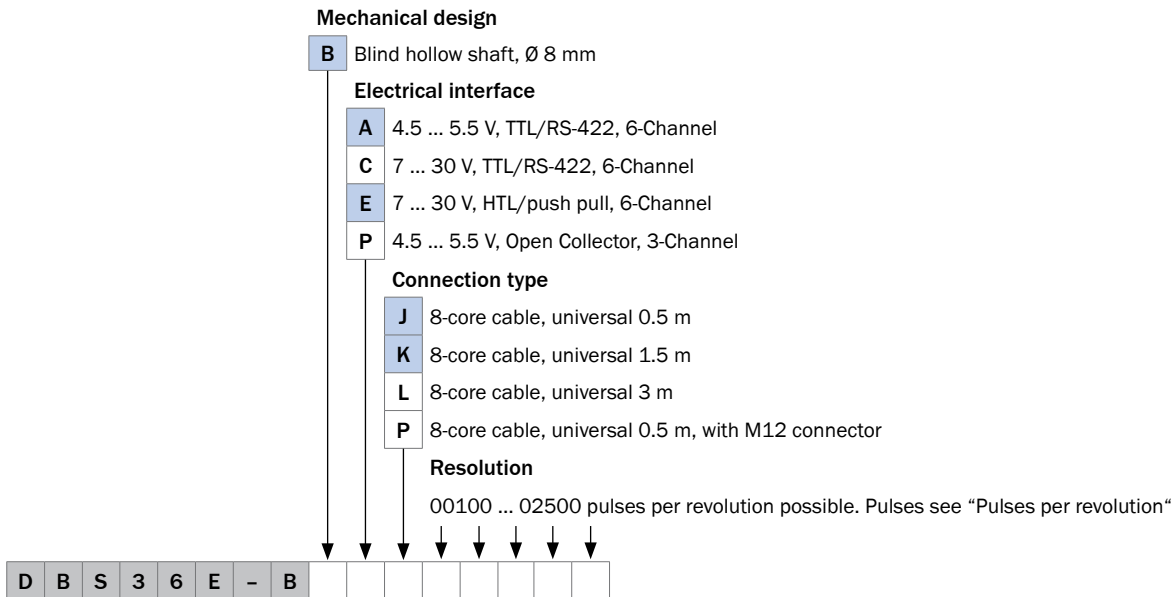
Type code, DBS36, solid shaft (marked in blue = preferred types ¹⁾)



¹⁾ The properties in the type code in blue and of the table "Pulses per revolution" are preferred types. Encoder versions compiled exclusively from preferred features are available in limited quantities from the warehouse with no minimum order quantity. They are therefore ideal for fast delivery worldwide.



Type code, DBS36, blind hollow shaft (marked in blue = preferred types ¹⁾)



¹⁾ The properties in the type code in blue and of the table "Pulses per revolution" are preferred types. Encoder versions compiled exclusively from preferred features are available in limited quantities from the warehouse with no minimum order quantity. They are therefore ideal for fast delivery worldwide.

Pulses per revolution (marked in blue = preferred types ¹⁾)

	E
Pulses per revolution	00100
	00120
	00125
	00200
	00256
	00300
	00360
	00400
	00500
	00512
	00600
	01000
	01024
	01200
	02000
	02048
	02500

¹⁾ The properties in the type code in blue and of the table "Pulses per revolution" are preferred types. Encoder versions compiled exclusively from preferred features are available in limited quantities from the warehouse with no minimum order quantity. They are therefore ideal for fast delivery worldwide.

D

Ordering information

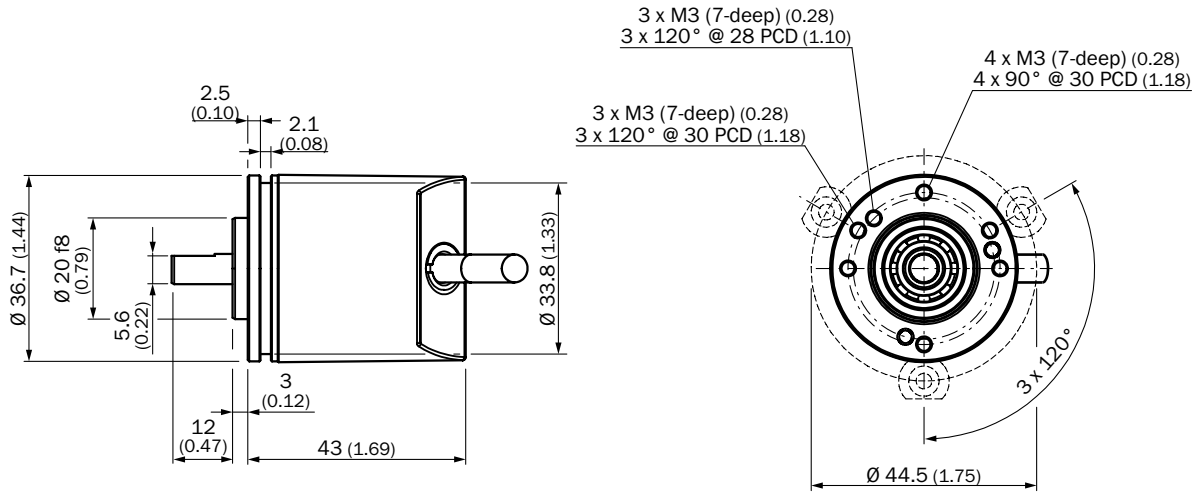
Mechanical interface	Shaft diameter	Electrical interface	Connection type	Pulses per revolution	Model name	Part no.
Solid shaft, face mount flange	6 mm	4.5 ... 5.5 V TTL/RS422	Cable, 8-pin, universal, 1.5 m	100	DBS36E-S3AK00100	1060535
				360	DBS36E-S3AK00360	1060536
				400	DBS36E-S3AK00400	1060537
				500	DBS36E-S3AK00500	1060538
				1,000	DBS36E-S3AK01000	1060539
				1,024	DBS36E-S3AK01024	1060144
				2,048	DBS36E-S3AK02048	1058602
		7 ... 30 V HTL/push pull	Cable, 8-pin, universal, 1.5 m	100	DBS36E-S3EK00100	1060540
				360	DBS36E-S3EK00360	1060541
				400	DBS36E-S3EK00400	1060542
				500	DBS36E-S3EK00500	1060543
				1,000	DBS36E-S3EK01000	1060544
				1,024	DBS36E-S3EK01024	1060545
				2,048	DBS36E-S3EK02048	1059907
Blind hollow shaft	8 mm	4.5 ... 5.5 V TTL/RS422	Cable, 8-pin, universal, 1.5 m	100	DBS36E-BBAK00100	1060524
				360	DBS36E-BBAK00360	1060525
				400	DBS36E-BBAK00400	1060526
				500	DBS36E-BBAK00500	1060527
				1,000	DBS36E-BBAK01000	1060528
				1,024	DBS36E-BBAK01024	1060147
				2,048	DBS36E-BBAK02048	1058603
		7 ... 30 V HTL/push pull	Cable, 8-pin, universal, 1.5 m	100	DBS36E-BBEK00100	1060529
				360	DBS36E-BBEK00360	1060530
				400	DBS36E-BBEK00400	1060531
				500	DBS36E-BBEK00500	1060532
				1,000	DBS36E-BBEK01000	1060533
				1,024	DBS36E-BBEK01024	1060534
				2,048	DBS36E-BBEK02048	1059910

D

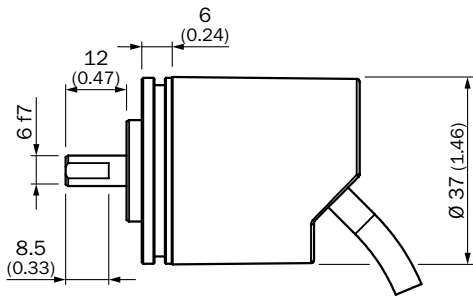
Dimensional drawings

dimensions in mm (inch)

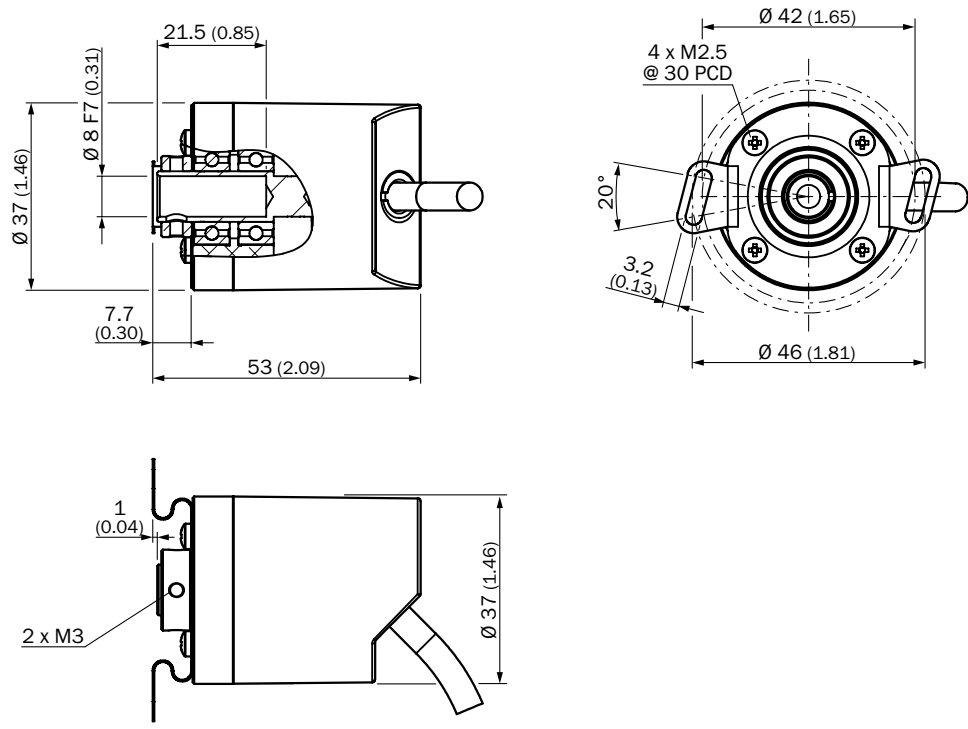
Solid shaft



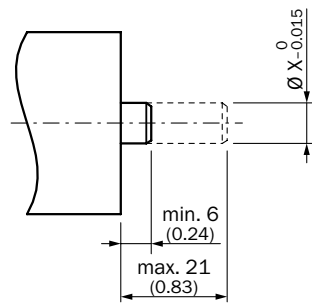
D



Blind hollow shaft



Proposed fitting

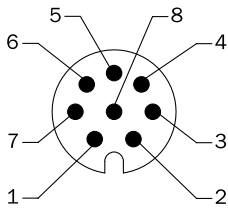


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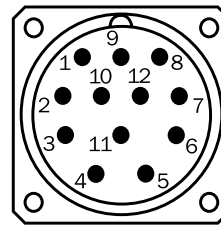
PIN assignment

8-core cable

View of M12 device connector on cable



View of M23 device connector on cable



PIN, 8-pin in M12	PIN, 12-pin in M23	Color of wires	Signal OC	Signal TTL, HTL	Explanation
1	6	Brown	Not connected	\bar{A}	Signal line
2	5	White	A	A	Signal line
3	1	Black	Not connected	\bar{B}	Signal line
4	8	Pink	B	B	Signal line
5	4	Yellow	Not connected	\bar{Z}	Signal line
6	3	Lilac	Z	Z	Signal line
7	10	Blue	GND	GND	Ground connection of the encoder
8	12	Red	+U _s	+U _s	Supply voltage
-	9	-	Not connected	Not connected	Not connected
-	2	-	Not connected	Not connected	Not connected
-	11	-	Not connected	Not connected	Not connected
-	7	-	Not connected	Not connected	Not connected
Screen	Screen	Screen	Screen	Screen	Screen connected to encoder housing

D

Recommended accessories

Other mounting accessories

Short description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
Replacement O-ring set (set of 2) for measuring wheels (circumference 200 mm) with O-ring	BEF-OR-053-040	2064061
Replacement O-ring set (set of 2) for measuring wheels (circumference 300 mm) with O-ring	BEF-OR-083-05	2064076
Flange adapter, adapts face mount flange with 20 mm centering collar to 33 mm servo flange	BEF-FA-020-033	2066312
Mounting bracket for encoder with 20 mm centering collar	BEF-WF-20	2066393
Servo clamps (set of 3), small	BEF-WK-RESOL	2039082

Plug connectors and cables

Short description	Model name	Part no.
Cable socket, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	DOS-1208-GA01	6045001
Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	DOS-2312-G	6027538
Data cable by the meter 4 x 2 x 0.15 mm ² with shielding, diam. 5.6 mm	LTG-2308-MWENC	6027529

Shaft adaptation

Short description	Model name	Part no.
Stator coupling with hole diameter combination 6 mm x 8 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0606-S	2056406
Double loop coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 2.5 mm, axial ± 3 mm, angle $\pm 10^\circ$, torsion spring stiffness 25 Nm/rad, material: polyurethane, galvanized steel flange	KUP-0610-D	5326697
Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985
Collet for blind hollow shaft with 5 mm diameter	SPZ-005-AD-A	2066991
Collet for blind hollow shaft with 6 mm diameter	SPZ-006-DD36-A	2056390

→ For additional accessories, please see page H-399

D

EASIMA®: The MultiFit Incremental Encoder



D



Product description

The EASIMA® incremental encoder DBS50E stands out due to its high mechanical flexibility, outstanding technical features and many possible variations. The DBS50E has a face mount flange with 50 mm diameter and a solid shaft with 8 mm diameter. At 37 mm, the housing diameter is extremely compact, saving valuable space. The face mount

flange offers 2 different mounting hole patterns and a servo groove for mounting with servo clamps. The encoder has compact dimensions and a universal cable outlet that makes it possible to run the cable in the axial or radial direction. The DBS50E incremental encoder is fully compatible with the DDS50E incremental encoder.

At a glance

- 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, flange diameter: 50 mm
- Various electrical interfaces: TTL/RS-422, HTL/push pull and Open Collector NPN
- Available PPR from 100 up to 2,500
- Working temperature range: -20 °C ... +85 °C
- Enclosure rating: IP 65

Your benefits

- The universal cable outlet allows use in tight spaces and makes flexible cable routing possible
- Face mount flange with various mounting hole patterns for easy device replacement without changing the application
- Face mount flange with servo groove makes mounting with servo clamps possible
- The high flexibility of the encoders' mechanical interface and the available accessories make it possible to use one design in many applications
- The compact housing diameter saves valuable space
- Compatibility with the DDS50 series makes it easy to replace this series in existing applications



Additional information

Detailed technical data D-37

Ordering information D-39

Dimensional drawings D-40

PIN assignment D-41

Recommended accessories D-42

→ www.mysick.com/en/DBS50

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

Performance

Pulses per revolution	100 ...2,500
Measuring step deviation	$\pm 18^\circ$ /pulses per revolution
Error limits	$\pm 54^\circ$ /pulses per revolution
Measuring step	90° electronically/pulses per revolution
Initialization time after Power On	< 3 ms

Mechanical data

Mechanical interface	Solid shaft, face mount flange
Shaft diameter	8 mm x 15.5 mm
Mass	180 g (with connecting cable 1.5 m)
Start up torque	0.9 Ncm (+20 °C)
Operating torque	0.6 Ncm (+20 °C)
Permissible shaft loading radial/axial	30 N (radial) 50 N (axial)
Operating speed	6,000 min ⁻¹ ¹⁾
Maximum operating speed	8,000 min ⁻¹ ²⁾
Moment of inertia of the rotor	6.5 gcm ²
Bearing lifetime	2 x 10 ⁹ revolutions
Max. angular acceleration	≤ 500,000 rad/s ²

¹⁾ Self-warming 6.2 K per 1,000 min⁻¹.

²⁾ No permanent operation. Decreasing signal quality.

Electrical data

Electrical interface	4.5 V ... 5.5 V, Open Collector NPN, 4.5 V ... 5.5 V, TTL/RS-422, 7 V ... 30 V, TTL/RS-422, 7 V ... 30 V, HTL/push pull,
Connection type	Cable, 8-pin, universal, 0.5 m Cable, 8-pin, universal, 1.5 m Cable, 8-pin, universal, 3 m Cable, 8-pin, universal, 5 m Cable, 8-pin, universal, 0.5 m with connector M12
Operating power consumption (no load) 4.5 V ... 5.5 V, Open Collector NPN 4.5 V ... 5.5 V, TTL/RS-422	50 mA 50 mA
Power consumption (no load) 7 V ... 30 V, TTL/RS-422 7 V ... 30 V, HTL/push pull	≤ 0.5 W ≤ 0.5 W
Reverse polarity protection 4.5 V ... 5.5 V, Open Collector NPN 4.5 V ... 5.5 V, TTL/RS-422 7 V ... 30 V, TTL/RS-422 7 V ... 30 V, HTL/push pull	Yes No Yes Yes
Short-circuit protection of the outputs 4.5 V ... 5.5 V, Open Collector NPN 4.5 V ... 5.5 V, TTL/RS-422 7 V ... 30 V, TTL/RS-422 7 V ... 30 V, HTL/push pull	Yes Yes Yes Yes
Load current max.	≤ 30 mA (TTL/HTL) ≤ 20 mA (Open Collector)
Maximum output frequency	≤ 300 kHz
Reference signal, number	1
Reference signal, position	90°, electronically, gated with A and B
MTTF_D: mean time to dangerous failure ¹⁾	600 years (EN ISO 13849-1) ¹⁾

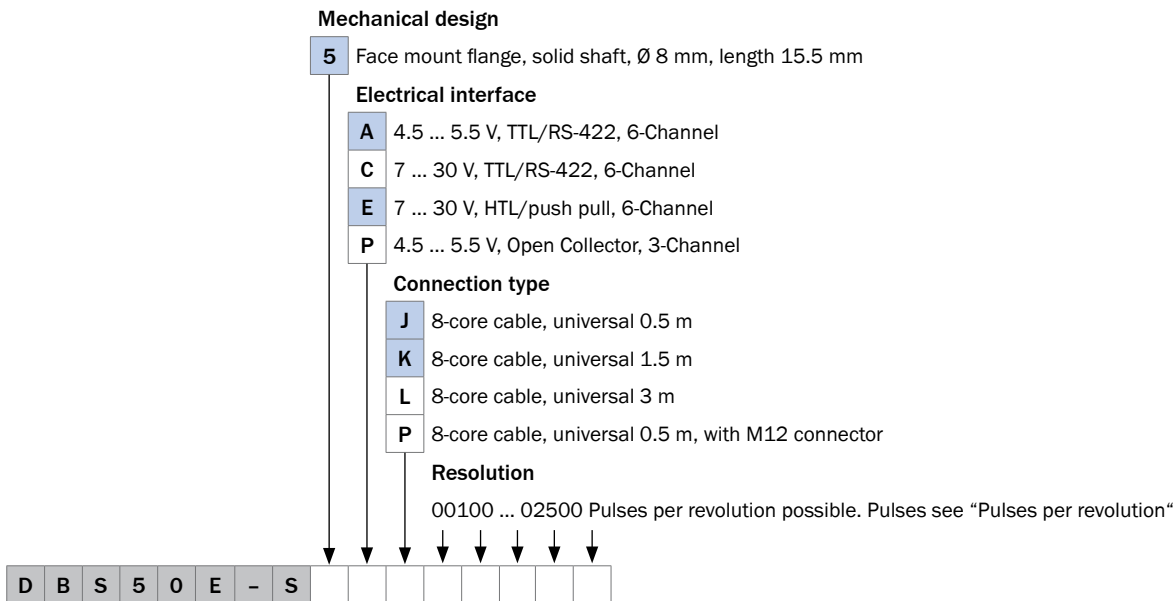
¹⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-4
Enclosure rating	IP 65
Permissible relative humidity	90 % (condensation of the optical scanning not permitted)
Working temperature range	-20 °C ... +85 °C
Storage temperature range	-40 °C ... +100 °C, without package
Resistance to shocks	100 g (EN 60068-2-27)
Resistance to vibration	20 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

Ordering information

Type code, DBS50, solid shaft (marked in blue = preferred types ¹⁾)



¹⁾ The properties in the type code in blue and of the table "Pulses per revolution" are preferred types. Encoder versions compiled exclusively from preferred features are available in limited quantities from the warehouse with no minimum order quantity. They are therefore ideal for fast delivery worldwide.



Pulses per revolution (marked in blue = preferred types ¹⁾)

	E
Pulses per revolution	00100
	00120
	00125
	00200
	00256
	00300
	00360
	00400
	00500
	00512
	00600
	01000
	01024
	01200
	02000
	02048
	02500

¹⁾ The properties in the type code in blue and of the table "Pulses per revolution" are preferred types. Encoder versions compiled exclusively from preferred features are available in limited quantities from the warehouse with no minimum order quantity. They are therefore ideal for fast delivery worldwide.

Ordering information

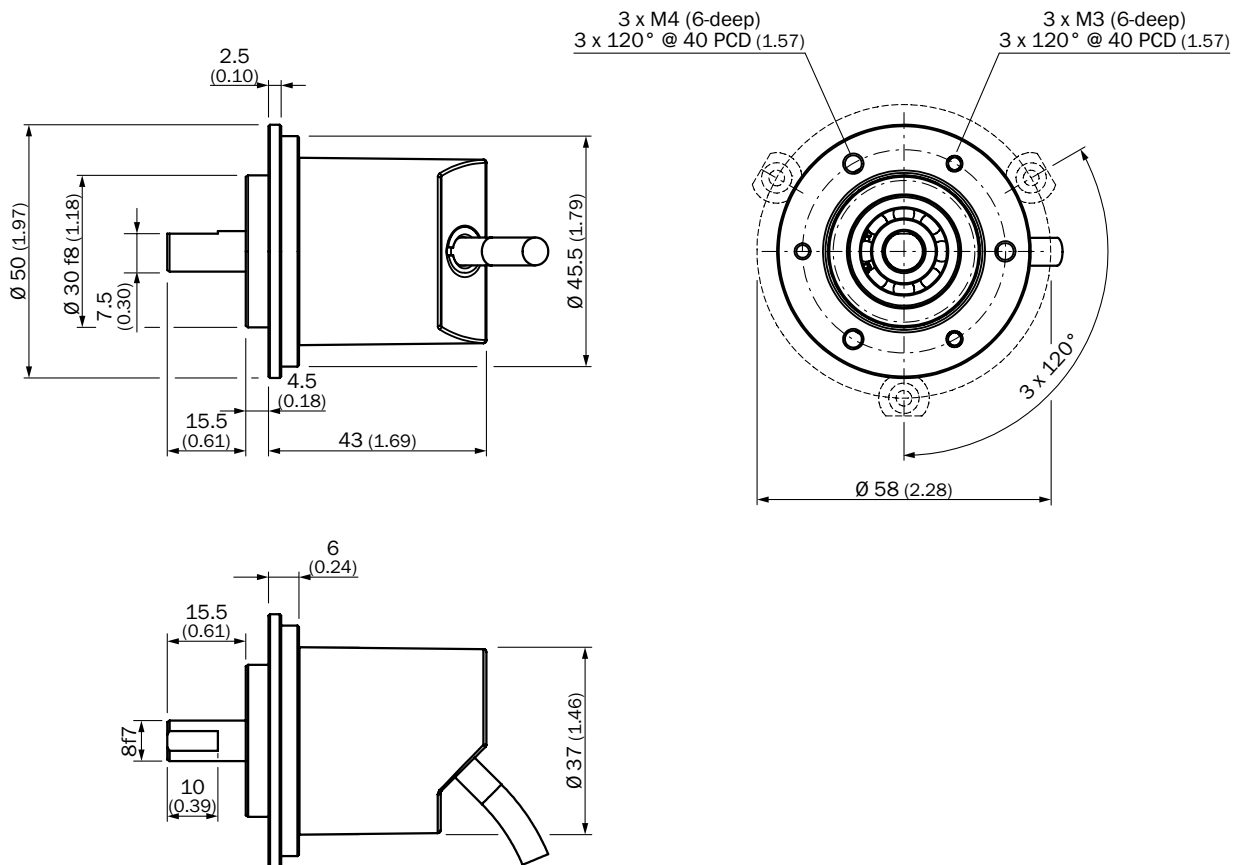
- **Mechanical interface:** Solid shaft, face mount flange
- **Shaft diameter:** 8 mm

Electrical interface	Connection type	Pulses per revolution	Model name	Part no.
4.5 ... 5.5 V TTL/RS422	Cable, 8-pin, universal, 1.5 m	100	DBS50E-S5AK00100	1060685
		360	DBS50E-S5AK00360	1060686
		400	DBS50E-S5AK00400	1060687
		500	DBS50E-S5AK00500	1060688
		1,000	DBS50E-S5AK01000	1060145
		1,024	DBS50E-S5AK01024	1060689
		2,048	DBS50E-S5AK02048	1057446
7 ... 30 V HTL/push pull	Cable, 8-pin, universal, 1.5 m	100	DBS50E-S5EK00100	1060690
		360	DBS50E-S5EK00360	1060691
		400	DBS50E-S5EK00400	1060692
		500	DBS50E-S5EK00500	1060693
		1,000	DBS50E-S5EK01000	1060694
		1,024	DBS50E-S5EK01024	1060695
		2,048	DBS50E-S5EK02048	1059903

D

Dimensional drawings

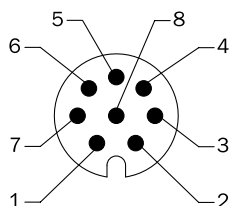
dimensions in mm (inch)



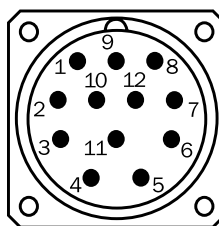
PIN assignment

8-core cable

View of M12 device connector on cable



View of M23 device connector on cable



PIN, 8-pole in M12	PIN, 12-pole in M23	Color of wires	Signal OC	Signal TTL, HTL	Explanation
1	6	Brown	Not connected	\bar{A}	Signal line
2	5	White	A	A	Signal line
3	1	Black	Not connected	\bar{B}	Signal line
4	8	Pink	B	B	Signal line
5	4	Yellow	Not connected	\bar{Z}	Signal line
6	3	Lilac	Z	Z	Signal line
7	10	Blue	GND	GND	Ground connection of the encoder
8	12	Red	+U _S	+U _S	Supply voltage
-	9	-	Not connected	Not connected	Not connected
-	2	-	Not connected	Not connected	Not connected
-	11	-	Not connected	Not connected	Not connected
-	7	-	Not connected	Not connected	Not connected
Screen	Screen	Screen	Screen	Screen	Screen connected to encoder housing

D

Recommended accessories

Mounting brackets/plates

Short description	Model name	Part no.
Mounting bracket for encoder with 30 mm centering collar	BEF-WF-30	2066391

Other mounting accessories

Short description	Model name	Part no.
Servo clamps (set of 3), small	BEF-WK-RESOL	2039082

Plug connectors and cables

Short description	Model name	Part no.
Cable socket, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	DOS-1208-GA01	6045001
Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	DOS-2312-G	6027538
Data cable by the meter 4 x 2 x 0.15 mm ² with shielding, diam. 5.6 mm	LTG-2308-MWENC	6027529

Shaft adaptation

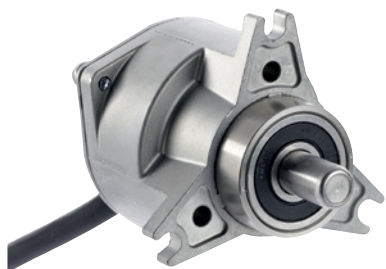
Short description	Model name	Part no.
Stator coupling with hole diameter combination 6 mm x 8 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0608-S	5314179
Stator coupling with hole diameter combination 8 mm x 8 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0808-S	5314177
Double loop coupling with hole diameter combination 8 mm x 10 mm, maximum shaft offset, radial ± 2.5 mm, axial ± 3 mm, angle $\pm 10^\circ$, torsion spring stiffness 25 Nm/rad, material: polyurethane, galvanized steel flange	KUP-0810-D	5326704
Stator coupling with hole diameter combination 8 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0810-S	5314178

→ For additional accessories, please see page H-399

D



Rugged, high-performance incremental encoder



D

Product description

The DKS40 incremental encoder offers an outstanding price-performance ratio. Its housing is made of solid zinc die cast and, with an external diameter of 50 mm, it is extremely compact, saving valu-

able installation space. Use of mini-disc technology makes the DKS40 extremely resistant to shock and vibration. In addition, the DKS40 has a high IP 64 enclosure rating

At a glance

- Compact housing
- Durable, low-cost design
- Interfaces: Open collector NPN, TTL/RS-422 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

Your benefits

- Low-cost encoder with outstanding quality
- Withstands harsh environmental conditions due to high IP enclosure rating and rugged design
- Universal cable outlet enables axial and radial cable guidance
- Compact dimensions enable simple installation even where space is cramped



UL certification not valid for all types. See type code.

Additional information

- Detailed technical dataD-45
- Ordering informationD-46
- Dimensional drawingD-48
- PIN assignmentD-49
- Recommended accessoriesD-50

→ www.mysick.com/en/DKS40

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

Performance

Pulses per revolution	1 ... 2.048
Error limits binary number of lines	0.09° ¹⁾
Error limits non-binary number of lines	0.13° ²⁾
Measuring step deviation at binary number of lines	0.035°
Measuring step deviation at non binary number of lines	0.07°
Initialization time after Power On	40 ms
Measuring step	90° / electrical / number of lines

¹⁾ "Binary" number of lines 2^n , n is a whole number.

²⁾ „Non binary“ number of lines 2^n , n is not a whole number.

Mechanical data

Mechanical interface	Solid shaft, face mount flange
Shaft diameter	8 mm x 13 mm
Mass	0.18 kg
Start up torque	0.6 Ncm
Operating torque	0.4 Ncm
Permissible shaft loading radial/axial	40 N, 20 N
Maximum operating speed	6,000 min ⁻¹
Moment of inertia of the rotor	6 gcm ²
Bearing lifetime	2 x 10 ⁹ revolutions
Max. angular acceleration	5 x 10 ⁵ rad/s ²

Electrical data

Electrical interface	4.5 ... 5.5 V, TTL/RS422, 6-Channel 10 ... 24 V, HTL/Push Pull, 6-Channel 4.5 ... 5.5 V, Open Collector NPN, 3-Channel 10 ... 30 V, Open Collector NPN, 3-Channel
Connection type	Cable 8-core, universal cable outlet, 0.5 m ¹⁾ Cable 8-core, universal cable outlet, 1.5 m ¹⁾ Cable 8-core, universal cable outlet, 3.0 m ¹⁾ Cable 8-core, universal cable outlet, 5.0 m ¹⁾ Cable 8-core, universal cable outlet, 1.5 m, connector M12 ¹⁾
Operating power consumption (no load)	40 mA
Load current	≤ 30 mA
Maximum output frequency	Open Collector 50 KHz TTL/RS422 200 KHz HTL/push-pull 200 KHz
Reference signal, number	1
Reference signal, position	90°, electronically, gated with A and B
MTTFd: mean time to dangerous failure ²⁾	600 years (EN ISO 13849-1)

¹⁾ The universal cable output is positioned so that a kink-free cable run is possible in radial or axial direction.

²⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

EMC	EN 61000-6-2, EN 61000-6-3
Enclosure rating housing side	IP 64 (IEC 60529)
Enclosure rating shaft side	IP 64 (IEC 60529)
Air humidity	90 % (condensation of the optical scanning not permitted)
Working temperature range	0 °C ... +60 °C
Storage temperature range	-40 °C ... +70 °C, without package
Resistance to shocks	50 g, 7 ms (EN 60068-2-27)
Resistance to vibration	20 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

Ordering information

Type code DKS40

Electrical interface

- A** 4.5 ... 5.5 V, TTL/RS422, 6-Channel
- E** 10 ... 30 V, HTL/push pull, 6-Channel
- P** 4.5 ... 5.5 V, Open Collector NPN, 6-Channel
- R** 10 ... 30 V, Open Collector NPN, 6-Channel

Mechanical design

- 5** Solid shaft, face mount flange, Ø 8 mm, length 13 mm

Connection type

- J** 8-core cable, universal, 0.5 m¹⁾
- K** 8-core cable, universal, 1.5 m (no UL-Certificate)¹⁾
- L** 8-core cable, universal, 3.0 m (no UL-Certificate)¹⁾
- M** 8-core cable, universal, 5.0 m (no UL-Certificate)¹⁾
- P** 8-core cable, universal, 1.5 m, with M12 connector¹⁾

Resolution

Always 5 characters in clear text with leading zeros



¹⁾ The universal cable outlet is positioned so that a kink-free cable in a radial or axial direction is possible.

D

Ordering information

- **Mechanical interface:** Solid shaft, face mount flange

Electrical interface	Connection type	Pulses per revolution	Model name	Part no.
10 ... 30 V Open Collector NPN	Cable, universal, 0.5 m	10	DKS40-R5J00010	1034621
		20	DKS40-R5J00020	1034622
		50	DKS40-R5J00050	1034623
		100	DKS40-R5J00100	1034624
		200	DKS40-R5J00200	1034625
		250	DKS40-R5J00250	1034626
		256	DKS40-R5J00256	1034627
		360	DKS40-R5J00360	1034628
		500	DKS40-R5J00500	1034629
		512	DKS40-R5J00512	1034630
		720	DKS40-R5J00720	1034631
		800	DKS40-R5J00800	1036154
		1,000	DKS40-R5J01000	1034632
		1,024	DKS40-R5J01024	1034633
		2,000	DKS40-R5J02000	1034813
		2,048	DKS40-R5J02048	1034814
4.5 ... 5.5 V TTL/RS422	Cable, universal, 0.5 m	10	DKS40-A5J00010	1034634
		20	DKS40-A5J00020	1034635
		50	DKS40-A5J00050	1034636
		100	DKS40-A5J00100	1034637
		200	DKS40-A5J00200	1034638
		250	DKS40-A5J00250	1034639
		360	DKS40-A5J00360	1034641
		500	DKS40-A5J00500	1034642
		512	DKS40-A5J00512	1034643
		720	DKS40-A5J00720	1034644
		1,000	DKS40-A5J01000	1034645
		1,024	DKS40-A5J01024	1034646
		2,000	DKS40-A5J02000	1034815
		2,048	DKS40-A5J02048	1034816

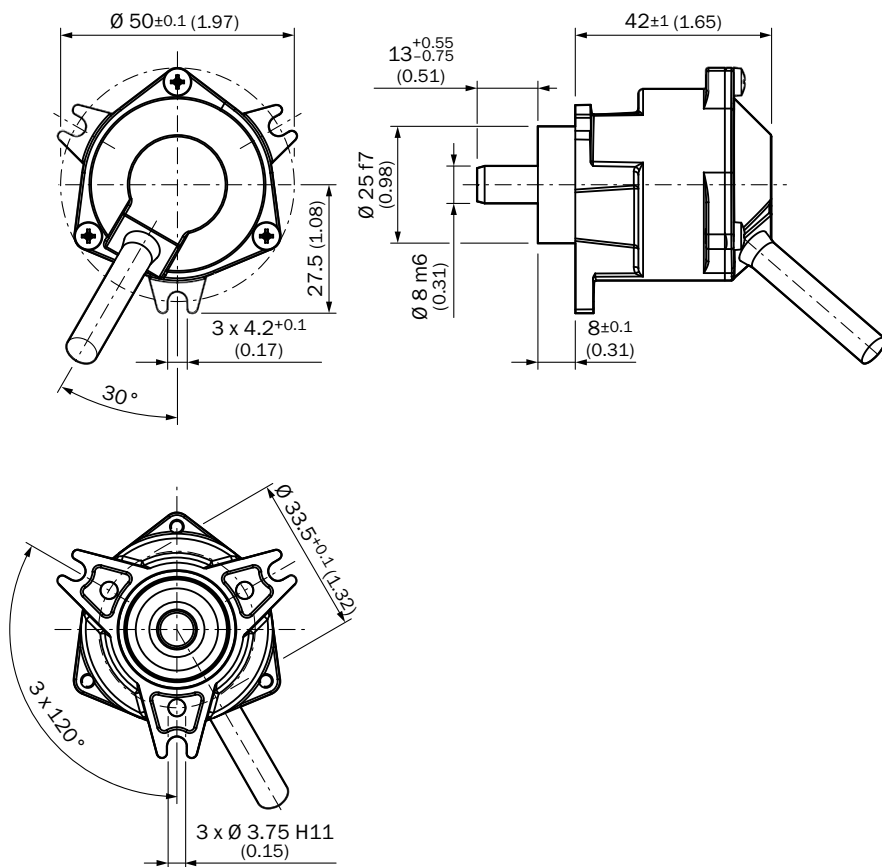
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Electrical interface	Connection type	Pulses per revolution	Model name	Part no.
10 ... 30 V HTL/push pull		10	DKS40-E5J00010	1034647
		20	DKS40-E5J00020	1034648
		50	DKS40-E5J00050	1034649
		100	DKS40-E5J00100	1034650
		200	DKS40-E5J00200	1034651
		250	DKS40-E5J00250	1034652
		256	DKS40-E5J00256	1034653
		360	DKS40-E5J00360	1034654
		500	DKS40-E5J00500	1034655
		512	DKS40-E5J00512	1034656
		720	DKS40-E5J00720	1034657
		1,000	DKS40-E5J01000	1034658
		1,024	DKS40-E5J01024	1034659
		2,000	DKS40-E5J02000	1034817
		2,048	DKS40-E5J02048	1034818

Dimensional drawing

dimensions in mm (inch)

D

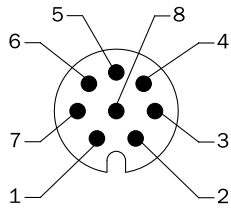


General tolerances as per DIN ISO 2768-mk

PIN assignment

8-core cable

View of the connector side of housing



PIN, 8-pole in M12	Color of wires	Signal OC	Signal TTL, HTL	Explanation
1	Brown	Not connected	\bar{A}	Signal line
2	White	A	A	Signal line
3	Black	Not connected	\bar{B}	Signal line
4	Pink	B	B	Signal line
5	Yellow	Not connected	\bar{Z}	Signal line
6	Lilac	Z	Z	Signal line
7	Blue	GND	GND	Ground connection of the encoder
8	Red	+U _s	+U _s	Supply voltage
Screen	Screen	Screen	Screen	Screen connected to encoder housing. Connect screen on control side.

D

Recommended accessories

Mounting brackets/plates

Short description	Model name	Part no.
Mounting bracket for encoder with 25 mm centering collar	BEF-WF-25	2032621

Flanges

Short description	Model name	Part no.
Flange adapter, adapts face mount flange with 25 mm centering collar to size 60 face mount flange with 36 mm centering collar	BEF-FA-025-036	2034226
Flange adapter, adapts face mount flange with 25 mm centering collar to 50 mm servo flange	BEF-FA-025-050	2032622
Flange adapter, adapts face mount flange with 25 mm centering collar to 60 mm square mounting plate	BEF-FA-025-060RCA	2032623
Flange adapter, adapts face mount flange with 25 mm centering collar to 60 mm square mounting plate with shock absorber	BEF-FA-025-060RSA	2032624
Flange adapter, adapts face mount flange with 25 mm centering collar to 63 mm square mounting plate	BEF-FA-025-063-REC	2033631

Other mounting accessories

Short description	Model name	Part no.
Mounting bell for servo flange encoder with 50 mm centering collar incl. mounting kit	BEF-MG-50	5312987
Servo clamps (set of 3), large	BEF-WK-SF	2029166

Plug connectors and cables

Short description	Cable length	Model name	Part no.
Cable socket, 8-pin, straight, pre-wired with 8-core cable, 4 x 2 x 0.25 mm ² , shielded, cable diameter 7.0 mm	2.0 m	DOL-1208-G02MAC1	6032866
	5.0 m	DOL-1208-G05MAC1	6032867
	10.0 m	DOL-1208-G10MAC1	6032868
	20.0 m	DOL-1208-G20MAC1	6032869
Data cable by the meter 4 x 2 x 0.15 mm ² with shielding, diam. 5.6 mm	-	LTG-2308-MWENC	6027529
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² with shielding, diam. 7.5 mm	-	LTG-2411-MW	6027530
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, diam. 7.8 mm	-	LTG-2512-MW	6027531
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, UV and salt water resistant, diam. 7.8 mm	-	LTG-2612-MW	6028516

Shaft adaptation

Short description	Model name	Part no.
Stator coupling with hole diameter combination 6 mm x 8 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0608-S	5314179
Stator coupling with hole diameter combination 8 mm x 8 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0808-S	5314177
Stator coupling with hole diameter combination 8 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0810-S	5314178
Double loop coupling with hole diameter combination 8 mm x 10 mm, maximum shaft offset, radial ± 2.5 mm, axial ± 3 mm, angle $\pm 10^\circ$, torsion spring stiffness 25 Nm/rad, material: polyurethane, galvanized steel flange	KUP-0810-D	5326704

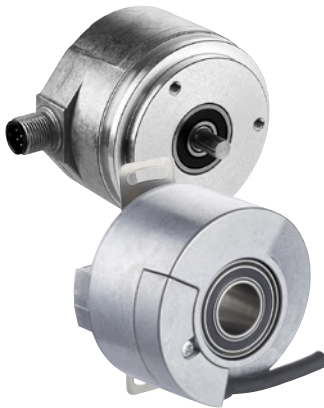
→ For additional accessories, please see page H-399



High-resolution, programmable encoder for sophisticated applications



D



UL certification not valid for all types. See type code.

Additional information

Detailed technical data D-53
 Maximum revolution range D-56
 Ordering information D-57
 Dimensional drawings D-64
 PIN and core assignment D-72
 Interfaces D-73
 Recommended accessories D-75

Product description

The DFS60 is a high-resolution incremental encoder with a diameter of 60 mm. It offers a wide variety of customer-specific mechanical and electric adjustments. Programming of the output signal, zero pulse and resolution of up to 65,356

pulses is a unique feature for the market. The high enclosure rating, wide temperature range and large ball bearing distance make the DFS60 the ideal encoder for industrial applications in harsh environments.

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: 5 V & 24 V TTL/RS-422, 24 V HTL/push pull
- Mechanical interfaces: face mount or servo flange, blind or through hollow shaft
- Remote 0-SET possible

Your benefit

- Reduced storage costs and downtime due to customer-specific programming
- Variety of different mechanical and electrical interfaces enable the encoder to be optimally adjusted to fit the installation situation
- Excellent concentricity even at high speeds
- High resolution of up to 16 bits ensures precise measurements
- Permanent and safe operation due to a high enclosure rating, temperature resistance and a long bearing lifetime
- Programmability via the PGT-08 programming software and the PGT-10-S display programming tool allow the encoder to be adapted flexibly and quickly according to customer needs
- Programmable zero pulse position simplifies installation

→ www.mysick.com/en/DFS60

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

Performance

	E	B	A
Pulses per revolution ^{1), 2)}	100 ... 2048 ²⁾	1 ... 10000 ²⁾	1 ... 65536 ²⁾
Pulses per revolution at SIN/COS 1.0 V_{PP} Interface	–	1024	–
Measuring step	90° electrical / pulses		
Reference signal			
Number	1		
Position	90° electr., logic operation with A and B/sine and cosine		
Error limits	± 0.3°	± 0.05°	± 0.03°
Measuring step deviation			
Pulses 1 ... 99	–	± 0.08°	± 0.04°
Pulses 100 ... 10000	± 0.2°	± 0.01°	± 0.008°
Pulses > 10000	–	–	± 0.002°

¹⁾ See "Maximum revolution range" on page D-56.

²⁾ Detailed list of "Pulses per revolution" on page D-63.

Mechanical data

Shaft diameter			
Face mount flange	10 x 19 mm		
Servo flange	6 x 10 mm		
Blind hollow shaft, through hollow shaft	6, 8, 10, 12, 14, 15 mm and 3/8", 1/2", 5/8"		
Material shaft	Stainless steel		
Material flange	Aluminium		
Material housing	Aluminium		
Mass ¹⁾			
Face mount flange, servo flange	0.3 kg ¹⁾		
Blind hollow shaft, through hollow shaft	0.2 kg ¹⁾		
Start-up torque at 20 °C			
Face mount flange, servo flange	0.5 Ncm		
Blind hollow shaft, through hollow shaft	0.8 Ncm		
Operating torque at 20 °C			
Face mount flange, servo flange	0.3 Ncm		
Blind hollow shaft, through hollow shaft	0.6 Ncm		
Permissible shaft loading			
Face mount flange, servo flange	80 N radial 40 N axial		
Permissible shaft movement of the drive element static/dynamic			
Blind hollow shaft, through hollow shaft	±0.3 / ±0.1 mm radial ±0.5 / ±0.2 mm axial	±0.3 / ±0.05 mm radial ±0.5 / ±0.1 mm axial	
Angular acceleration	5 x 10 ⁵ rad/s ²		
Operating speed ²⁾			
Face mount flange, servo flange	9000 min ⁻¹		
Blind hollow shaft	6000 min ⁻¹		
Through hollow shaft	9000 min ⁻¹		

¹⁾ Based on encoders with a connector outlet.

²⁾ Self warming 3.3 k/1,000 min⁻¹, when applying note working temperature range.

	E	B	A
Rotor moment of inertia			
Face mount flange, servo flange	6.2 gcm ²		
Blind hollow shaft, through hollow shaft	40 gcm ²		
Bearing lifetime	3.6 x 10 ¹⁰ revolutions		

¹ Based on encoders with a connector outlet.

² Self warming 3.3 k/1,000 min⁻¹, when applying note working temperature range.

Electrical data

Electrical interfaces	4.5 ... 5.5 V, TTL/RS422 10 ... 32 V, TTL/RS422 10 ... 32 V, HTL/push pull - - - - - - -	4.5 V ... 5.5 V, Sin/Cos 1.0 V _{pp} - 4.5 ... 5.5 V, TTL/RS422, with 0-set function on the M23 connector 10 ... 32 V, TTL/RS422, with 0-set function on the M23 connector 10 ... 32 V, HTL/push pull, with 0-set function on the M23 connector 4.5 ... 32 V, TTL/HTL programmable ¹⁾ 4.5 ... 32 V, TTL or HTL programmable with 0-set function on the M23 connector ^{1), 2)}
Initialization time after Power On	4.5 ... 5.5 V, TTL/RS422 10 ... 32 V, TTL/RS422 10 ... 32 V, HTL/push pull 4.5 V...5.5 V, Sin/Cos 1.0 V _{pp} 4.5 ... 5.5 V, TTL/RS422, 0-SET 10 ... 32 V, TTL/RS422, 0-SET 10 ... 32 V, HTL/push pull, 0-SET 4.5 ... 32 V, TTL/HTL programmable 4.5 ... 32 V, TTL/HTL programmable, 0-SET	40 ms 40 ms 40 ms - Max. 30 ms Max. 30 ms Max. 30 ms Max. 30 ms/max. 32 ms with mechanical zero pulse width Max. 30 ms/max. 32 ms with mechanical zero pulse width
0-SET function ²⁾	-	H - active; (L = 0 ... 3 V, H = 4 ... U _G V)
Load current	4.5 ... 5.5 V, TTL/RS422 10 ... 32 V, TTL/RS422 10 ... 32 V, HTL/push pull 4.5 ... 5.5 V, TTL/RS422, 0-SET 10 ... 32 V, TTL/RS422, 0-SET 10 ... 32 V, HTL/push pull, 0-SET 4.5 ... 32 V, TTL/HTL pro programmable 4.5 ... 32 V, TTL/HTL programmable, 0-SET	30 mA 30 mA 30 mA - 30 mA 30 mA 30 mA 30 mA 30 mA
Load resistance	4.5 V...5.5 V, Sin/Cos 1.0 V _{pp}	Min. 120 Ω -

¹ Factory settings: Output level TTL.

² Only with devices with M23 connector outlet in connection with the electrical interfaces M, U, V and W.

³ Short-circuit opposite to another channel, US or GND permissible for max. 30 s.

⁴ Short-circuit opposite to another channel, or GND permissible for max. 30 s.

⁵ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

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	E	B	A
Operating current with no load			
4.5 ... 5.5 V, TTL/RS422	40 mA		
4.5 V...5.5 V, Sin/Cos 1.0 V _{pp}	-	40 mA	-
Power consumption with no load			
10 ... 32 V, TTL/RS422	0.5 W		
10 ... 32 V, HTL/push pull	0.5 W		
4.5 ... 5.5 V, TTL/RS422, 0-SET	-	0.7 W	
10 ... 32 V, TTL/RS422, 0-SET	-	0.7 W	
10 ... 32 V, HTL/push pull, 0-SET	-	0.7 W	
4.5 ... 32 V, TTL/HTL pro programmable	-	0.7 W	
4.5 ... 32 V, TTL/HTL programmable, 0-SET	-	0.7 W	
Reverse polarity protection			
4.5 ... 5.5 V, TTL/RS422	No		
10 ... 32 V, TTL/RS422	Yes		
10 ... 32 V, HTL/push pull	Yes		
4.5 V...5.5 V, Sin/Cos 1.0 V _{pp}	-		
4.5 ... 5.5 V, TTL/RS422, 0-SET	-	Yes	
10 ... 32 V, TTL/RS422, 0-SET	-	Yes	
10 ... 32 V, HTL/push pull, 0-SET	-	Yes	
4.5 ... 32 V, TTL/HTL programmable	-	Yes	
4.5 ... 32 V, TTL/HTL programmable, 0-SET	-	Yes	
Short-circuit protection of the outputs			
4.5 ... 5.5 V, TTL/RS422	Yes ³⁾		
10 ... 32 V, TTL/RS422	Yes ⁴⁾		
10 ... 32 V, HTL/push pull	Yes ³⁾		
4.5 V...5.5 V, Sin/Cos 1.0 V _{pp}	-	Yes ³⁾	-
4.5 ... 5.5 V, TTL/RS422, 0-SET	-	Yes ³⁾	
10 ... 32 V, TTL/RS422, 0-SET	-	Yes ⁴⁾	
10 ... 32 V, HTL/push pull, 0-SET	-	Yes ³⁾	
4.5 ... 32 V, TTL/HTL programmable	-	Yes, HTL ³⁾ and TTL ⁴⁾	
4.5 ... 32 V, TTL/HTL programmable, 0-SET	-	Yes, HTL ³⁾ and TTL ⁴⁾	
MTTFd: mean time to dangerous failure ⁵⁾	300 years (EN ISO 13849-1)		

¹⁾ Factory settings: Output level TTL.

²⁾ Only with devices with M23 connector outlet in connection with the electrical interfaces M, U, V and W.

³⁾ Short-circuit opposite to another channel, US or GND permissible for max. 30 s.

⁴⁾ Short-circuit opposite to another channel, or GND permissible for max. 30 s.

⁵⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

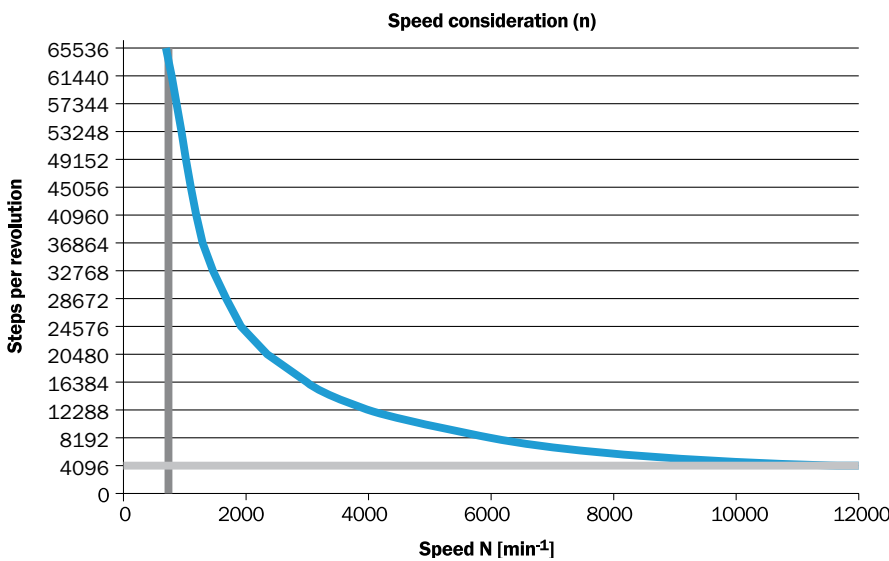
	E	B	A
EMC ¹⁾	As per EN 61000-6-2 and EN 61000-6-3		
Enclosure rating as per IEC 60529			
On the shaft	IP 65		
On the housing, connector outlet ²⁾	IP 67 (through hollow shaft IP 65)		
On the housing, cable outlet	IP 67 (through hollow shaft IP 65)		
Permissible relative air humidity	90 % condensation on the optical scanner not permissible		
Working temperature range	0 ... +85 °C	-30 ... +100 °C	
Storage temperature range (without packaging)	-40 ... +100 °C		
Resistance			
To shocks as per EN 60068-2-27	50 g/6 ms	70 g/6 ms	60 g/6 ms
To vibration as per EN 60068-2-6	20 g/ 10 ... 2,000 Hz	30 g/ 10 ... 2,000 Hz	20 g/ 10 ... 2,000 Hz

¹⁾ For the interfaces 10 ... 32 V, TTL/RS422 and 10 ... 32 V, HTL/push pull as per EN 61000-6-2 and EN 61000-6-4, devices of class A.

²⁾ When the mating connector is fitted.

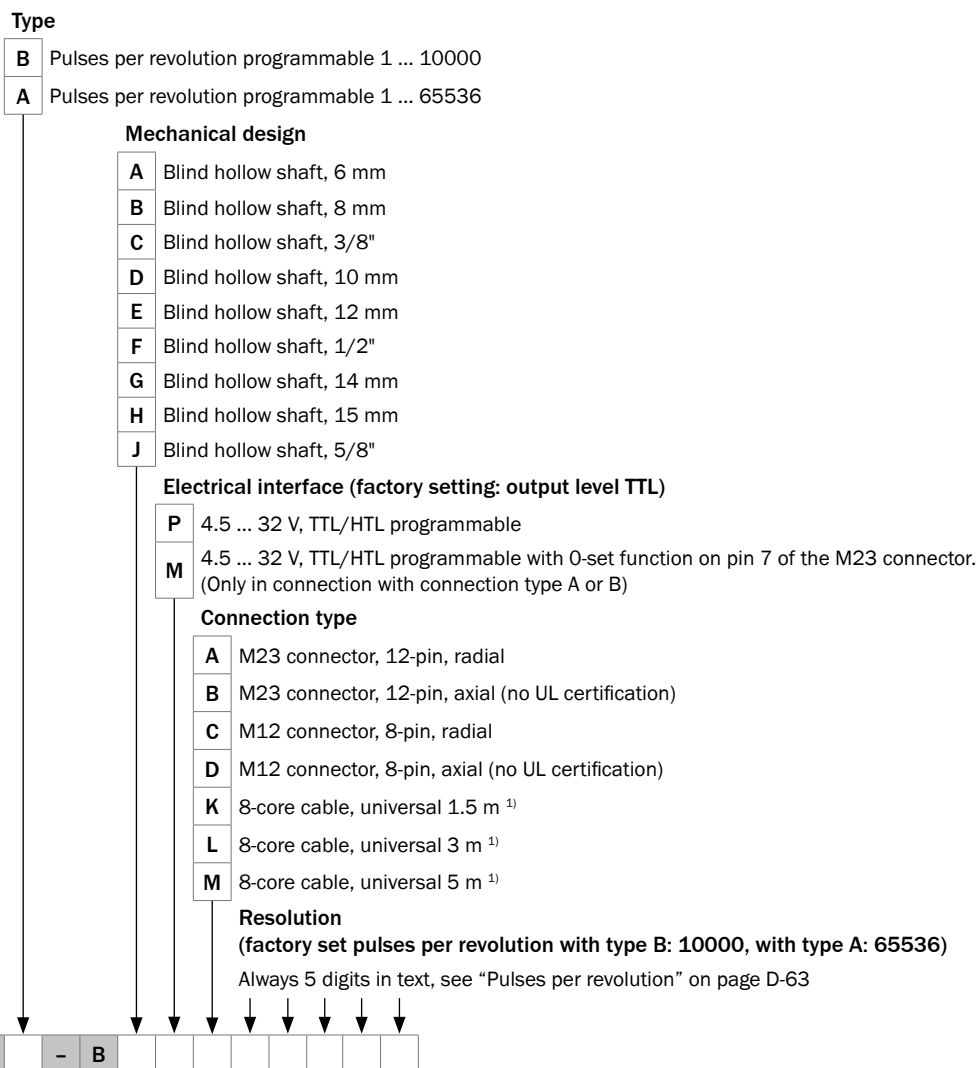
Maximum revolution range

D



Type code for blind hollow shaft, programmable

D

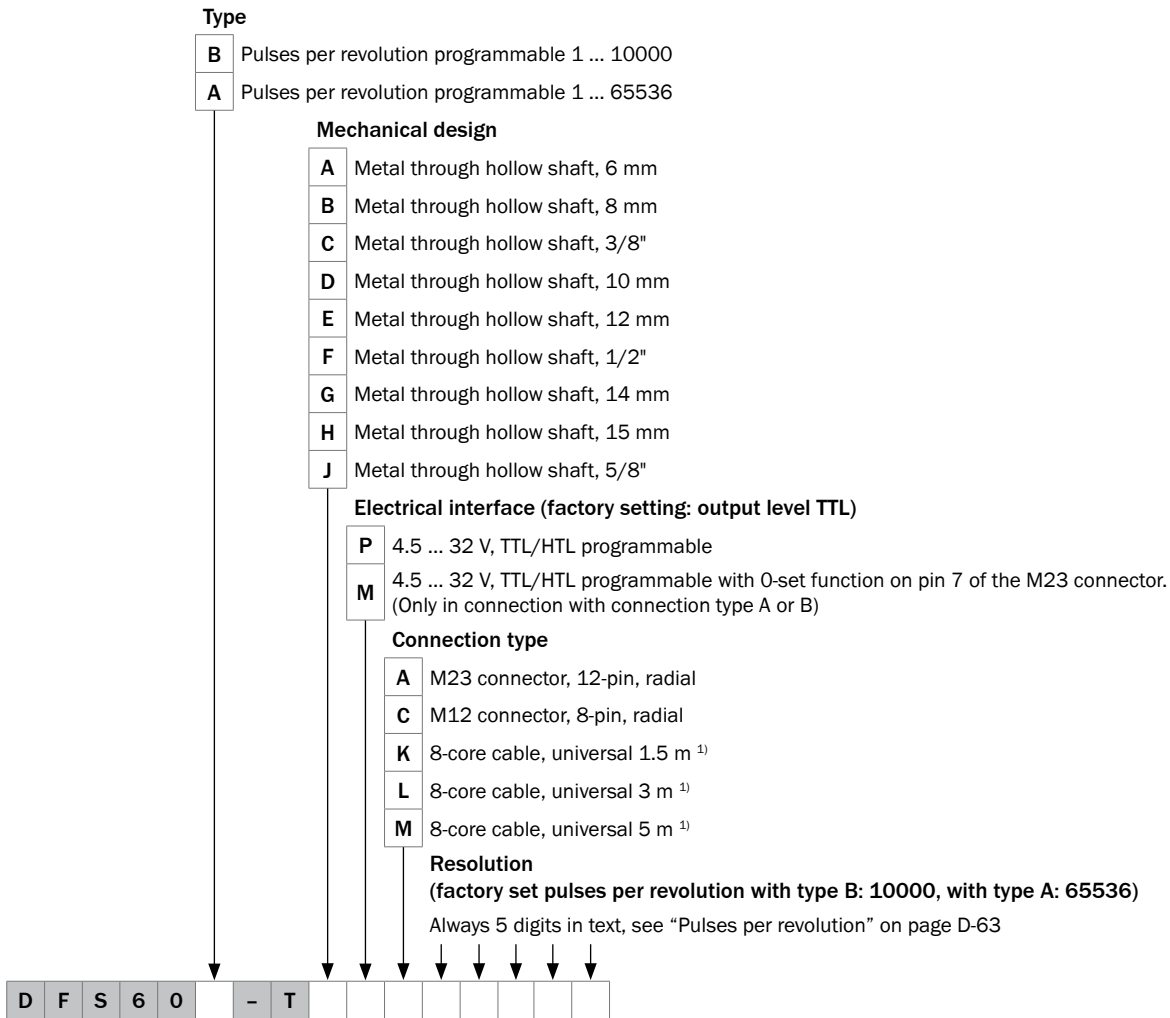


¹⁾ The universal cable outlet is positioned in such a way that kink-free laying in radial or axial direction is possible.

The following features can be programmed:

- Pulses per revolution from 1 ... 65536 using programming tools PGT-08-S or PGT-10-S (see accessories on page D-75).
- Zero pulse width electrically 90°, 180°, 270° using programming tools PGT-08-S or PGT-10-S (see accessories on page D-75).
- Zero pulse width mechanically 1° ... 359° using programming tool PGT-10-S (see accessories on page D-75).
- Level of the output voltage TTL/HTL using programming tools PGT-08-S or PGT-10-S (see accessories on page D-75).
- 0-SET function using programming tools PGT-08-S or PGT-10-S (see accessories on page D-75).
- 0-SET function via PIN 7 of the M23 connector by applying Us for at least 250 ms.

Type code for through hollow shaft, **programmable**



D

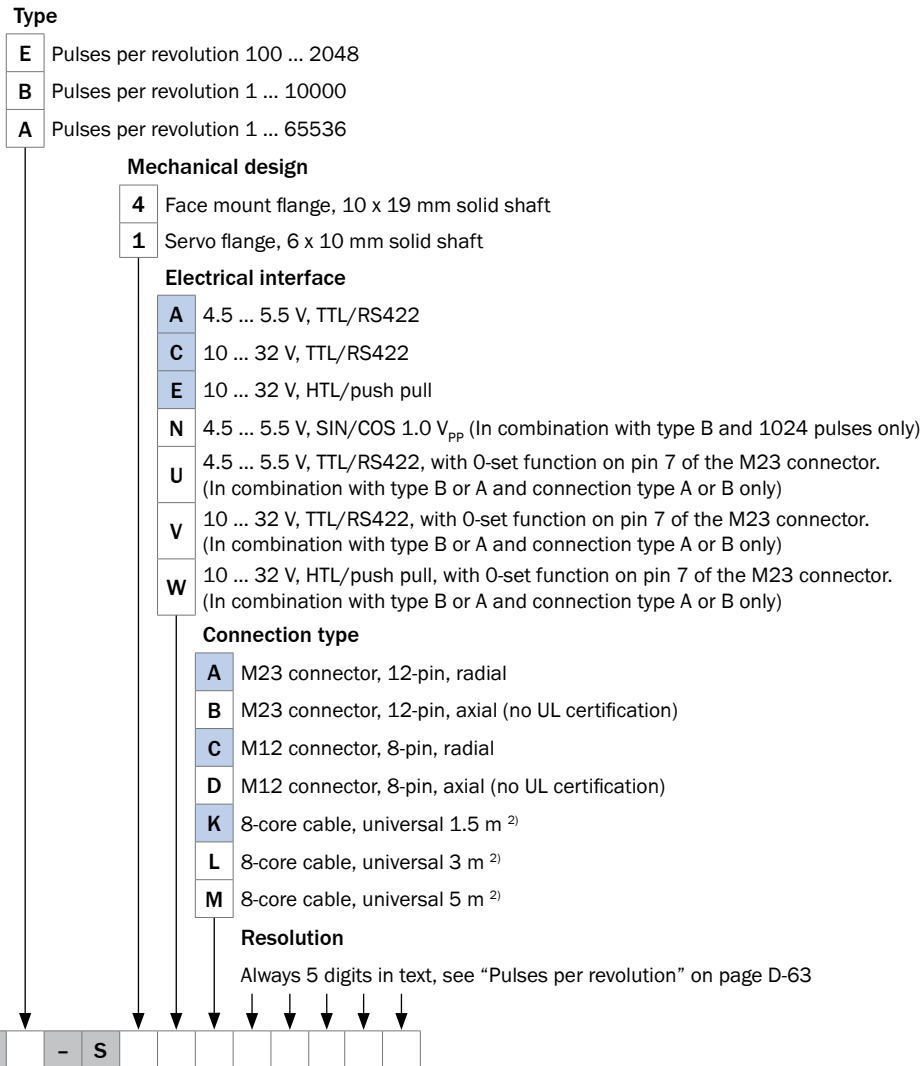
¹⁾ The universal cable outlet is positioned in such a way that kink-free laying in radial or axial direction is possible.

The following features can be programmed:

- Pulses per revolution from 1 ... 65536 using programming tools PGT-08-S or PGT-10-S (see accessories on page D-75).
- Zero pulse width electrically 90°, 180°, 270° using programming tools PGT-08-S or PGT-10-S (see accessories on page D-75).
- Zero pulse width mechanically 1° ... 359° using programming tool PGT-10-S (see accessories on page D-75).
- Level of the output voltage TTL/HTL using programming tools PGT-08-S or PGT-10-S (see accessories on page D-75).
- 0-SET function using programming tools PGT-08-S or PGT-10-S (see accessories on page D-75).
- 0-SET function via PIN 7 of the M23 connector by applying Us for at least 250 ms.

Type code for face mount flange and servo flange (highlighted in blue – standard types ¹⁾), not programmable

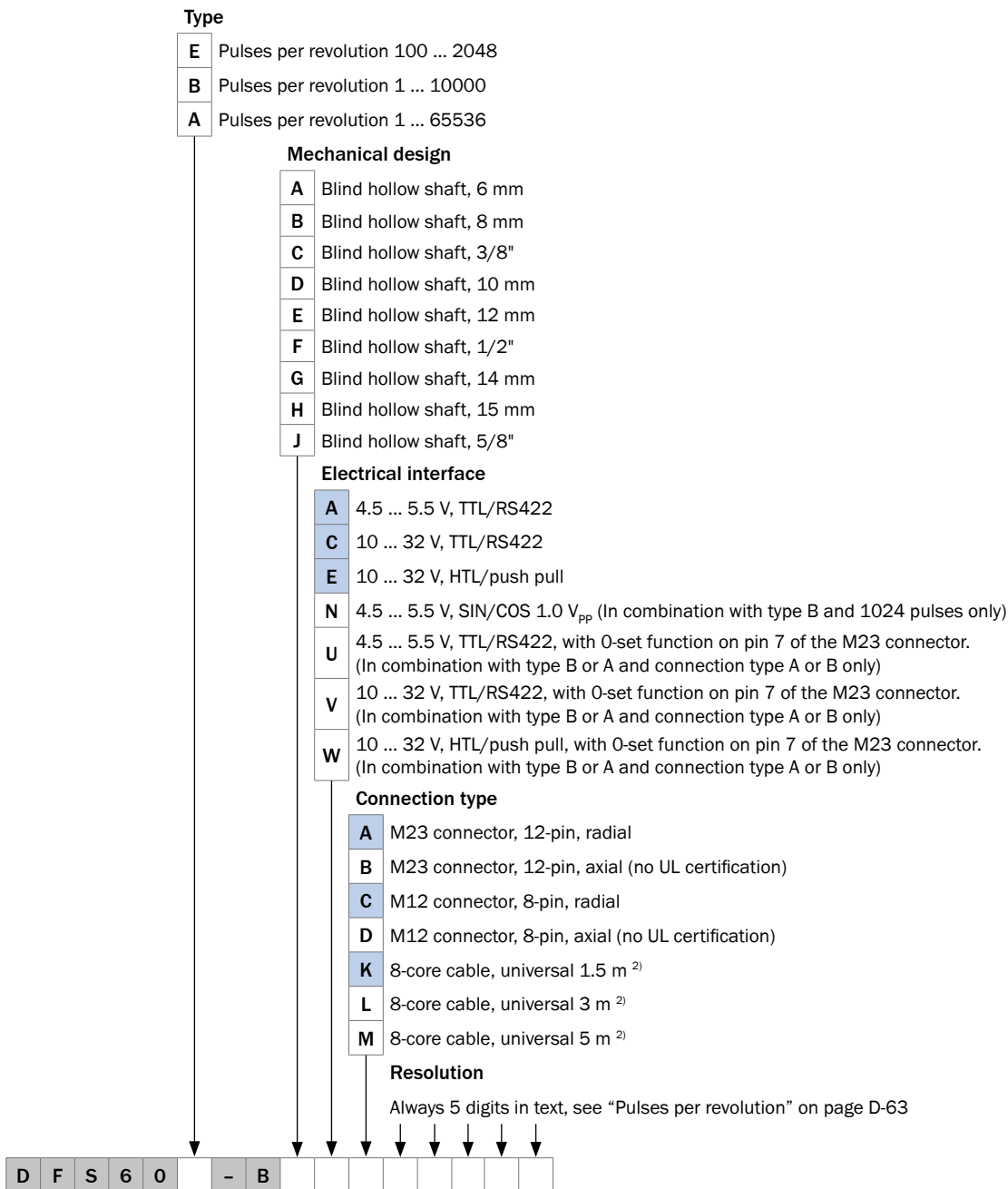
D



¹⁾ The properties in the type code in blue and of the table "Pulses per revolution" are preferred types. Encoder versions compiled exclusively from preferred features are available in limited quantities from the warehouse with no minimum order quantity. They are therefore ideal for fast delivery worldwide.

²⁾ The universal cable outlet is positioned in such a way that kink-free laying in radial or axial direction is possible.

Type code for blind hollow shaft (highlighted in blue – standard types ¹⁾), **not programmable**



¹⁾ The properties in the type code in blue and of the table "Pulses per revolution" are preferred types. Encoder versions compiled exclusively from preferred features are available in limited quantities from the warehouse with no minimum order quantity. They are therefore ideal for fast delivery worldwide.

²⁾ The universal cable outlet is positioned in such a way that kink-free laying in radial or axial direction is possible.

Type code for through hollow shaft (highlighted in blue – standard types ¹⁾), **not programmable**

D

Type

E	Pulses per revolution 100 ... 2048
B	Pulses per revolution 1 ... 10000
A	Pulses per revolution 1 ... 65536

Mechanical design

A	Metal through hollow shaft, 6 mm
B	Metal through hollow shaft, 8 mm
C	Metal through hollow shaft, 3/8"
D	Metal through hollow shaft, 10 mm
E	Metal through hollow shaft, 12 mm
F	Metal through hollow shaft, 1/2"
G	Metal through hollow shaft, 14 mm
H	Metal through hollow shaft, 15 mm
J	Metal through hollow shaft, 5/8"

Electrical interface

A	4.5 ... 5.5 V, TTL/RS422
C	10 ... 32 V, TTL/RS422
E	10 ... 32 V, HTL/push pull
N	4.5 ... 5.5 V, SIN/COS 1.0 V _{pp} (In combination with type B and 1024 pulses only)
U	4.5 ... 5.5 V, TTL/RS422, with 0-set function on pin 7 of the M23 connector. (In combination with type B or A and connection type A or B only)
V	10 ... 32 V, TTL/RS422, with 0-set function on pin 7 of the M23 connector. (In combination with type B or A and connection type A or B only)
W	10 ... 32 V, HTL/push pull, with 0-set function on pin 7 of the M23 connector. (In combination with type B or A and connection type A or B only)

Connection type

A	M23 connector, 12-pin, radial
C	M12 connector, 8-pin, radial
K	8-core cable, universal 1.5 m ²⁾
L	8-core cable, universal 3 m ²⁾
M	8-core cable, universal 5 m ²⁾

Resolution

Always 5 digits in text, see "Pulses per revolution" on page D-63



¹⁾ The properties in the type code in blue and of the table "Pulses per revolution" are preferred types. Encoder versions compiled exclusively from preferred features are available in limited quantities from the warehouse with no minimum order quantity. They are therefore ideal for fast delivery worldwide.

²⁾ The universal cable outlet is positioned in such a way that kink-free laying in radial or axial direction is possible.

Pulses per revolution (highlighted in blue – standard types ¹⁾)

	E	B	A
Pulses per revolution ²⁾	00100	00100	00100
	00200	00200	00200
	00250	00250	00250
	00256	00300	00300
	00314	00314	00314
	00360	00360	00360
	00500	00500	00500
	00512	00512	00512
	00720	00720	00720
	01000	01000	01000
	01024	01024	01024
	01250	01250	01250
	02000	02000	02000
	02048	02048	02048
		02500	02500
		03600	03600
		04000	04000
		04096	04096
		05000	05000
		07200	07200
		08192	08192
		10000	10000
			16384
			32768
		65536	

Others on request

Others on request

¹⁾ The properties in the type code in blue and of the table "Pulses per revolution" are preferred types. Encoder versions compiled exclusively from preferred features are available in limited quantities from the warehouse with no minimum order quantity. They are therefore ideal for fast delivery worldwide.

²⁾ The electrical interface N (Sin/Cox 1.0 V_{pp}) can only be ordered with 1024 pulses per revolution.

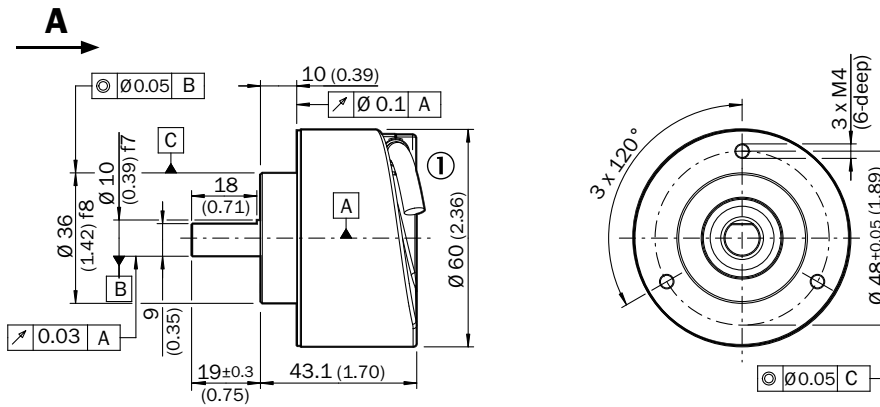


Dimensional drawings

dimensions in mm (inch)

Face mount flange

Cable outlet

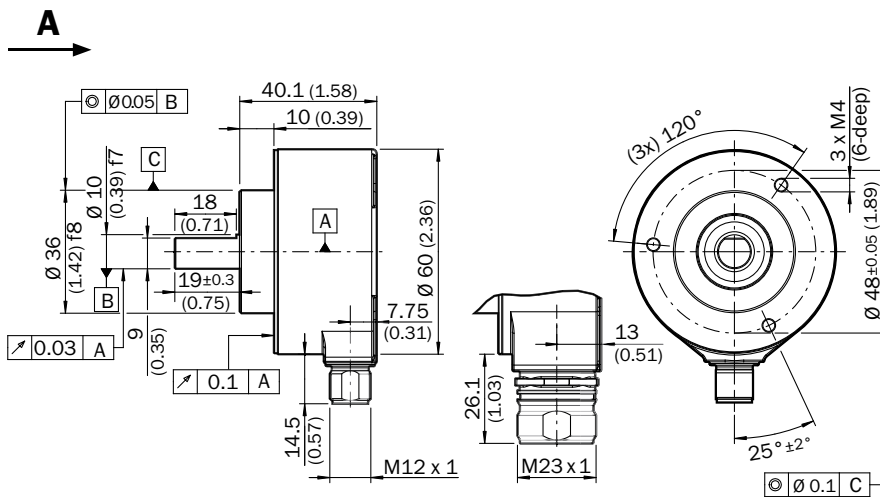


General tolerances as per DIN ISO 2768-mk

① Cable diameter = 5.6 ± 0.2 mm; bend radius R = 30 mm

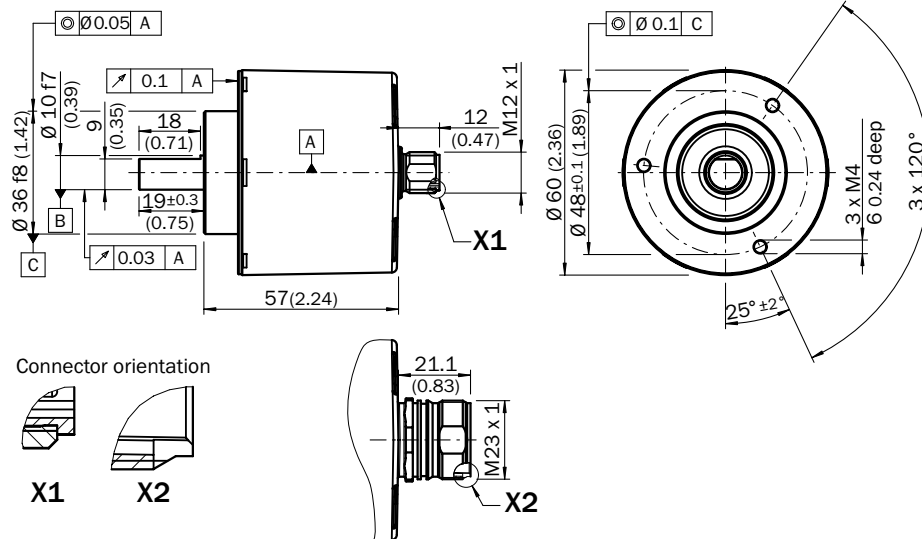
D

Radial connector outlet M12 and M23



General tolerances as per DIN ISO 2768-mk

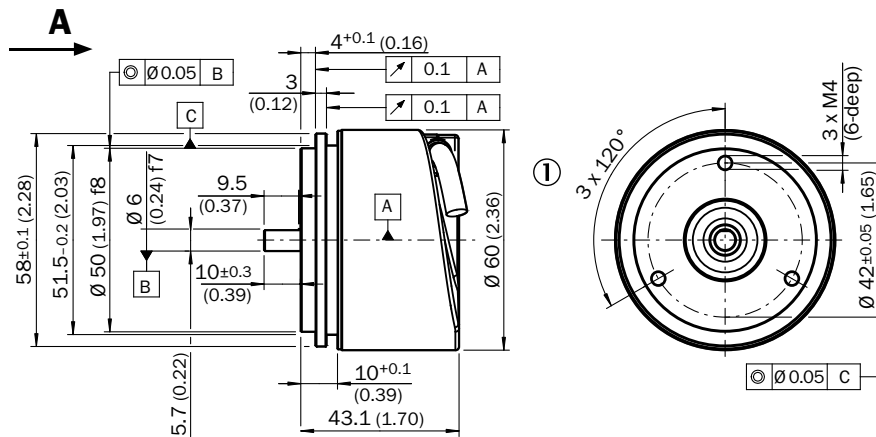
Axial connector outlet M12 and M23



General tolerances as per DIN ISO 2768-mk

Servo flange

Cable outlet

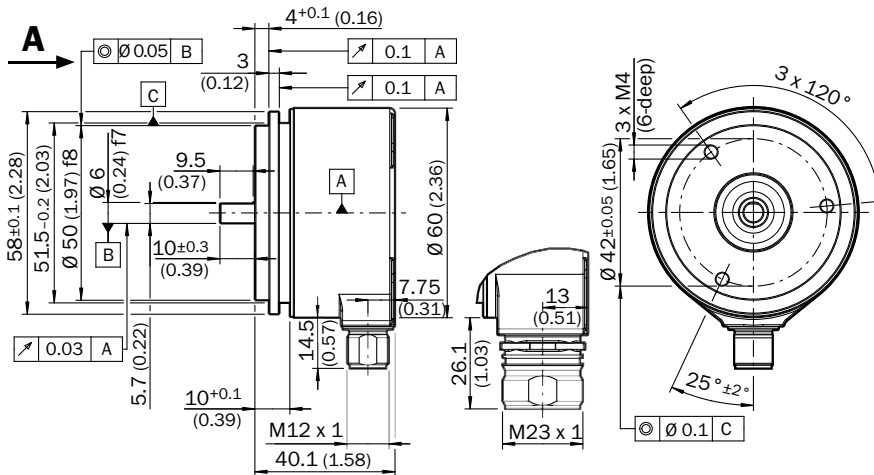


General tolerances as per DIN ISO 2768-mk

① Cable diameter = 5.6 ± 0.2 mm; bend radius R = 30 mm

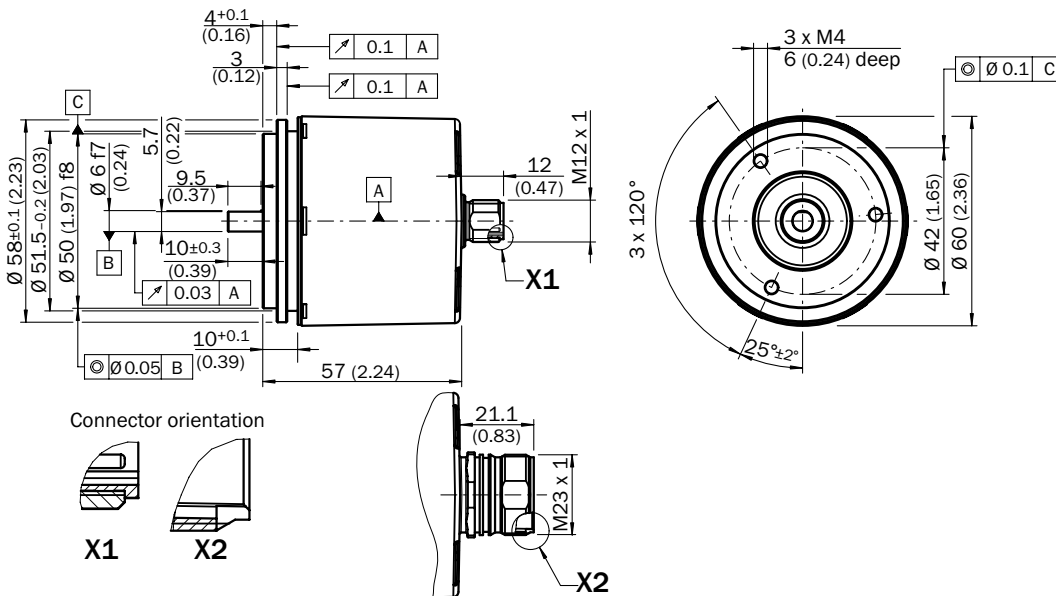
D

Radial connector outlet M12 and M23



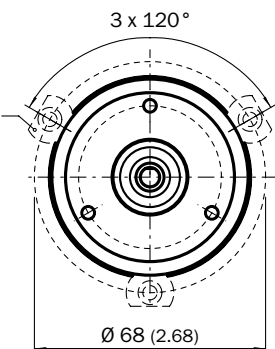
General tolerances as per DIN ISO 2768-mk

Axial connector outlet M12 and M23

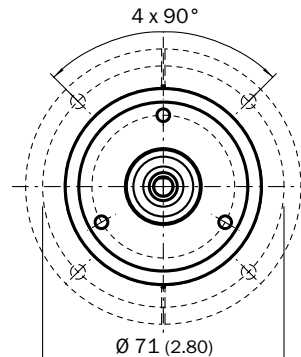


General tolerances as per DIN ISO 2768-mk

Mounting suggestion for small servo clamp part no. 2029166

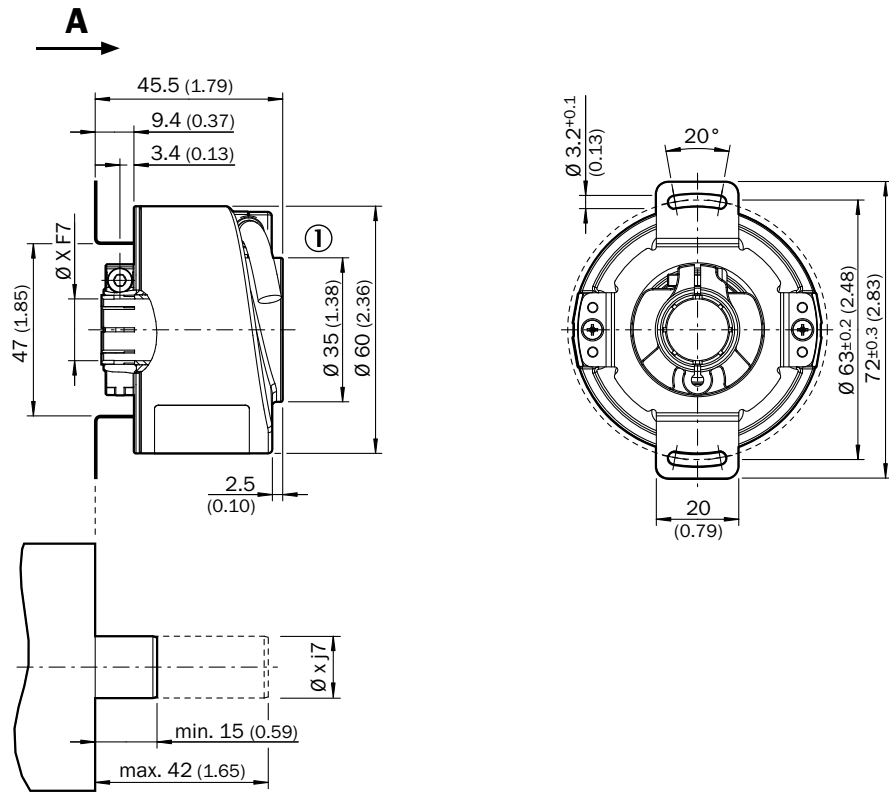


Mounting suggestion for half-shell servo clamp part no. 2029165



Blind hollow shaft

Cable outlet



General tolerances as per DIN ISO 2768-mk

① Cable diameter = 5.6 ± 0.2 mm; bend radius $R = 30$ mm

XF7 = Hollow shaft diameter, see table below

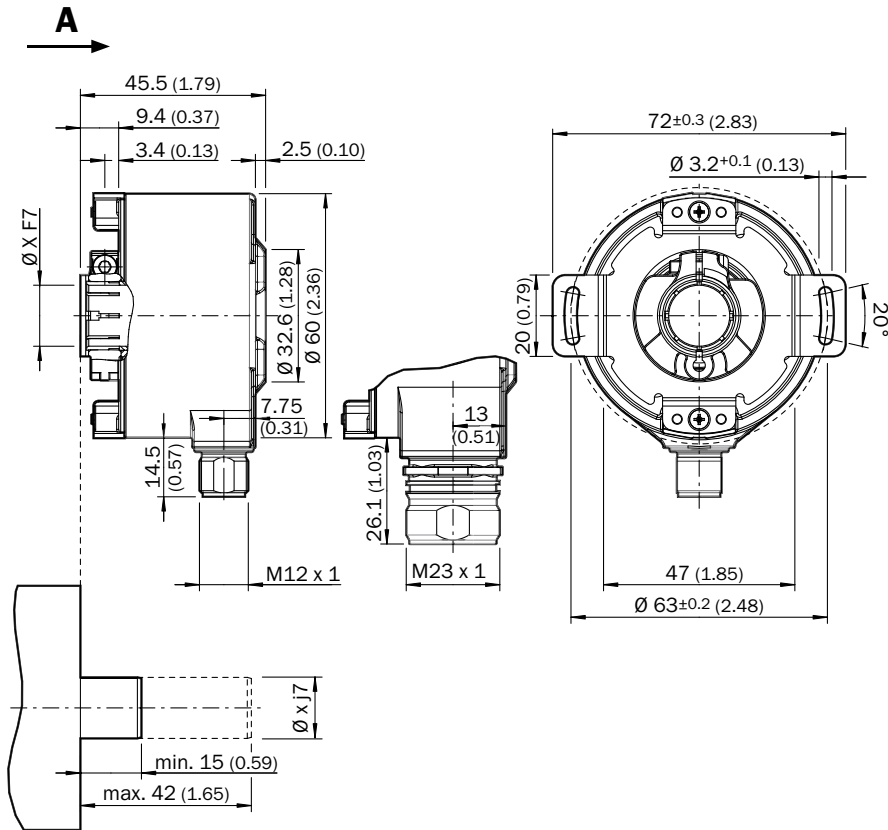
xj7 = Shaft diameter, on the customer side

Diameter XF7

- Blind hollow shaft 6 mm
- Blind hollow shaft 8 mm
- Blind hollow shaft 3/8"
- Blind hollow shaft 10 mm
- Blind hollow shaft 12 mm
- Blind hollow shaft 1/2"
- Blind hollow shaft 14 mm
- Blind hollow shaft 15 mm
- Blind hollow shaft 5/8"

D

Radial connector outlet M12 and M23



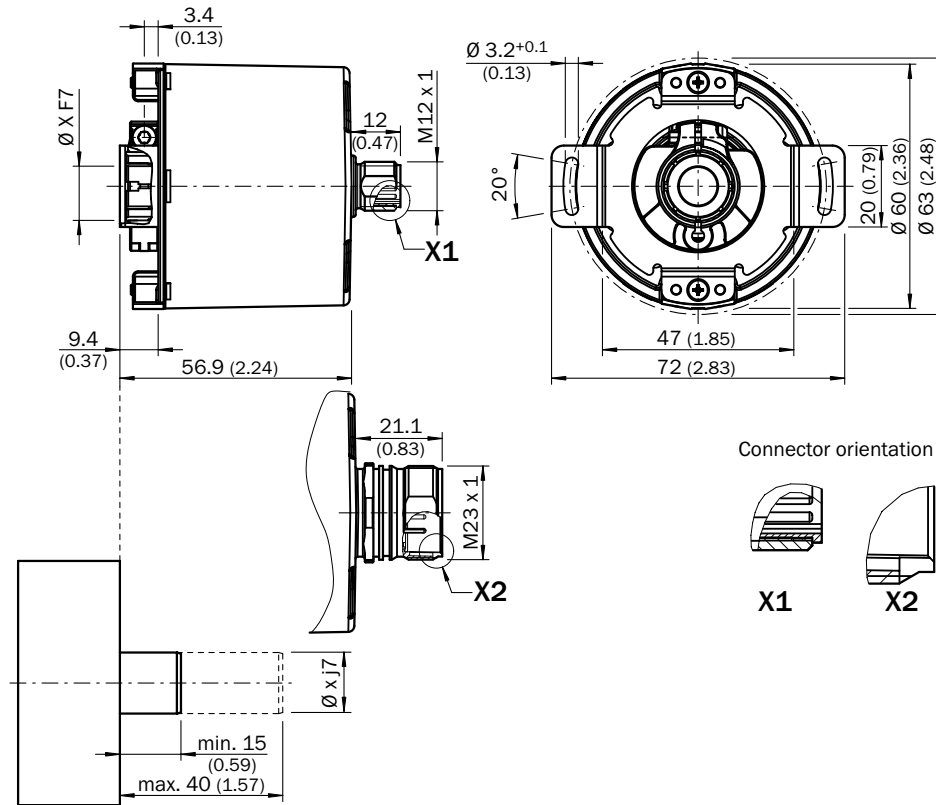
General tolerances as per DIN ISO 2768-mk

XF7 = Hollow shaft diameter, see table below

xj7 = Shaft diameter, on the customer side

Diameter XF7
Blind hollow shaft 6 mm
Blind hollow shaft 8 mm
Blind hollow shaft 3/8"
Blind hollow shaft 10 mm
Blind hollow shaft 12 mm
Blind hollow shaft 1/2"
Blind hollow shaft 14 mm
Blind hollow shaft 15 mm
Blind hollow shaft 5/8"

Axial connector outlet M12 and M23



Customer side

General tolerances as per DIN ISO 2768-mk

XF7 = Hollow shaft diameter, see table below

xj7 = Shaft diameter, on the customer side

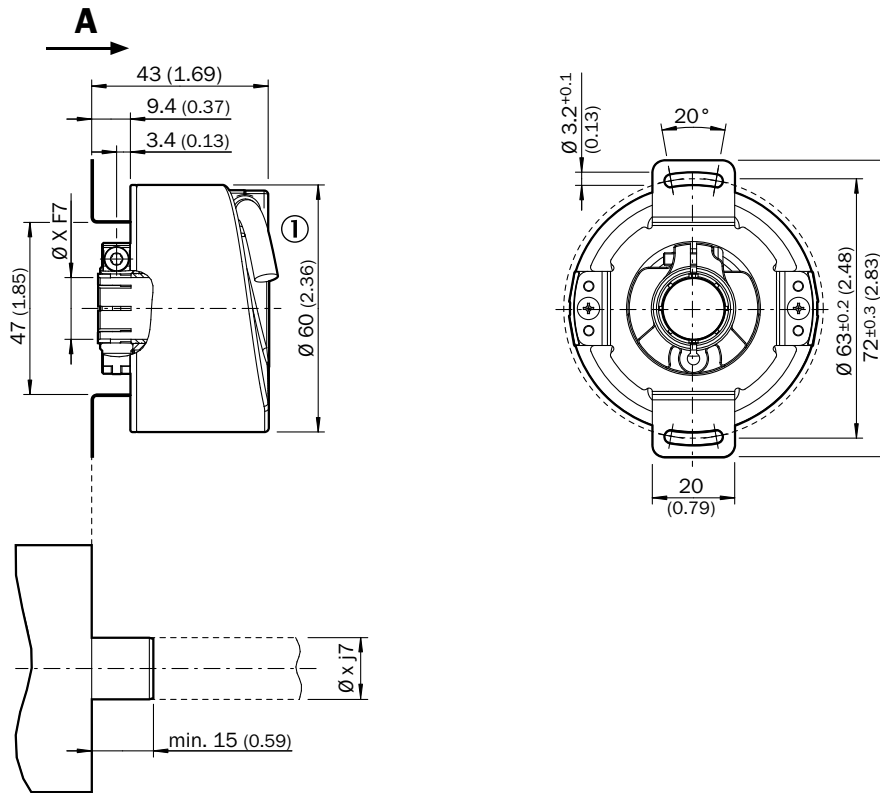
Diameter XF7

- Blind hollow shaft 6 mm
- Blind hollow shaft 8 mm
- Blind hollow shaft 3/8"
- Blind hollow shaft 10 mm
- Blind hollow shaft 12 mm
- Blind hollow shaft 1/2"
- Blind hollow shaft 14 mm
- Blind hollow shaft 15 mm
- Blind hollow shaft 5/8"

D

Through hollow shaft

Metal, cable outlet



General tolerances as per DIN ISO 2768-mk

① Cable diameter = 5.6 ± 0.2 mm; bend radius R = 30 mm

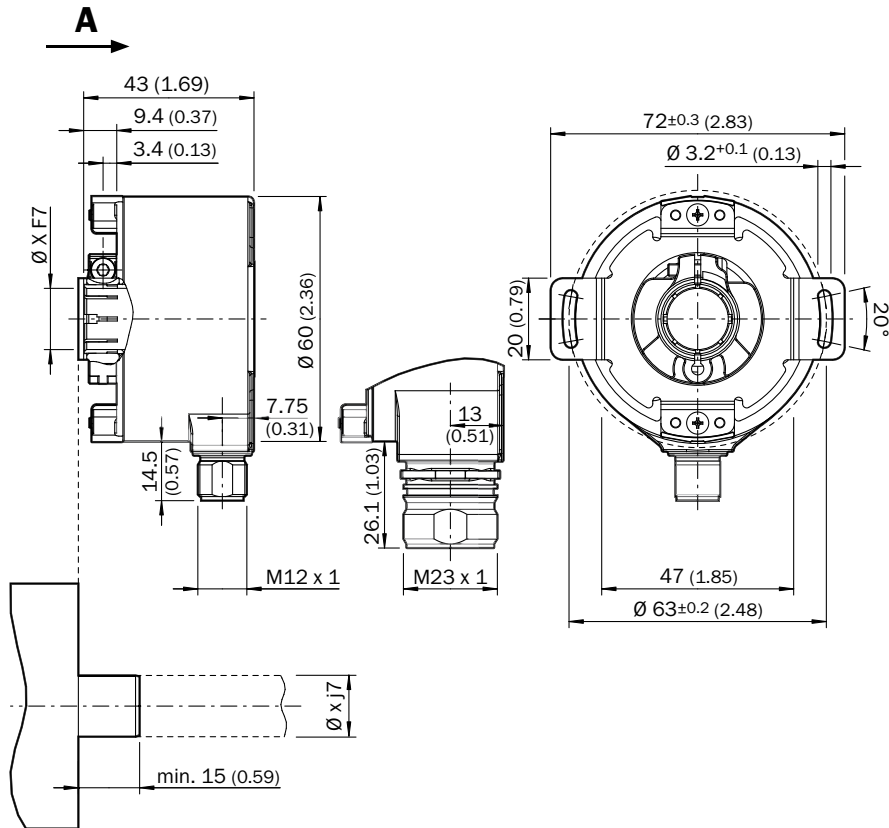
XF7 = Hollow shaft diameter, see table below

xj7 = Shaft diameter, on the customer side

Diameter XF7

- Blind hollow shaft 6 mm
- Blind hollow shaft 8 mm
- Blind hollow shaft 3/8"
- Blind hollow shaft 10 mm
- Blind hollow shaft 12 mm
- Blind hollow shaft 1/2"
- Blind hollow shaft 14 mm
- Blind hollow shaft 15 mm
- Blind hollow shaft 5/8"

Metal, radial connector outlet M12 and M23



General tolerances as per DIN ISO 2768-mk

XF7 = Hollow shaft diameter, see table below

xj7 = Shaft diameter, on the customer side

Diameter XF7

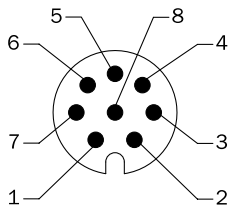
- Blind hollow shaft 6 mm
- Blind hollow shaft 8 mm
- Blind hollow shaft 3/8"
- Blind hollow shaft 10 mm
- Blind hollow shaft 12 mm
- Blind hollow shaft 1/2"
- Blind hollow shaft 14 mm
- Blind hollow shaft 15 mm
- Blind hollow shaft 5/8"

D

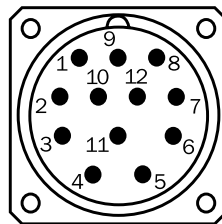
PIN and core assignment

8-core cable

View of M12 device connector on encoder



View of M23 device connector on encoder



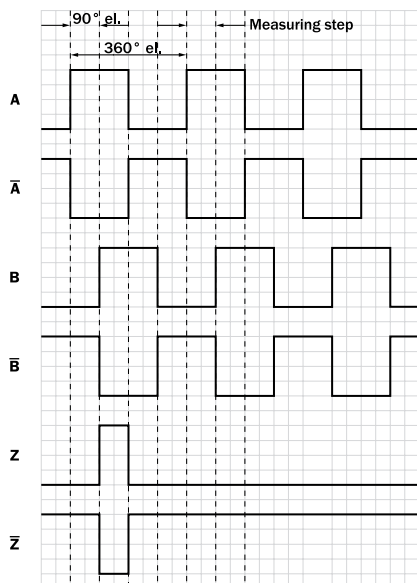
PIN, 8-pin, M12 connector	PIN, 12-pin, M23 connector	Core colors of encoders with cable outlet	TTL/HTL signal	SIN/COS 1.0 V _{PP}	Explanation
1	6	Brown	\bar{A}	COS-	Signal cable
2	5	White	A	COS+	Signal cable
3	1	Black	\bar{B}	SIN-	Signal cable
4	8	Pink	B	SIN+	Signal cable
5	4	Yellow	\bar{Z}	\bar{Z}	Signal cable
6	3	Lilac	Z	Z	Signal cable
7	10	Blue	GND	GND	Ground connection of the encoder
8	12	Red	+U _s	+U _s	Supply voltage (volt-free to housing)
-	9	-	N.C.	N.C.	Not assigned
-	2	-	N.C.	N.C.	Not assigned
-	11	-	N.C.	N.C.	Not assigned
-	7 ¹⁾	-	0-SET ¹⁾	N.C.	Zeropulse Teach ¹⁾
Shield	Shield	Shield	Shield	Shield	Shield connected to housing on side of encoder. Connected to ground on side of control.

¹⁾ For electrical interfaces only: M, U, V, W with 0-SET function on PIN 7 on M23 connector. The 0-SET input is used to set the zero pulse on the current shaft position. If the 0-SET input is applied to U_s for longer than 250 ms, after it has been open for at least 1,000 ms or applied to GND, the current shaft position is assigned the zero pulse signal "Z".

D

Interfaces

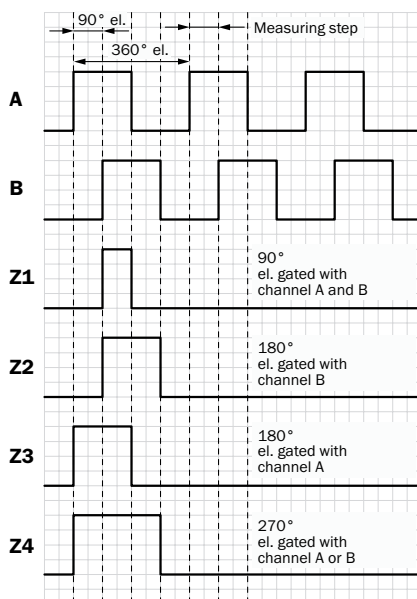
Signal outputs for electrical interfaces TTL and HTL



Cw looking towards the encoder shaft pointing towards “A” , see dimensional drawing.

Supply voltage	Output
4.5 ... 5.5 V	TTL
10 ... 32 V	TTL
10 ... 32 V	HTL

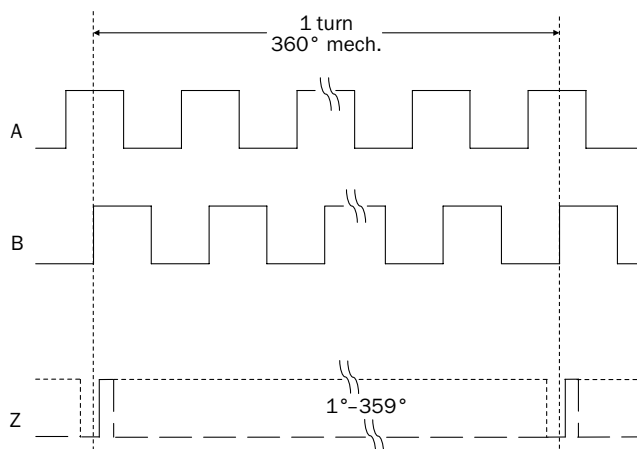
Electrical zero pulse width 90°, 180° or 270° programmable. Width of the zero pulse in relation to a pulse period.



Cw looking towards the encoder shaft pointing towards “A” , see dimensional drawing.

Supply voltage	Output
4.5 ... 32 V	HTL/TTL programmable

Mechanical zero pulse width 1° to 359° programmable. Width of the zero pulse in relation to a mechanical revolution of the shaft.

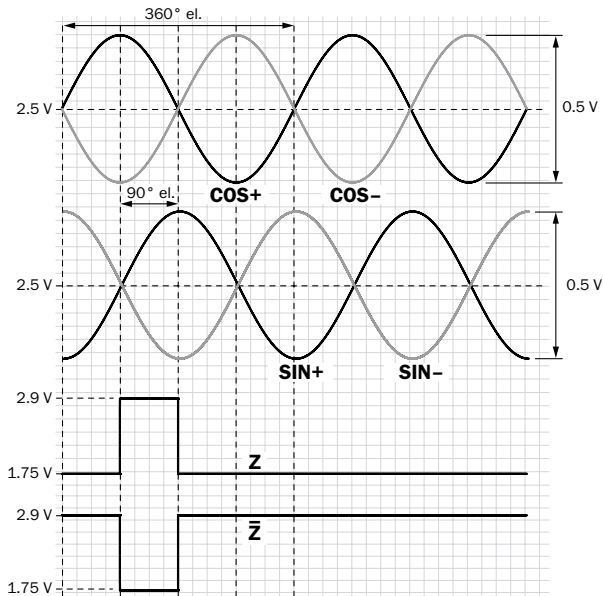


Electrical interfaces SIN/COS 1.0 V_{pp}

Power supply	Output
4.5 ... 5.5 V	Sine 0.5 V _{pp}

Signal **before** differential generation at load 120 Ω and U_S = 5 V

Signal diagram for clockwise rotation of the shaft looking in direction "A" (shaft)



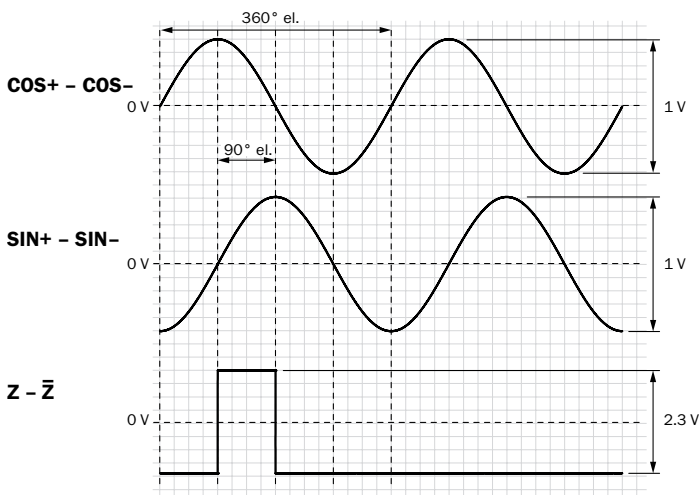
D

Interface signals Sin+, SIN-, COS+, COS-	Signal before differential generation at load 120 Ω	Signal offset
Analog differential	0.5 V _{pp} ± 20 %	2.5 V ± 10 %

Interface signals Z, Z̄	Signal before differential generation at load 120 Ω
Digital differential	Low: 1.75 V ± 15 %; High: 2.9 V ± 15 %

Signal **after** differential generation at load 120 Ω and U_S = 5 V

Signal diagram for clockwise rotation of the shaft looking in direction "A" (shaft)



Recommended accessories

Programming Tools

Description	Model name	Part no.
Programming tool for connection to standard PC or notebook via USB port	PGT-08-S	1036616
The PGT-10-S is an intuitively operated standalone programming device for SICK incremental encoders. Its low weight and compact dimensions make it portable and usable everywhere.	PGT-10-S	1052967

Adapter cable for programming tools

The following adapter cables are required to program the SICK incremental encoders.

Description	Model name	Part no.
Adapter cable for incremental programming tool with SUB-D 9-pin cable connector and M12 8-pin cable socket, pre-wired with 8-core cable, 4 x 2 x 0.08 mm ² , shielded, suitable for incremental encoder with M12 plug connector	DSL-2D08-G0M5AC3	2046579
Adapter cable for incremental programming tool with SUB-D 9-pin cable connector and M23 12-pin cable socket, pre-wired with 8-core cable, 4 x 2 x 0.08 mm ² , shielded, suitable for incremental encoder with M23 plug connector	DSL-3D08-G0M5AC3	2046580
Adapter cable for incremental programming tool with SUB-D 9-pin cable connector, shielded, suitable for incremental encoder with cable outlet	DSL-0D08-G0M5AC3	2061739

WARNING: Programming of the incremental encoders using the adapter cables for the absolute encoders will destroy the incremental encoders. Please ensure correct use!

D

Plug connectors and cables

M12 screw-in system

- Straight, shielded, convertible (on adapter)

Contacts	Cable diameter	Description	Model name	Part no.
8	4 ... 8 mm	Cable connector, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	STE-1208-GA01	6044892
		Cable socket, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	DOS-1208-GA01	6045001

- Straight, shielded

Description	Cable length	Model name	Part no.
Cable socket, 8-pin, straight, pre-wired with 8-core cable, 4 x 2 x 0.25 mm ² , shielded, cable diameter 7.0 mm	2.0 m	DOL-1208-G02MAC1	6032866
	5.0 m	DOL-1208-G05MAC1	6032867
	10.0 m	DOL-1208-G10MAC1	6032868
	20.0 m	DOL-1208-G20MAC1	6032869

Cables

- With shield

Cores	Cable diameter	Description	Cable length	Model name	Part no.
8	5.6 mm	Data cable by the meter 4 x 2 x 0.15 mm ² with shielding, diam. 5.6 mm	Bulk goods	LTG-2308-MWENC	6027529
			0.5 m	DOL-0J08-G0M5AA3	2046873
		Cables including seal, 4 x 2 x 0.15 mm ² for incremental encoder with universal cable outlet, with shielding, diam. 5.6 mm	1.5 m	DOL-0J08-G1M5AA3	2046874
			3.0 m	DOL-0J08-G03MAA3	2046875
			5.0 m	DOL-0J08-G05MAA3	2046876
			10.0 m	DOL-0J08-G10MAA3	2046877

D



Attention!

The flexible wires twisted in pairs must be assigned in accordance with the signals.

- White/Brown = A/ \bar{A}
- Lilac/Yellow = Z/ \bar{Z}
- Pink/Black = B/ \bar{B}
- Red/Blue = preferably U_s and GND

Round screw system M23

- Straight, shielded

Description	Cable length	Model name	Part no.
M23 cable connector, 12-pin, straight, 8-core cable, including seal, 4 x 2 x 0.15 mm ² , with shielding, cable diameter 5.6 mm	0.35 m	STL-2312-GM35AA3	2061621
	1.0 m	STL-2312-G01MAA3	2061622
	2.0 m	STL-2312-G02MAA3	2061504

PIN allocation connector M23

PIN	Signal TTL, HTL	Signal sine 0.5 V _{pp}
1	\bar{B}	SIN-
2	Not connected	Not connected
3	Z	Z
4	\bar{Z}	\bar{Z}
5	A	COS+
6	\bar{A}	COS-
7	Not connected	Not connected
8	B	SIN+
9	Shield	Shield
10	GND	GND
11	Not connected	Not connected
12	U _s	U _s
Shield	Shield ¹⁾	Shield ¹⁾

**Attention!**

The flexible wires twisted in pairs must be assigned in accordance with the signals.

White/Brown	= A/ \bar{A} or COS+/COS-
Lilac/Yellow	= Z/ \bar{Z}
Pink/Black	= B/ \bar{B} or SIN+/SIN-
Red/Blue	= preferably U _s and GND

¹⁾ Shield connected to housing on side of encoder. Connected to ground on side of control.

Warning! Only in combination with the electrical interfaces A, C, E and P.

D

M23 screw-in system

- Straight, shielded

Contacts	Description	Model name	Part no.
12	Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	STE-2312-G	6027537
	Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	DOS-2312-G	6027538

Description	Cable length	Model name	Part no.
Cable socket, M23, 12-pin, straight, pre-wired with 11-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, cable diameter 7.8 mm ¹⁾	2.0 m	DOL-2312-G02MLA3	2030682
	7.0 m	DOL-2312-G07MLA3	2030685
	10.0 m	DOL-2312-G10MLA3	2030688
	15.0 m	DOL-2312-G15MLA3	2030692
	20.0 m	DOL-2312-G20MLA3	2030695
	25.0 m	DOL-2312-G25MLA3	2030699
	30.0 m	DOL-2312-G30MLA3	2030702

¹⁾ Warning! Only in combination with the electrical interfaces A, C, E and P.

Description	Cable length	Model name	Part no.
Cable socket, M23, 12-pin, straight, 11-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, cable diameter 7.8 mm ¹⁾	2.0 m	DOL-2312-G02MLD1	2062202
	7.0 m	DOL-2312-G07MLD1	2062203
	10.0 m	DOL-2312-G10MLD1	2062204
	15.0 m	DOL-2312-G15MLD1	2062205
	20.0 m	DOL-2312-G20MLD1	2062206
	25.0 m	DOL-2312-G25MLD1	2062207
	30.0 m	DOL-2312-G30MLD1	2062208

¹⁾ Warning! Only in combination with the electrical interfaces U, V, W and M.

D

Shaft adaptation

Couplings

- Bellow coupling, max. shaft offset radially ± 0.3 mm, axially 0.4 mm, angle ± 4 degrees, torsion spring stiffness of 120 Nm/rad, stainless steel bellow, aluminum hub.

Description	Model name	Part no.
Bellows coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad, material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
Bellows coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983
Bellows coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984

- Spring-disc coupling, max. shaft offset radially ± 0.3 mm, axially 0.4 mm, angle ± 2.5 degrees, torsion spring stiffness of 50 Nm/rad, aluminum flange, plastic spring washer glass-fiber reinforced.

Description	Model name	Part no.
Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985
Spring washer coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

Insulating shaft connection

Outside diameter	Inside diameter	Model name	Part no.
10 mm	8 mm	Isolierhülse 8 x 10 PEEK	2065642
12 mm	10 mm	Isolierhülse 10 x 12 PEEK	2064571
14 mm	12 mm	Isolierhülse 12 x 14 PEEK	2064573
15 mm	12.7 mm	Isolierhülse 12,7 x 15 PEEK	2064572

Torque support

Description	Model name	Part no.
Standard torque support	BEF-DS00XFX	2056812
Torque support, one-sided, 81 mm long with slot	BEF-DS01DFS/VFS	2047428
Torque support, one-sided, 179 mm long with slots	BEF-DS02DFS/VFS	2047430
Torque support, one-sided, 248 mm long with slots	BEF-DS03DFS/VFS	2047431

Mechanical adapters

Adapter flange

- Flange adapter aluminium for face mount flange, centering collar 36 mm.

Description	Model name	Part no.
Flange adapter, adapts face mount flange with 36 mm centering collar to 50 mm servo flange	BEF-FA-036-050	2029160
Flange adapter, adapts face mount flange with 36 mm centering collar to 60 mm square mounting plate	BEF-FA-036-060REC	2029162
Flange adapter, adapts face mount flange with 36 mm centering collar to 58 mm square mounting plate with shock absorber	BEF-FA-036-060RSA	2029163
Flange adapter, adapts face mount flange with 36 mm centering collar to 63 mm square mounting plate	BEF-FA-036-063REC	2034225

Mounting bell

- Mounting bell incl. mounting kit for encoder with servo flange.

Description	Model name	Part no.
Mounting bell for servo flange encoder with 50 mm centering collar incl. mounting kit	BEF-MG-50	5312987

Mounting bracket

- Mounting bracket incl. mounting kit for encoder with face mount flange

Description	Model name	Part no.
Mounting bracket for encoder with 36 mm centering collar	BEF-WF-36	2029164

Servo clamps

Description	Model name	Part no.
Servo clamp half-shells (set of 2) for 50 mm centering collar	BEF-WG-SF050	2029165
Servo clamps (set of 3), large	BEF-WK-SF	2029166

Bearing block

Description	Model name	Part no.
Bearing block for hollow shaft encoder	BEF-FA-B12-010	2042728
Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591

Measuring wheels

- Plastic surface, circumference 200 mm

Description	Model name	Part no.
Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678

- Plastic surface, circumference 500 mm

Description	Model name	Part no.
Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989

- O-ring surface, circumference 200 mm

Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224
Replacement O-ring set (set of 2) for measuring wheels (circumference 200 mm) with O-ring	BEF-OR-053-040	2064061

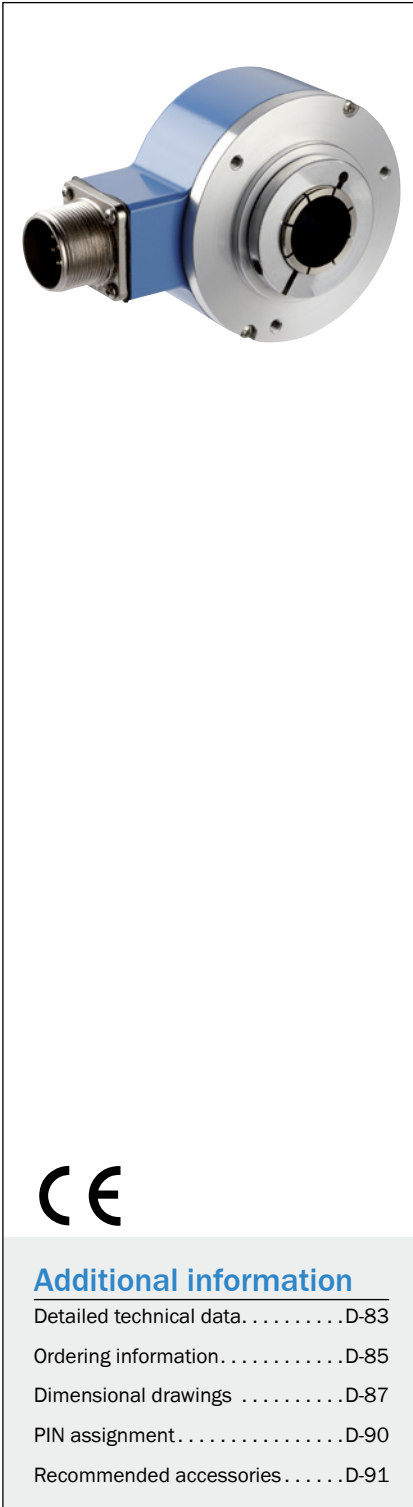
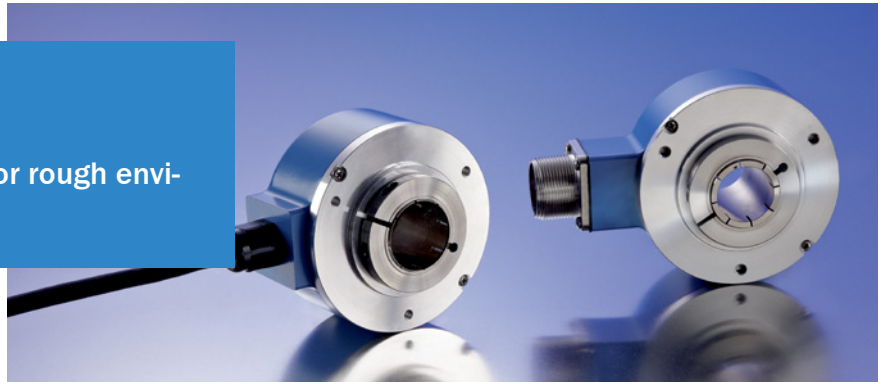
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- O-ring surface, circumference 300 mm

Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278
Replacement O-ring set (set of 2) for measuring wheels (circumference 300 mm) with O-ring	BEF-OR-083-050	2064076

D

Large hollow shaft encoders for rough environmental conditions



D

Product description

The high resolution DGS34/35 hollow shaft Incremental encoder family is a rugged solution for heavy-duty encoder

applications. With a large bore size up to 1-1/8 in or 30 mm, these are ideal for direct mounting on motor shafts

At a glance

- Incremental encoder with 3.5" diameter
- Pulses per revolution: 120 ... 16,384
- Choice of various electric interfaces: TTL / RS-422, HTL/push pull or open collector
- High enclosure rating: IP 66
- Blind hollow shaft for shaft diameters of up to 30 mm or 1-1/8"
- Connection via cable outlet or 10-pin MIL connector

Your benefits

- High frequency response eliminates need for speed reduction hardware
- Hollow shaft design eliminates need for couplings and mounting brackets
- Anti-rotation brackets available for most AC induction motor frames



Additional information

Detailed technical dataD-83
 Ordering informationD-85
 Dimensional drawingsD-87
 PIN assignmentD-90
 Recommended accessoriesD-91

→ www.mysick.com/en/DGS34

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

Performance

Pulses per revolution ^{1), 2)}	120 ... 16,384 ²⁾
Measuring step	90° electrical / number of lines
Reference signal	
	Number 1
	Position 90° electr., logic operation with A and B or 180° electr., logic operation with B- (cf. electric interface)
Error limits	45/Z°
Measuring step deviation	45/Z°

¹⁾ 3,000 min⁻¹ (2,200 min⁻¹ for 8,192 and 16,384 pulses per revolution).

²⁾ Detailed list of "Pulses per revolution" on page D-85.

Mechanical data

Shaft diameter	
	DGS34 blind hollow shaft 1" DGS35 through hollow shaft 30 mm; other shaft diameters possible with collets, see accessories
Material shaft	Brass
Material flange	Aluminium
Material housing	Aluminium
Mass ¹⁾	1.1 kg
Start-up torque at 20 °C	9.0 Ncm
Operating torque at 20 °C	7.0 Ncm
Permissible shaft movement of the drive element static/dynamic	0.5 mm / 0.1 mm radial 0.5 mm / 0.5 mm axial
Angular acceleration	1 x 10 ⁵ rad/s ²
Operating speed ²⁾	3,000 min ⁻¹
Rotor moment of inertia	490 gcm ²
Bearing lifetime	4.5 x 10 ⁹ revolutions

¹⁾ Based on encoders with a connector outlet.

²⁾ 3,000 min⁻¹ (2,200 min⁻¹ for 8,192 and 16,384 pulses per revolution).

D

Electrical data

Electrical interface	4.5 ... 5.5 V, TTL/RS422, 3487, zero pulse width 180° 8 ... 24 V, TTL/RS422, 3487, zero pulse width 180° 8 ... 24 V, HTL/push pull, 7272, zero pulse width 180° 8 ... 24 V, open collector, 7273, zero pulse width 180° 4.5 ... 5.5 V, TTL/RS422, 3487, zero pulse width 90° (only 10000 and 16384 pulses possible) 8 ... 24 V, TTL/RS422, 3487, zero pulse width 90° (only 10000 and 16384 pulses possible) 8 ... 24 V, HTL/push pull, 7272, zero pulse width 90° (only 10000 and 16384 pulses possible) 8 ... 24 V, open collector, 7273, zero pulse width 90° (only 10000 and 16384 pulses possible)
Connection type	Cable, 11-core, radial, 1.0 m Cable, 11-core, radial, 1.5 m Cable, 11-core, radial, 3.0 m Cable, 11-core, radial, 5 m Cable, 11-core, radial, 10 m (not possible with open collector outputs) Connector MS 10-pin, radial
Maximum output frequency	≤300 kHz (1-8192 pulses); ≤600 kHz (>8192 pulses)
Load current	
4.5 ... 5.5 V, TTL/RS422	40 mA
8 ... 24 V, TTL/RS422; 8 ... 24 V, HTL/push pull	40 mA
8 ... 24 V, open collector	20 mA
Operating power consumption (no load)	
8 ... 24 V	100 mA
4.5 ... 5.5 V	120 mA
Reverse polarity protection	Yes
Short-circuit protection of the outputs	
4.5 ... 5.5 V, TTL/RS422, 3487	No
8 ... 24 V, TTL/RS422, 3487	No
8 ... 24 V, HTL/push pull, 7272	Yes
8 ... 24 V, open collector, 7273	Yes
4.5 ... 5.5 V, TTL/RS422, 3487	No
8 ... 24 V, TTL/RS422, 3487	No
8 ... 24 V, HTL/push pull, 7272	Yes
8 ... 24 V, open collector, 7273	Yes

Ambient data

EMC	EN 61000-4-8
Enclosure rating	
Housing side connector outlet ¹⁾	IP 66
Housing side cable outlet	IP 66
Permissible relative humidity	95 % Condensation of the optical scanning not permitted
Working temperature range	-20 ... +70 °C
Storage temperature range	-30 ... +85 °C
Resistance	
To shocks	50 g/11 ms
To vibration	20 g/ 5 ... 2,000 Hz

¹⁾ When the mating connector is fitted.

Ordering information

Type code DGS34/DGS35

Mechanical design

- 4** Blind hollow shaft ¹⁾
- 5** Through hollow shaft ¹⁾

Electrical interface

- 1** 4.5 ... 5.5 V, TTL/RS422, 3487 ²⁾, marker 180
- 2** 8 ... 24 V, 5 V, 3487 ²⁾, marker 90 ³⁾
- 3** 8 ... 24 V, 5V, 3487 ²⁾, marker 180
- 4** 8 ... 24 V, 8/24 V, 7272 ²⁾, marker 90 ³⁾
- 5** 8 ... 24 V, 8/24 V, 7272 ²⁾, marker 180
- 8** 8 ... 24 V, Open Collector, 7273 ²⁾, marker 90 ³⁾
- 9** 8 ... 24 V, Open Collector, 7272 ²⁾, marker 180
- Y** 5 V, 5 V, 3487 ²⁾, marker 90 ³⁾

Mechanical interface

- H** T1 stator coupling, shaft diameter Ø 1"
- J** Pin block, shaft diameter Ø 1"
- K** T1 stator coupling, shaft diameter Ø 30 mm
- L** Pin block, shaft diameter Ø 30 mm

Connection type

- 2** Cable, 11-core, radial, 1 m
- K** Cable, 11-core, radial, 1.5 m
- L** Cable, 11-core, radial, 3 m
- M** Cable, 11-core, radial, 5 m
- N** Cable, 11-core, radial, 10 m (not in combination with the electrical interfaces 8 and 9)
- 4** Connector, MS 10-pin, radial

Pulses

Always five characters in clear text



¹⁾ Collets for 7/8", 24 mm, 25 mm, 18 mm, 20 mm and 22 mm as accessories ordered separately, see "Recommended Accessories" on page D-91
²⁾ Integrated circuit.
³⁾ 10,000 and 16,384 pulses per revolution only come with 90° marker.

Pulses per revolution

Pulses per revolution	120	3600
	360	4096
	600	5000
	1024	8192
	2000	10000
	2048	16384
	2500	



DGS34 blind hollow shaft ordering information

Electrical interface	Mechanical interface	Connection type	Model name	Part no.
4.5 ... 5.5 V, TTL/RS422, 3487, marker 180	Pin block, shaft diameter Ø 30 mm	Connector, MS 10-pin, radial	DGS34-1L402048	7101744
8 ... 24 V, 8/24 V, 7272, marker 180	Pin block, shaft diameter Ø 1"	Connector, MS 10-pin, radial	DGS34-5J404096	7102201
	Pin block, shaft diameter Ø 30 mm	Cable 12-core, radial, 1.5 m	DGS34-5LK02048	7101764

DGS35 through hollow shaft ordering information

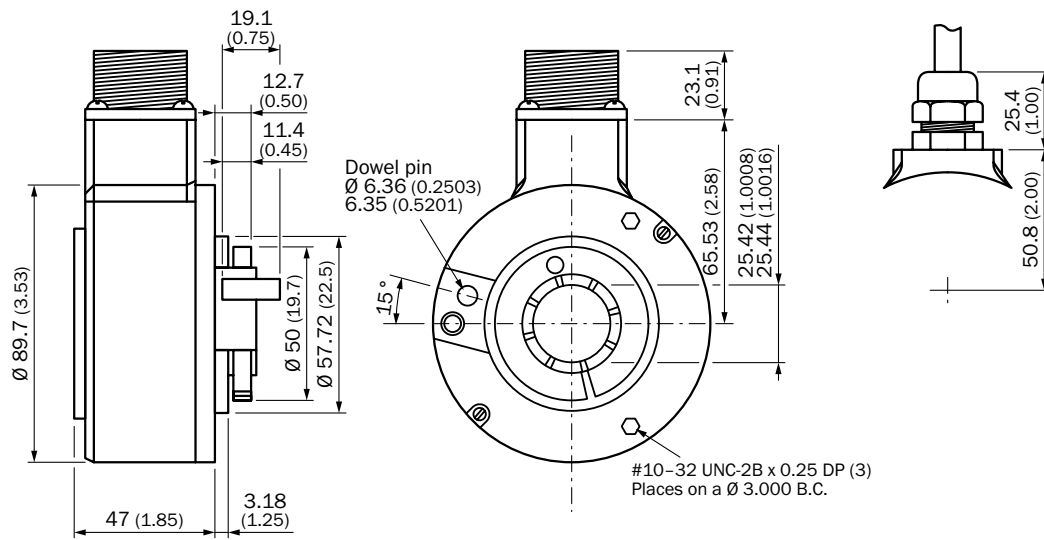
Electrical interface	Mechanical interface	Connection type	Model name	Part no.	
4.5 ... 5.5 V, TTL/RS422, 3487, marker 180	Pin block, shaft diameter Ø 1"	Cable 12-core, radial, 3 m	DGS35-1JL01024	7134504	
		Connector, MS 10-pin, radial	DGS35-1K402048	7130548	
	T1 stator coupling, shaft diameter Ø 30 mm	Cable 12-core, radial, 1.5 m	DGS35-1KK01024	1049552	
		Cable 12-core, radial, 1.5 m	DGS35-1KK02500	1055330	
	Pin block, shaft diameter Ø 30 mm	Connector, MS 10-pin, radial	DGS35-1L401024	7101683	
			DGS35-1L402048	7101684	
		Cable 12-core, radial, 1.5 m	DGS35-1LK01024	7101698	
			DGS35-1LK02048	7101699	
			DGS35-1LK08192	7101701	
			DGS35-1LK08192	7101701	
8 ... 24 V, 5 V, 3487, marker 180	Pin block, shaft diameter Ø 1"	Connector, MS 10-pin, radial	DGS35-3J401024	7126765	
		Connector, MS 10-pin, radial	DGS35-3K401024	1058110	
	T1 stator coupling, shaft diameter Ø 30 mm	Connector, MS 10-pin, radial	DGS35-3K402048	1060264	
		Cable 12-core, radial, 1.5 m	DGS35-3KK01024	1057039	
		Cable 12-core, radial, 1.5 m	DGS35-3KK02048	1062810	
	Pin block, shaft diameter Ø 30 mm	Connector, MS 10-pin, radial	DGS35-3L402048	1062795	
		Cable 12-core, radial, 1.5 m	DGS35-3LK02048	1062354	
		Cable 12-core, radial, 3 m	DGS35-3LL01024	1055112	
		Cable 12-core, radial, 3 m	DGS35-3LL01024	1055112	
	8 ... 24 V, 8/24 V, 7272, marker 180	T1 stator coupling, shaft diameter Ø 1"	Cable 12-core, radial, 1.5 m	DGS35-5HK00120	7130703
T1 stator coupling, shaft diameter Ø 30 mm		Connector, MS 10-pin, radial	DGS35-5K401024	7134312	
			DGS35-5K402048	1062811	
			DGS35-5K402500	7134638	
			DGS35-5K405000	7130624	
Pin block, shaft diameter Ø 30 mm		Connector, MS 10-pin, radial	Cable 12-core, radial, 1.5 m	DGS35-5KK01024	1058301
			Cable 12-core, radial, 1.5 m	DGS35-5L401024	7101688
		Cable 12-core, radial, 1.5 m	DGS35-5LK04096	7101705	
			DGS35-5LK08192	7101706	

D

Dimensional drawings

dimensions in mm (inch)

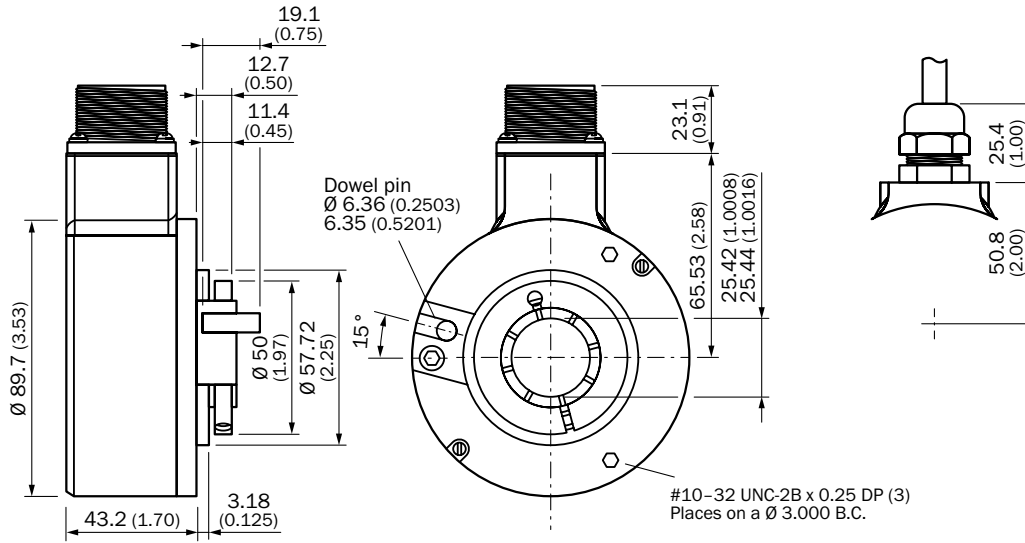
Blind hollow shaft



Hollow shaft	Shaft diameter		Insertion depth	
	Min.	Max.	Min.	Max.
1/2"	12.67 mm	12.7 mm	25.4 mm	54.1 mm
5/8"	15.85 mm	15.88 mm	25.4 mm	54.1 mm
3/4"	19.02 mm	19.05 mm	25.4 mm	54.1 mm
7/8"	22.2 mm	22.23 mm	25.4 mm	54.1 mm
1,0"	25.37 mm	25.4 mm	25.4 mm	54.1 mm
1 1/8"	28.55 mm	28.58 mm	45.47 mm	54.1 mm
M30	29.96 mm	29.98 mm	46 mm	54 mm



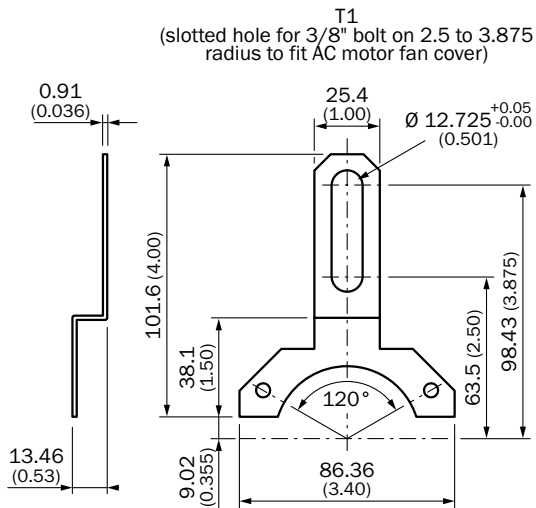
Through hollow shaft



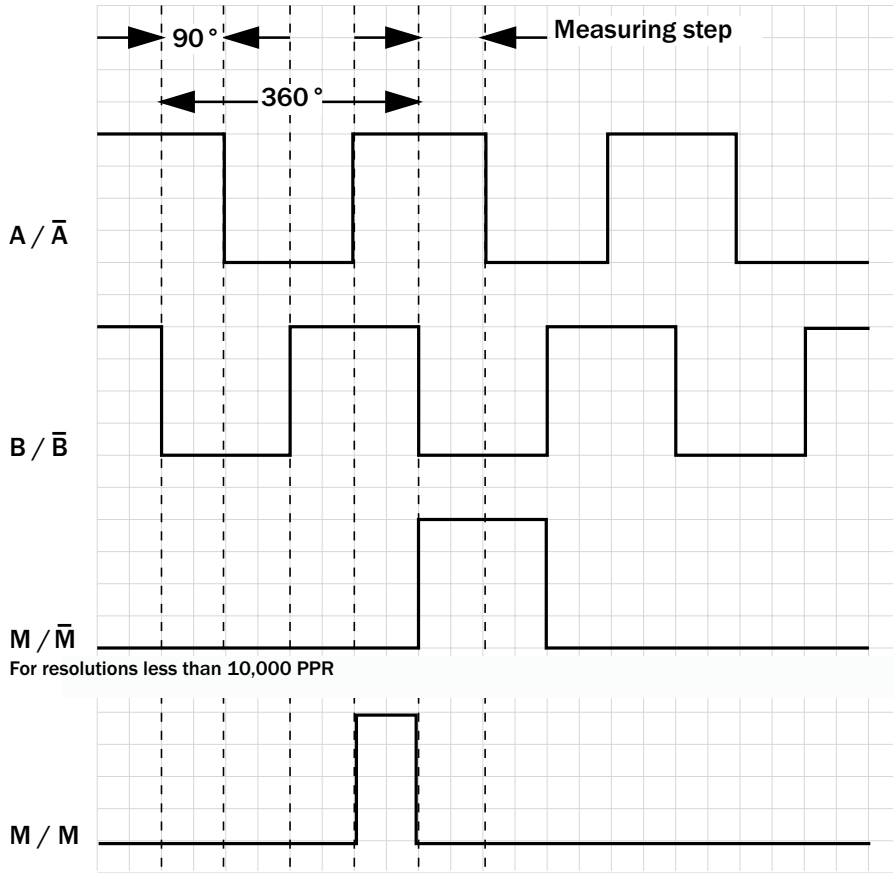
Hollow shaft	Shaft diameter	Insertion depth min.
1/2"	12.67 mm / 12.7 mm	25.4 mm
5/8"	15.85 mm / 15.88 mm	25.4 mm
3/4"	19.02 mm / 19.05 mm	25.4 mm
7/8"	22.2 mm / 22.23 mm	25.4 mm
1,0"	25.37 mm / 25.4 mm	25.4 mm
1 1/8"	28.55 mm / 28.58 mm	45.47 mm
M30	29.96 mm / 29.98 mm	46 mm

D

Spring mounting plate



Signal outputs



For resolutions less than 10,000 PPR

For resolutions greater than or equal to 10,000 PPR and push-pull driver option

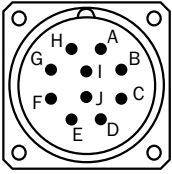
Electrical interfaces

Supply voltage
4.75 ... 5.25 V
8.0 ... 24.0 V
8.0 ... 24.0 V

D

PIN assignment

10-pin MS3102



PIN, 10-pin	Color of wires	Explanation
A	White	A
B	Pink	B
C	Lilac	M
H	Brown	\bar{A}
I	Black	\bar{B}
J	Yellow	\bar{M}
D	Red	$+V_s$
F	Blue	GND
G	N/A	Case ground
N/A	N/A	Screen

D

Recommended accessories

Collets

Short description	Shaft diameter	Model name	Part no.
For T1 stator coupling	7/8"	SPZ-7E8-DD35-AD	7102158
For 30 mm stator coupling	24 mm	SPZ-024-MD35-AD	7130587
	25 mm	SPZ-025-MD35-AD	7130588
For T1 stator coupling	18 mm	SPZ-018-DD35-AD	7130585
	20 mm	SPZ-020-DD35-AD	7130529
	22 mm	SPZ-022-DD35-AD	7130586

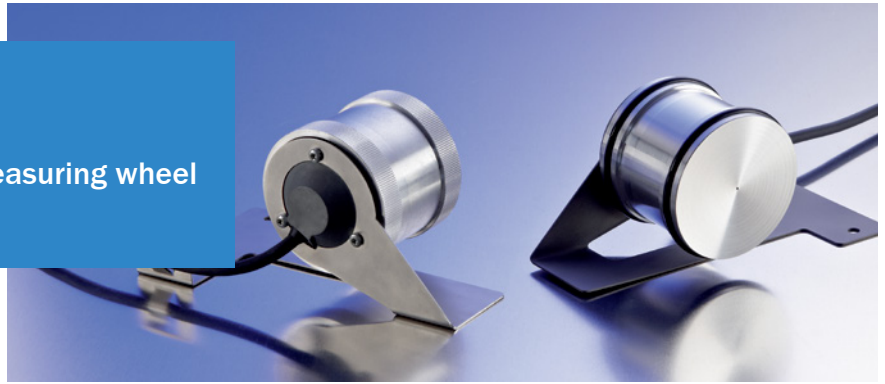
Plug connectors and cables

Short description	Cable length	Model name	Part no.
Cable connector MS 3105 female, 10 pin, straight	-	DOS-MS10-G	7102129
Connector MS 3105 female, 10 pin, straight, cable 11 core, 4 x 2 x 0.25 + 2 x 0.5 + 1 x 0.14 mm ² with screening, cable diameter 7.5 mm	1.5 m	DOL-MS10-G1M5MA2	7102130
	3.0 m	DOL-MS10-G03MMA2	7102131
	5.0 m	DOL-MS10-G05MMA2	7102132
	10.0 m	DOL-MS10-G10MMA2	7102133
	20.0 m	DOL-MS10-G20MMA2	7102134
	30.0 m	DOL-MS10-G30MMA2	7102135
Data cable by the meter 4 x 2 x 0.15 mm ² with shielding, diam. 5.6 mm	-	LTG-2308-MWENC	6027529
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² with shielding, diam. 7.5 mm	-	LTG-2411-MW	6027530
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, diam. 7.8 mm	-	LTG-2512-MW	6027531

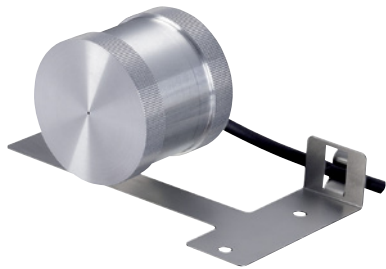
→ For additional accessories, please see page H-399

D

Rugged, high-performance measuring wheel incremental encoder



D



UL certification not valid for all types. See type label on the encoder.

Additional information

Detailed technical data.....D-93
 Ordering information.....D-94
 Dimensional drawings.....D-95
 PIN and core assignment.....D-96
 Signal outputs.....D-96
 Working position/force.....D-97
 Max. deflection.....D-97
 Recommended accessories.....D-97

Product description

The DKV60 compact measuring wheel encoder is a low-cost solution for determining position and speed directly on conveyor belts or rollers. The DKV60 consists of an incremental encoder, a measuring roller, an installation plate, and a cable guide and it is preassembled

upon delivery. Two different measuring wheel surfaces ensure the encoder can adapt to the surface to be measured. Plus, with an IP 67-rated enclosure rating, the rugged housing of the DKV60 is able to withstand shock and vibration

At a glance

- 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/RS-422 or HTL/push pull.
- Connection via cable outlet, for radial or axial use with open ends or fitted with an M12 connector

Your benefits

- Complete system with universal mounting clamps and integrated cable guidance enables simple and quick mounting
- Spring steel mounting clamps allow high level of measuring accuracy when deflecting the measuring wheel in X and Y directions
- Low-cost encoder with outstanding performance
- Withstands harsh environments due to a high IP enclosure rating, a non-corrosive mounting bracket and a rugged housing
- Compact dimensions enable simple installation even where space is cramped

→ www.mysick.com/en/DKV60_measuring_wheel_encoder

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

Performance

Pulses per revolution	1 ¹⁾ ... 2,000 ¹⁾
Error limits knurled surface	± 0.5 mm/m
Error limits 'O' ring surface	± 4 mm/m
Initialization time	40 ms
Resolution	0.1 mm ... 200 mm
Smallest measuring step	0.025 mm ... 50 mm

¹⁾ Pulses per 200 mm.

Mechanical data

Mechanical interface	Measuring drum, knurled surface Measuring drum, O ring surface
Mass	0.42 kg
Maximum operating speed	1,500 U/min
Bearing lifetime	2 x 10 ⁹ revolutions

Electrical data

Electrical interface	4.5 ... 5.5 V, TTL/RS 422, 6-Channel 10 ... 30 V, HTL, 6-Channel
Connection type	Cable, 1.5 m Cable, M12, 8-pin, 1.5 m
Output current	≤ 30 mA
Operating power consumption (no load)	
4.5 ... 5.5 V, TTL/RS 422	40 mA
10 ... 30 V, HTL/push pull	40 mA
Reference signal, number	1
Reference signal, position	90°, electronically, gated with A and B
MTTFd: mean time to dangerous failure¹⁾	600 years (EN ISO 13849-1)

¹⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

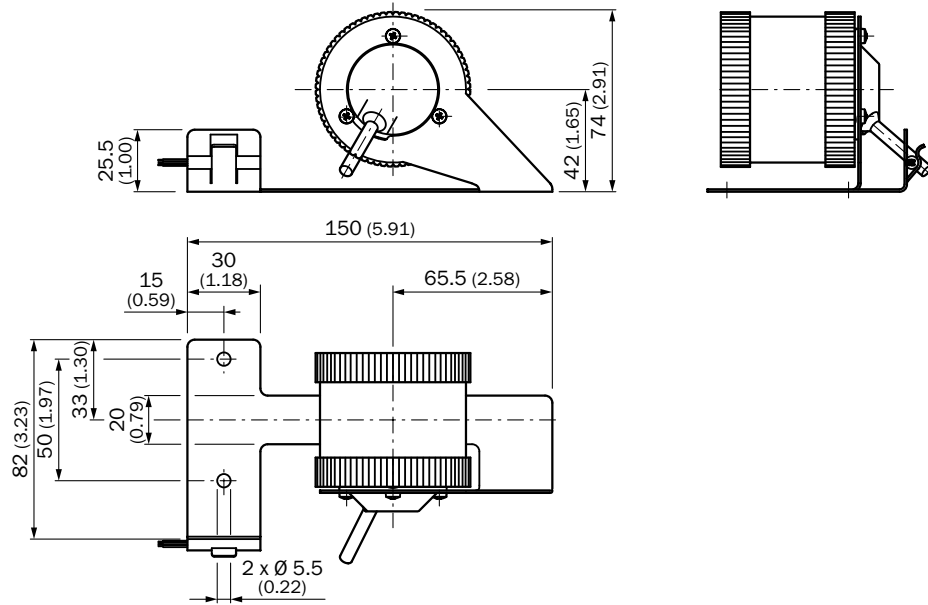
Ambient data

EMC	EN 61000-6-3, EN 61000-6-2
Enclosure rating	IP 65 (IEC 60529)
Air humidity	90 %, condensation of the optical scanning not permitted
Working temperature range	-10 °C ... +60 °C
Storage temperature range	-40 °C ... +70 °C, without package
Resistance to shocks	50 g/7 ms (EN 60068-2-27)
Resistance to vibration	20 g/10 Hz ... 2,000 Hz (EN 60068-2-6)

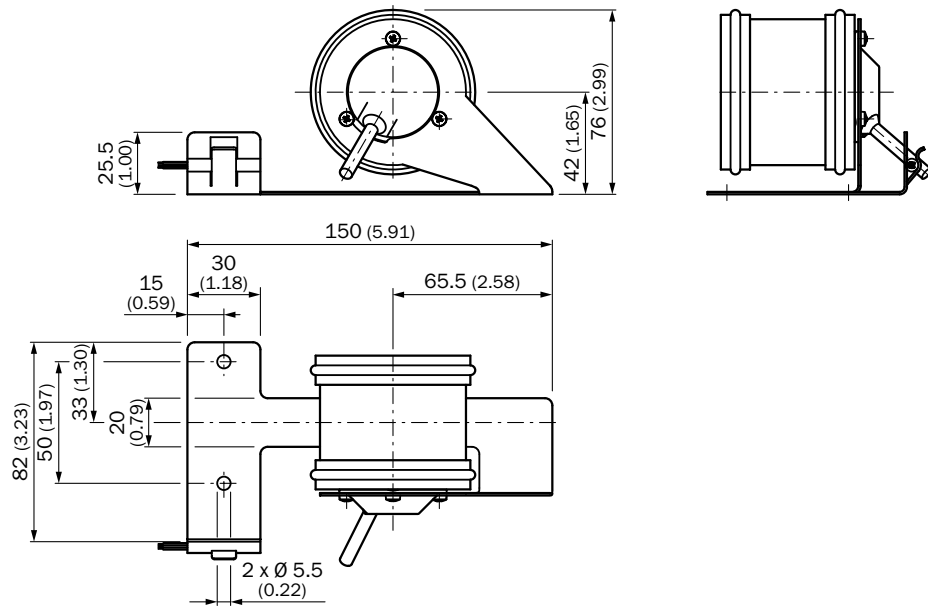
Dimensional drawings

dimensions in mm (inch)

Knurled surface



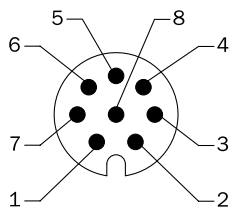
O-ring surface



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PIN and core assignment

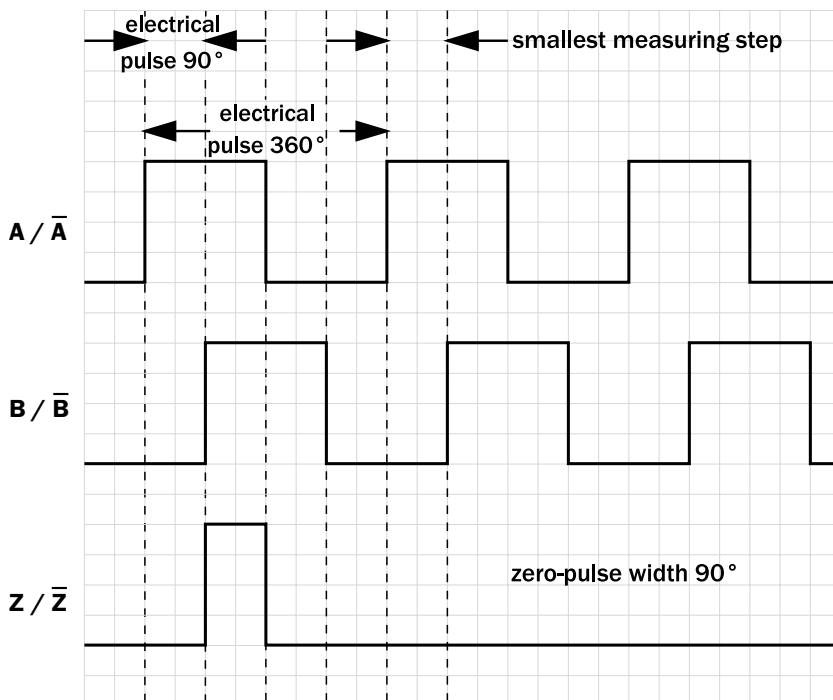
View of the connector side of housing



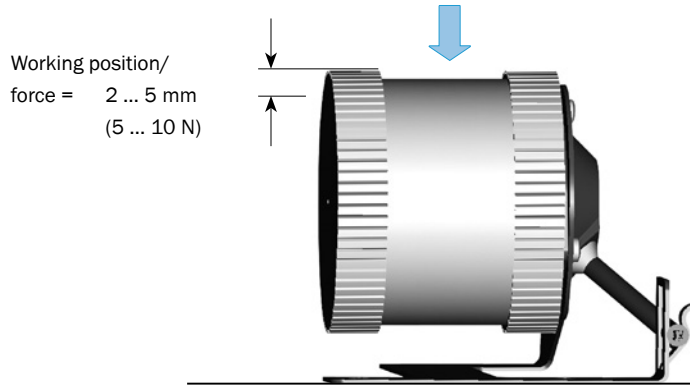
PIN, 8-pin, connector M12	Color of wires	Signal TTL, HTL	Explanation
1	Brown	\bar{A}	Signal line
2	White	A	Signal line
3	Black	\bar{B}	Signal line
4	Pink	B	Signal line
5	Yellow	\bar{Z}	Signal line
6	Lilac	Z	Signal line
7	Blue	GND	Ground connection of the encoder
8	Red	+U _s	Supply voltage, potential free to the housing
Screen	Screen	Screen	Screen connected to encoder housing

D

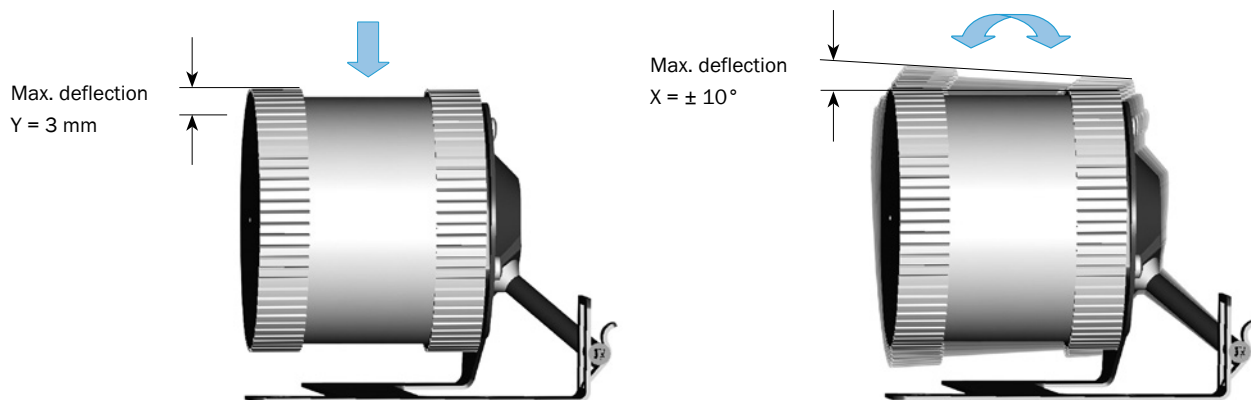
Signal outputs



Working position/force



Max. deflection



D

Recommended accessories

Other mounting accessories

Short description	Model name	Part no.
O-ring set for DKV60 encoder	O-Ring SET DKV60	6032709

Plug connectors and cables

Short description	Cable length	Model name	Part no.
Cable socket, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	DOS-1208-GA01	6045001
Cable connector, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1208-GA01	6044892
Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	DOS-2312-G	6027538
Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	STE-2312-G	6027537
Data cable by the meter 4 x 2 x 0.15 mm ² with shielding, diam. 5.6 mm	-	LTG-2308-MWENC	6027529
Cable socket, 8-pin, straight, pre-wired with 8-core cable, 4 x 2 x 0.25 mm ² , shielded, cable diameter 7.0 mm	2.0 m	DOL-1208-G02MAC1	6032866
	5.0 m	DOL-1208-G05MAC1	6032867
	10.0 m	DOL-1208-G10MAC1	6032868
	20.0 m	DOL-1208-G20MAC1	6032869

¹⁾ Warning! Only in combination with the electrical interfaces A, C, E and P.

→ For additional accessories, please see page H-399

High-resolution, programmable measuring wheel incremental encoder



Product description

The DFV60 high-resolution measuring wheel encoder is an extremely robust solution for determining position and speed directly on the conveyor belt, even in applications where the measuring surface is subject to high levels of vibrations. The DFV60 consists of an incremental

encoder with a mounting arm and two measuring wheels. The spring arm is available as an accessory. Extensive programmability of output signal, zero pulse and lines counts from 1 to 65,536 enable customer-specific adaptations.

At a glance

- 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: 5 V & 24 V TTL/RS-422, 24 V HTL/push pull
- Remote zero setting possible

Your benefits

- Universal-use spring arm ensures fast and simple mounting
- The high level of spring tension enables use in harsh environmental conditions
- Reduced storage costs and downtime due to programmability
- Connector-in cable outlet in radial or axial direction enables customer-specific cable solutions
- Excellent concentricity even at high speeds
- Permanent and safe operation due to a high enclosure rating, temperature resistance and a long bearing lifetime
- Programmability via the PGT-08 programming software and the PGT-10-S display programming tool allow the encoder to be adapted flexibly and quickly according to customer needs
- Programmable zero pulse position simplifies installation



Additional information

Detailed technical data	D-99
Ordering information	D-100
Dimensional drawing	D-101
PIN assignment	D-102
Signal outputs	D-103
Zero pulse width 90°, 180° or 270° programmable	D-104
Recommended accessories	D-105

→ www.mysick.com/en/DFV60_measuring_wheel_encoder

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

Performance

Pulses per revolution	1 ... 65,536 programmable	
Error limits O-ring surface	± 0.03 mm	
Measuring step deviation	Pulses 1 ... 99	± 0.04 °
	Pulses 100 ... 10,000	± 0.008 °
	Pulses > 10,000	± 0.002 °
Initialization time	30 ms	

Mechanical data

Mechanical interface	2 measuring wheels, O-ring surface
Mass	0.5 kg
Maximum operating speed ¹⁾	3,000 min ⁻¹
Bearing lifetime	3 x 10 ⁹ revolutions
Spring deflection spring arm	40 mm
Preload spring arm	20 mm

¹⁾ Self warming 3.3 k/1,000 min⁻¹, when applying note working temperature range.

Electrical data

Electrical interface	4.5 V ... 32 V TTL/HTL programmable (factory set TTL)
Connection type	Connector, M12, 8-pin, radial Cable, universal, 1.5 m Cable, universal, 3 m Cable, universal, 5 m (depending on type)
Load current	≤ 30 mA
Power consumption	0.7 W (without load)
Maximum output frequency	≤ 820 kHz
Reference signal, number	1
Reference signal, position	Pre-adjusted: 90 °, electronically, gated with A and B (programmable, see zero pulse width)
MTTFd: mean time to dangerous failure ¹⁾	300 years (EN ISO 13849-1)

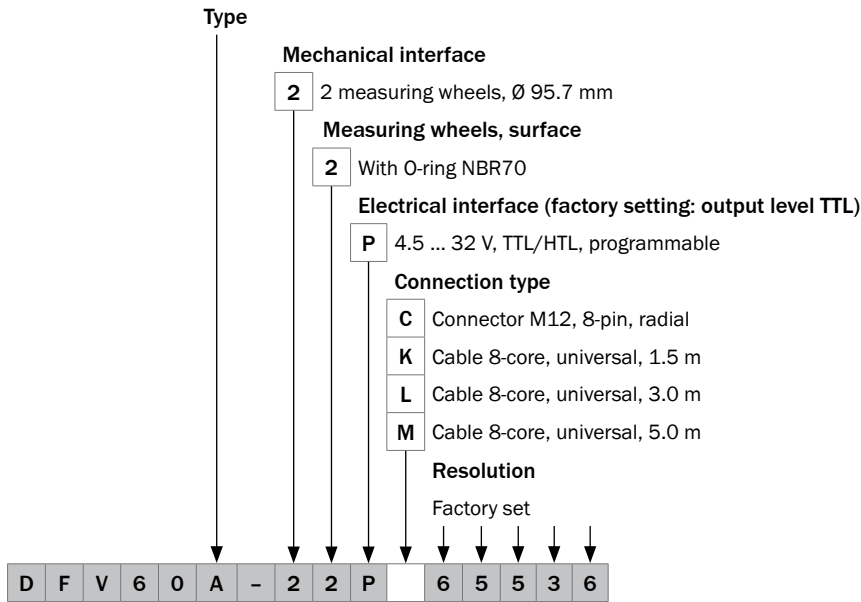
¹⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

EMC	EN 61000-6-4, EN 61000-6-2
Enclosure rating	IP 65 IEC 60529
Air humidity	90 %, condensation of the optical scanning not permitted
Working temperature range	-20 °C ... +100 °C
Storage temperature range	-40 °C ... +100 °C, without package
Resistance to shocks	70 g/6 ms (EN 60068-2-27)
Resistance to vibration	30 g/2,000 Hz ... 10 Hz (EN 60068-2-6)

Ordering information

Type code DFV60 measuring wheel encoder



D

Ordering information

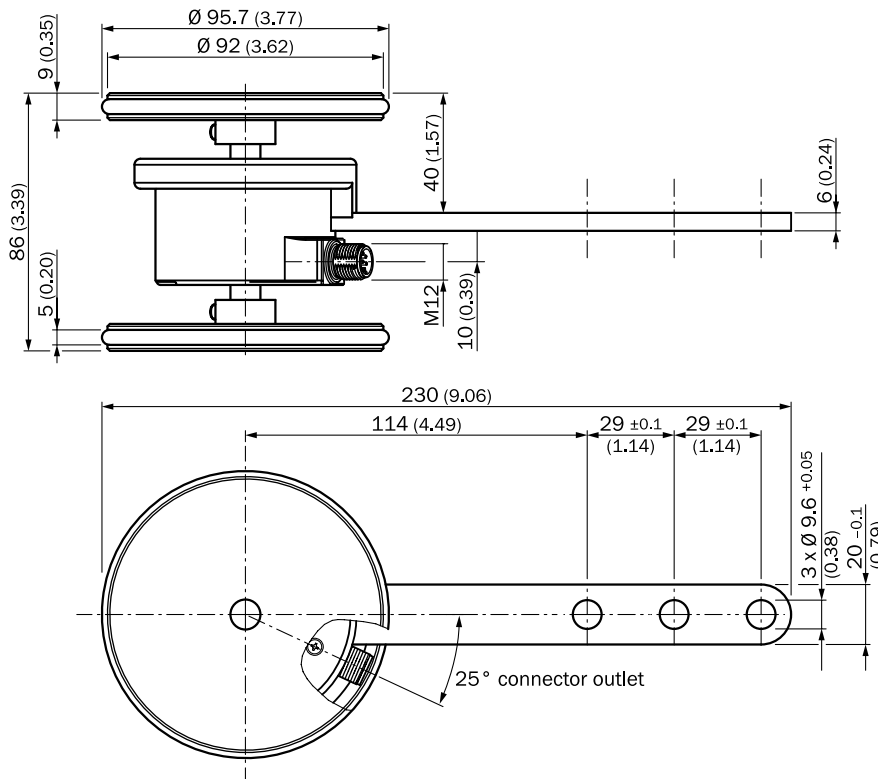
- **Mechanical interface:** 2 measuring wheels, O-ring surface
- **Electrical interface:** TTL/HTL programmable
- **Pulses per revolution:** 65,536

Connection type	Model name	Part no.
Connector, M12, 8-pin, radial	DFV60A-22PC65536	1051309
Cable, universal, 1.5 m	DFV60A-22PK65536	1051331
Cable, universal, 3.0 m	DFV60A-22PL65536	1051334
Cable, universal, 5.0 m	DFV60A-22PM65536	1051337

Dimensional drawing

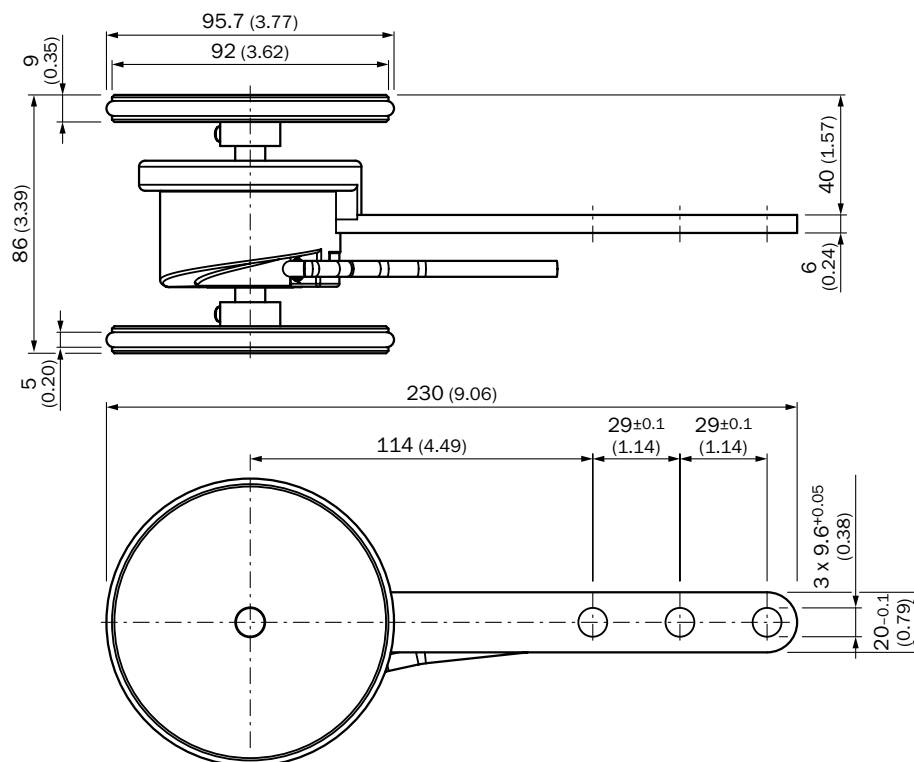
dimensions in mm (inch)

Connector outlet



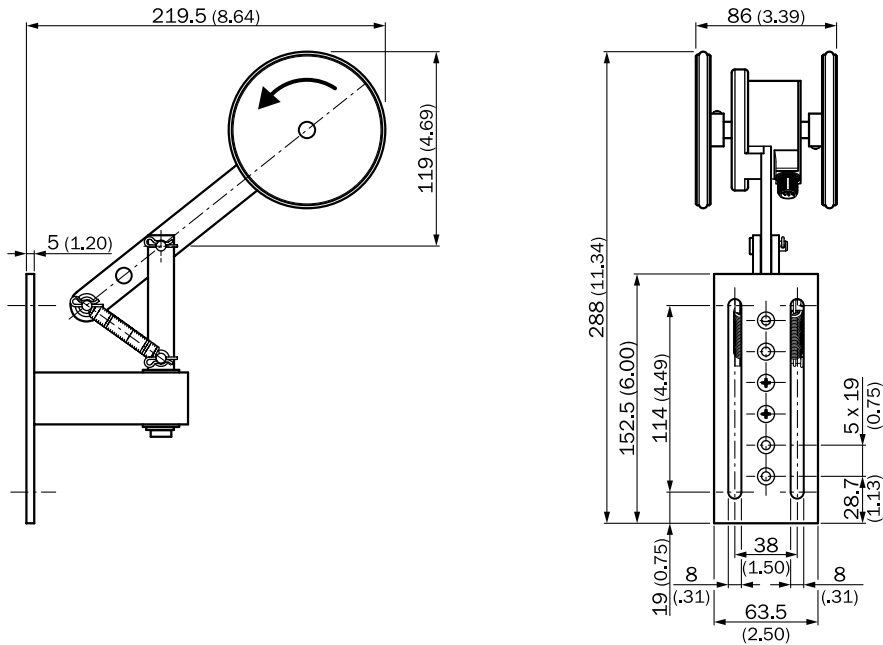
General tolerances as per DIN ISO 2768-mk

Cable outlet



General tolerances as per DIN ISO 2768-mk

DFV60 with mounted spring arm 2056155 (available as accessory)

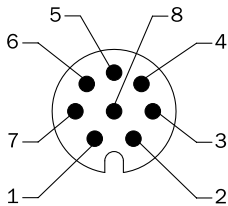


D

PIN assignment

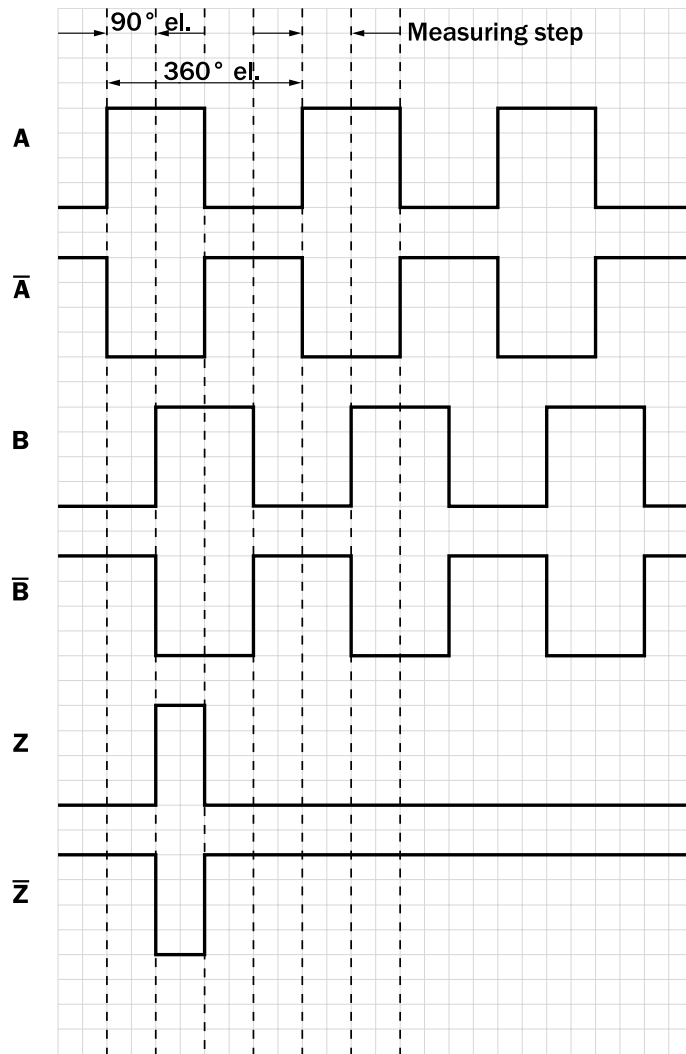
Cable 8-core

View to the connector M12 fitted to the encoder body



PIN, 8-pin, connector M12	Color of wires for encoders with cable outlet	Signal TTL, HTL	Explanation
1	Brown	\bar{A}	Signal line
2	White	A	Signal line
3	Black	\bar{B}	Signal line
4	Pink	B	Signal line
5	Yellow	\bar{Z}	Signal line
6	Lilac	Z	Signal line
7	Blue	GND	Ground connection of the encoder
8	Red	+U _s	Supply voltage (potential free to housing)
Screen	Screen	Screen	Screen connected to encoder housing. On the control side connected to earth.

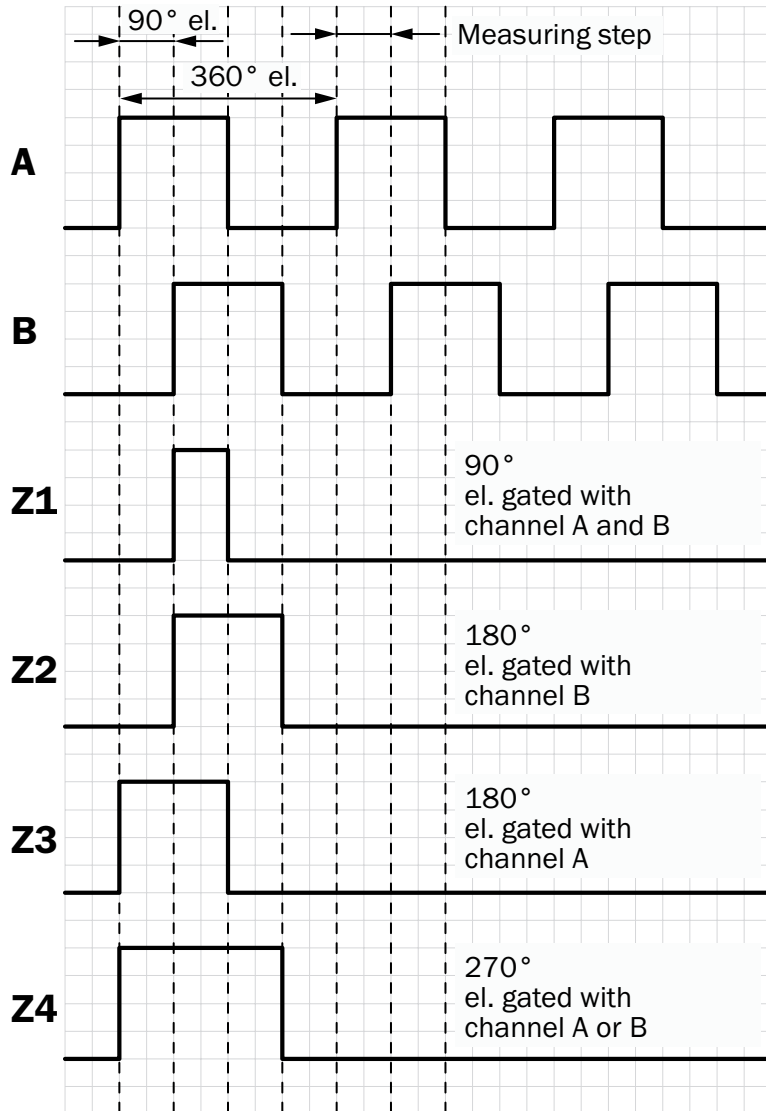
Signal outputs



CCW with view on the measuring wheel, see dimensional drawing.

D

Zero pulse width 90°, 180° or 270° programmable



D

CCW with view on the measuring wheel, see dimensional drawing.

Recommended accessories

Mounting brackets/plates

Short description	Model name	Part no.
Spring arm / mounting arm for DFV60	DFV60-Federarm	2056155

Programming and configuration tools

Short description	Cable length	Model name	Part no.
Programming tool for connection to standard PC or notebook via USB port	-	PGT-08-S	1036616
The PGT-10-S is an intuitively operated standalone programming device for SICK incremental encoders. Its low weight and compact dimensions make it portable and usable everywhere.	-	PGT-10-S	1052967
Adapter cable for incremental programming tool with SUB-D 9-pin cable connector and M12 8-pin cable socket, pre-wired with 8-core cable, 4 x 2 x 0.08 mm ² , shielded, suitable for incremental encoder with M12 plug connector	0.5 m	DSL-2D08-G0M5AC3	2046579
Adapter cable for incremental programming tool with SUB-D 9-pin cable connector and M23 12-pin cable socket, pre-wired with 8-core cable, 4 x 2 x 0.08 mm ² , shielded, suitable for incremental encoder with M23 plug connector	0.5 m	DSL-3D08-G0M5AC3	2046580
Adapter cable for incremental programming tool with SUB-D 9-pin cable connector, shielded, suitable for incremental encoder with cable outlet	0.5 m	DSL-0D08-G0M5AC3	2061739

Other mounting accessories

Short description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR-010030R	2049278

Plug connectors and cables

Short description	Cable length	Model name	Part no.
Cable connector, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1208-GA01	6044892
Cable socket, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	DOS-1208-GA01	6045001
Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	STE-2312-G	6027537
Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	DOS-2312-G	6027538
Cable socket, 8-pin, straight, pre-wired with 8-core cable, 4 x 2 x 0.25 mm ² , shielded, cable diameter 7.0 mm	2.0 m	DOL-1208-G02MAC1	6032866
	5.0 m	DOL-1208-G05MAC1	6032867
	10.0 m	DOL-1208-G10MAC1	6032868
	20.0 m	DOL-1208-G20MAC1	6032869
Data cable by the meter 4 x 2 x 0.15 mm ² with shielding, diam. 5.6 mm	-	LTG-2308-MWENC	6027529
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² with shielding, diam. 7.5 mm	-	LTG-2411-MW	6027530

¹⁾ Warning! Only in combination with the electrical interfaces A, C, E and P.

→ For additional accessories, please see page H-399

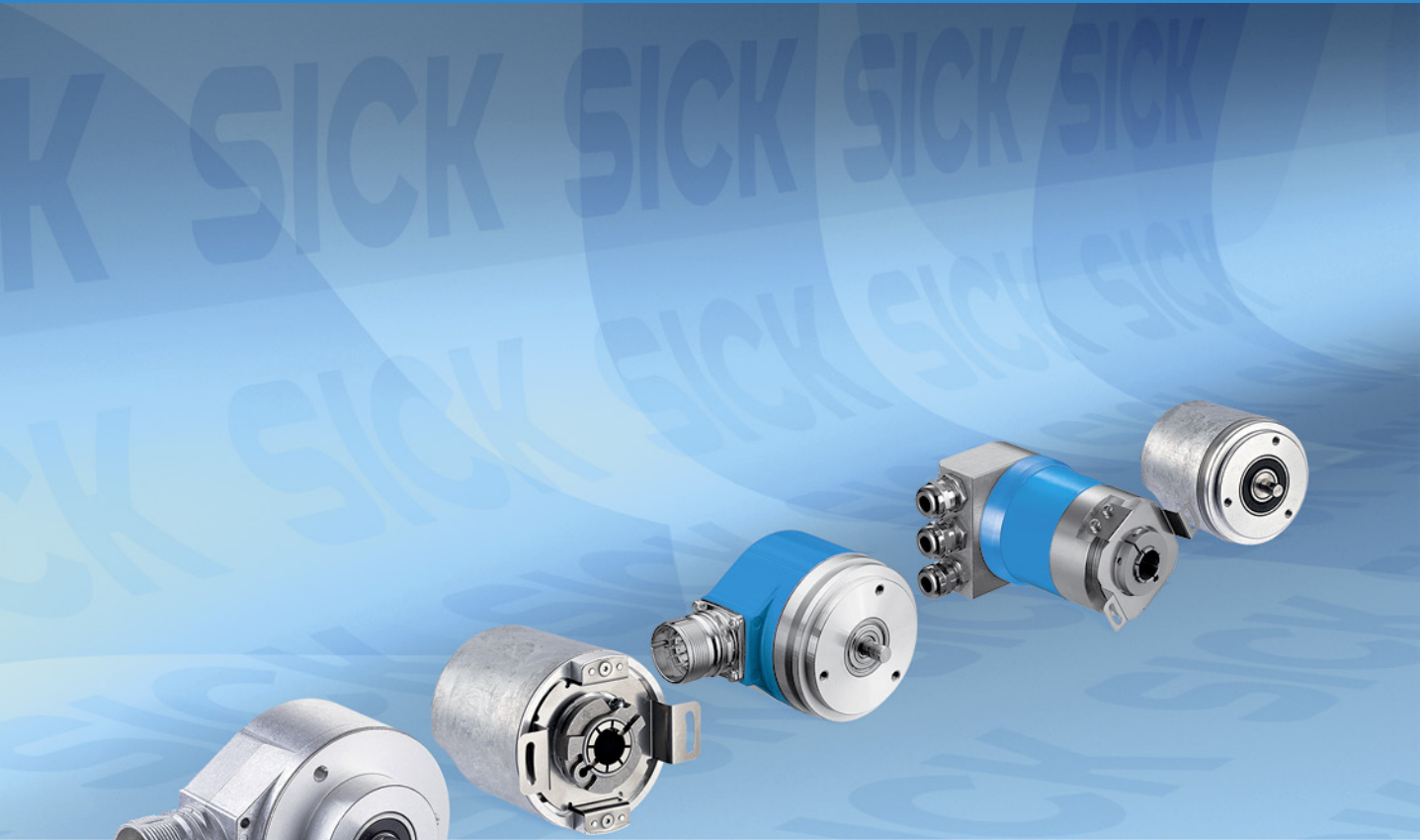


Flexible, compact and reliable – absolute encoders made to measure!

Absolute encoders are ideal for retaining position data after loss of power. They generate information about position, angle and number of revolutions in various angle increments. Based on these measurements, a unique code pattern is assigned to each angle increment. The number of available code patterns per revolution determines the resolution. Each code pattern forms a unique reference and hence an absolute position. As a result, a reference run after switching on is not required. A singleturn encoder measures the absolute position within a full 360° revolution. A multiturn encoder determines both the position within a revolution as well as the number of revolutions

Your benefits







- Optical and magnetic variants for the widest range of requirements
- Reduced maintenance costs thanks to magnetic, wearless scanning in single and multiturn design
- High level of productivity due to optical encoders with a high level of precision and fast calculation of positions
- Robust design for maximum system availability, even in extreme environmental conditions
- Absolutely compact – specially suited in cases where installation space is tight
- Flexible integration in all common networks









E

Absolute encoders

Applications	E-108
Product family overview	E-110

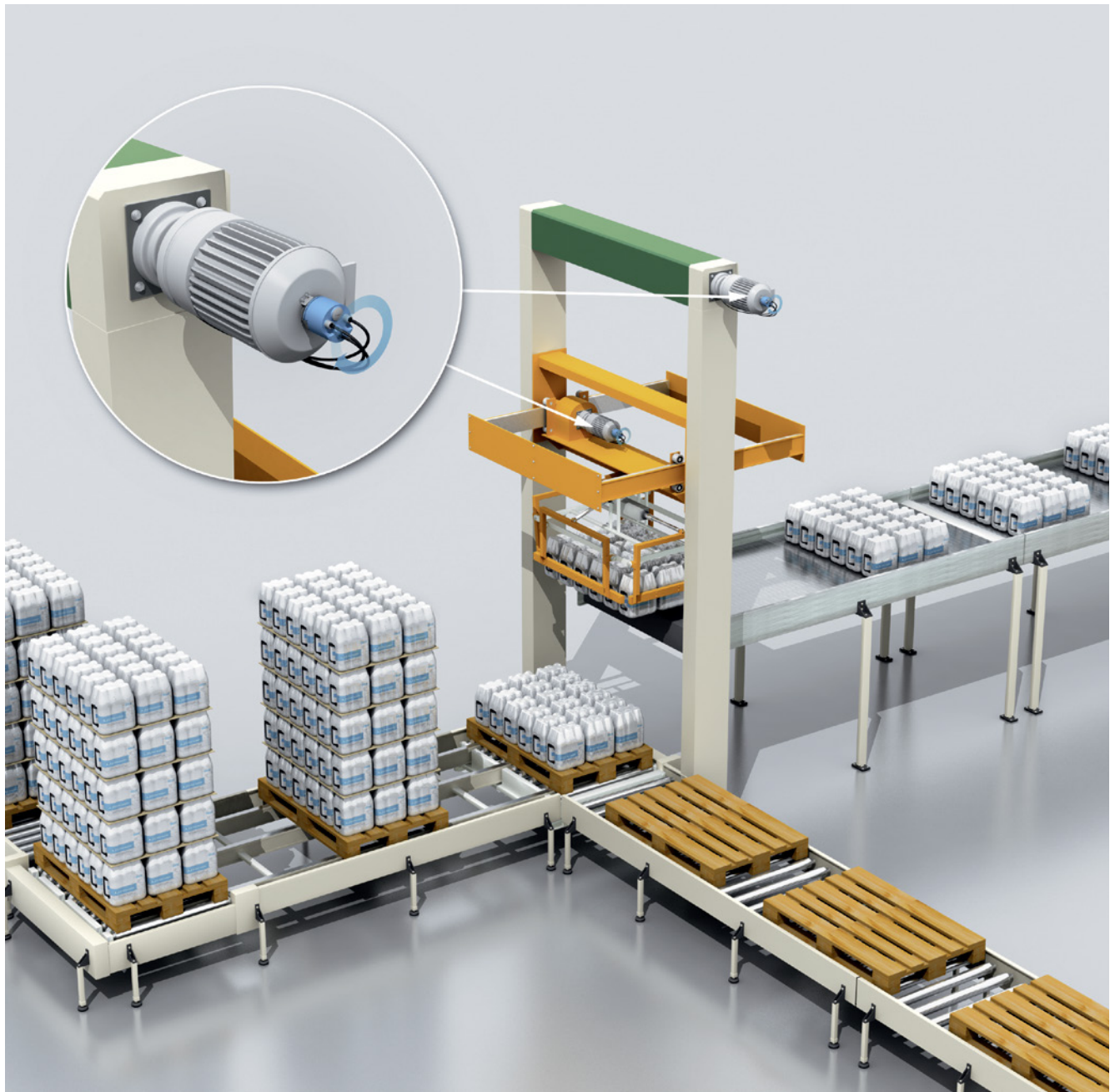
	AFS/AFM60 SSI E-116 Precise, flexible, versatile
	AFS/AFM60 EtherNet/IP E-156 Intelligent, powerful, precise
	AFS/AFM60 PROFINET E-174 Intelligent, powerful, precise
	AFS/AFM60 EtherCAT® E-190 Intelligent, powerful, precise
	A3M60 PROFIBUS E-208 Compact, robust, powerful
	ATM60 PROFIBUS E-218 Reliable, established and modular

	ATM60 SSI E-226 Reliable, established and modular
	ATM60 CANopen E-236 Reliable, established and modular
	ATM60 DeviceNet E-244 Reliable, established and modular
	ATM90 SSI E-252 Reliable, established and modular
	ATM90 PROFIBUS E-258 Reliable, established and modular
	ARS60 SSI/Parallel E-266 Reliable and established

Typical absolute encoders applications

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.

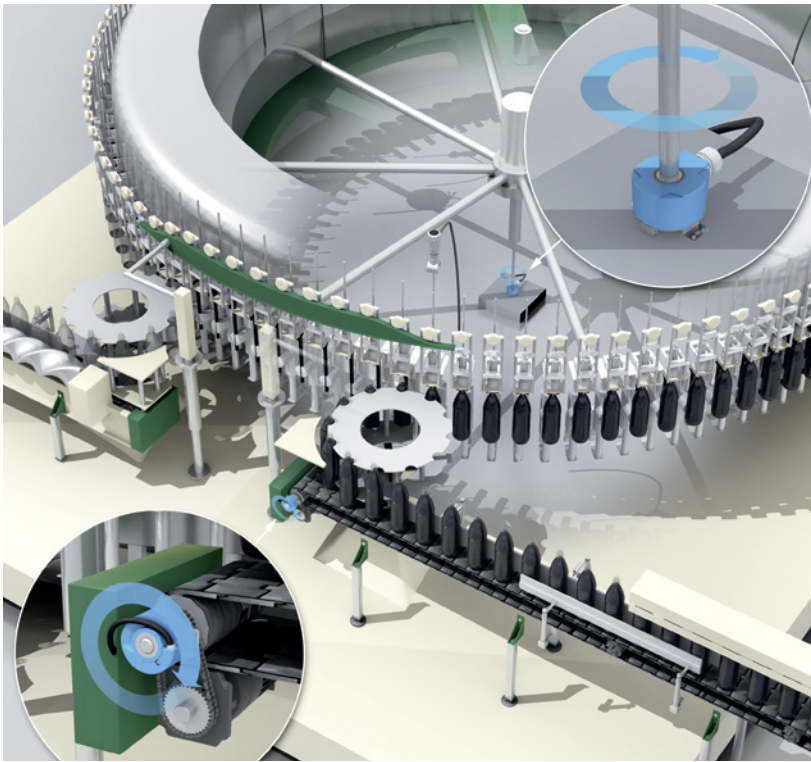
Palletizer system – positioning the gripper

**E**

For example, plastic bottles are stacked in multiple layers on pallets in a palletizer system. The gripper of the palletizer 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 EtherNet/IP interface from the AFM60 product family can be used for this type of application. Or alternatively, you could also use an encoder with a SSI interface, such as the AFM60 SSI.

Bottling plant – positioning of the turntable and conveyor belt

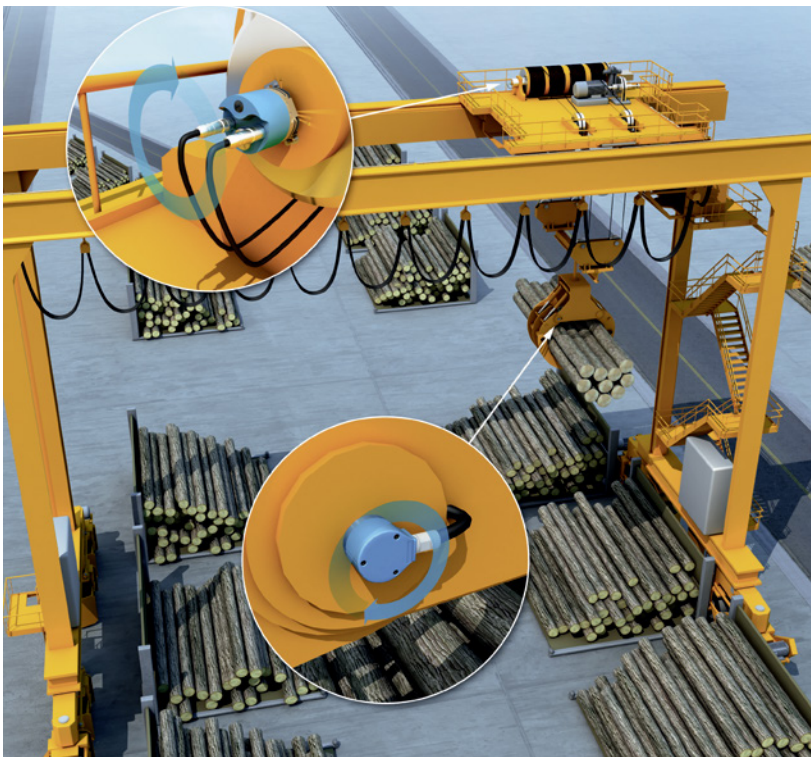


In the bottling line shown here, bottles are collected in the rotating turntable filling stations from the left-hand side and are filled as they rotate. Once full, the bottles are placed on a conveyor belt. The position and speed of the rotating turntable and the conveyor belt are monitored using an absolute encoder.

This application is ideal for multiturn absolute encoders with fieldbus interfaces and round axis functionality such as the A3M60 PROFIBUS. The speed of the conveyor belt can be detected using an absolute encoder. Or alternatively, you can use an absolute encoder with a combined interface, such as the SSI + Incremental to detect the speed and position of the conveyor belt.

E

Cranes – calculating the lift height and opening angle of the gripper



When moving and loading logs using cranes, you must be able to detect the height of the gripper. An absolute encoder mounted on the drum is ideal for this purpose. An additional absolute encoder is mounted on the gripper itself to calculate the opening angle in use.

With its Ethernet-based fieldbus interfaces EtherNet/IP, EtherCAT® or PROFINET, the multiturn AFM60 EtherNet/IP absolute encoder is especially well suited to this application. The position and velocity, as well as other parameters, can simultaneously be transmitted. A singleturn AFS60 absolute encoder with EtherNet-based interface can be used to calculate the gripper opening.

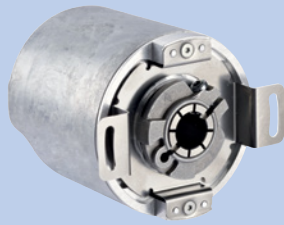
Product family overview

	 <p style="text-align: center;">AFS/AFM60 SSI</p> <p style="text-align: center;">Precise, flexible, versatile</p>	 <p style="text-align: center;">AFS/AFM60 EtherNet/IP</p> <p style="text-align: center;">Intelligent, powerful, precise</p>
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Technical data overview			
Electrical interface	SSI/Gray SSI/Gray + Incremental, HTL SSI/Gray + Incremental, TTL SSI/Gray + Sin/Cos, 1,024 periods SSI/Gray, programmable SSI/Gray + Incremental, TTL/HTL, programmable SSI/Gray + Sin/Cos, 1,024 periods, programmable	EtherNet/IP	
Resolution	Up to max. 18 bit singleturn and multiturn 12 bit	Up to max. 18 bit singleturn and multiturn 12 bit	
Mechanical interface	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft Through hollow shaft	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft	
Connection type	Connector radial Cable universal Cable radial	Connector axial	
Ambient temperature	-30 °C ... +100 °C	-30 °C ... +85 °C	
Enclosure rating	Up to IP 67	Up to IP 67	
Programmable	✓	✓	

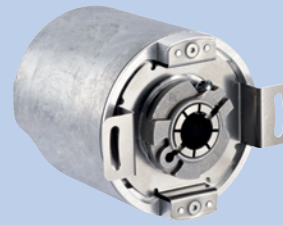
At a glance			
	<ul style="list-style-type: none"> • High-resolution absolute encoders with up to 30 bits (AFM60) or up to 18 bits (AFS60) • Face mount flange, servo flange, blind or through hollow shaft • SSI, SSI + Incremental or SSI + Sin/Cos interface • Programmable resolution and offset (dependent on type) • Connection system: M12, M23 connector or cable outlet • Enclosure rating: IP 67 (housing), IP 65 (shaft) • Operating temperature: -30 °C to +100 °C (depends on type) 	<ul style="list-style-type: none"> • High-resolution, 30-bit absolute encoder (18 bit singleturn and 12 bit multiturn) • Device Level Ring (DLR functionality) • Extensive diagnostics: Min/max values for temperature, position, speed. Operating hours counter, display of flags, alarms and warnings using e.g. a fault header (32 bit) • Status display via 5 duo LEDs • Rotary axis function • IP address via DHCP / DEC switches • Ethernet/IP interface (extended profile 0x22) • Function block 	
Detailed information	→ E-116	→ E-156	





AFS/AFM60 PROFINET

Intelligent, powerful, precise



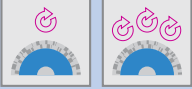

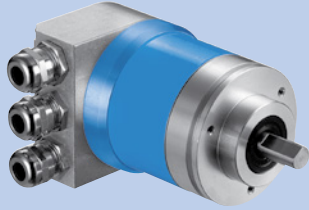
AFS/AFM60 EtherCAT®

Intelligent, powerful, precise

PROFINET	EtherCAT®
Up to max. 18 bit singleturn and multiturn 12 bit	Up to max. 18 bit singleturn and multiturn 12 bit
Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft
Connector axial	Connector axial
-30 °C ... +85 °C	-30 °C ... +85 °C
Up to IP 67	Up to IP 67
✓	✓
<ul style="list-style-type: none"> • 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 • 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 	<ul style="list-style-type: none"> • 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 • Up to 125 µs on-the-fly data transfer speed • 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
→ E-174	→ E-190



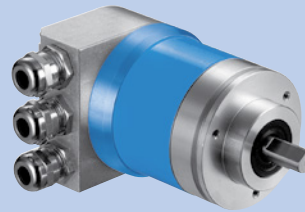
Product family overview

	 <p>A3M60 PROFIBUS</p> <p>Compact, robust, powerful</p>	 <p>ATM60 PROFIBUS</p> <p>Reliable, established and modular</p>
<p>Technical data overview</p>		
<p>Electrical interface</p>	<p>PROFIBUS</p>	
<p>Resolution</p>	<p>Up to max. 14 bit singleturn and multiturn 17 bit</p>	<p>Up to max. 13 bit singleturn and multiturn 13 bit</p>
<p>Mechanical interface</p>	<p>Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft</p>	<p>Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft</p>
<p>Connection type</p>	<p>Connector axial</p>	<p>Bus adapter</p>
<p>Ambient temperature</p>	<p>-30 °C ... +80 °C</p>	<p>-20 °C ... +80 °C</p>
<p>Enclosure rating</p>	<p>Up to IP 67</p>	<p>Up to IP 67</p>
<p>Programmable</p>	<p>✓</p>	<p>✓</p>
<p>At a glance</p>		
<p>E</p>	<ul style="list-style-type: none"> • Robust absolute multiturn encoder with up to 31 bits (14 bits singleturn and 17 bits multiturn) • Face mount flange, servo flange or blind hollow shaft • Compact design (<70 mm) • Integrated PROFIBUS interface with DP V0, V1 and V2 functionality (dependent on type) • Connection system: 3 x M12 connectors • Enclosure rating up to IP 67 • Operating temperature: -30 °C to +80 °C (dependent on type) 	<ul style="list-style-type: none"> • 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 • Electrical interface: PROFIBUS DP as per IEC61158 / RS 485 , electrically isolated • Electronically adjustable, configurable resolution • Magnetic scanning
<p>Detailed information</p>	<p>→ E-208</p>	<p>→ E-218</p>



ATM60 SSI

Reliable, established and modular



ATM60 CANopen

Reliable, established and modular

	SSI	CANopen
	Up to max. 13 bit singleturn and multiturn 13 bit	Up to max. 13 bit singleturn and multiturn 13 bit
	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft
	Connector radial Cable radial	Bus adapter
	-20 °C ... +85 °C	-20 °C ... +80 °C
	Up to IP 67	Up to IP 67
	✓	✓

- Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 25 bits
- Mechanical interface: face mount flange, servo flange and blind hollow shaft
- Zero-set and preset functions via hardware or software
- Electrical interface: SSI with gray or binary code type
- Electronically adjustable, configurable resolution
- Endless operating functionality (optional)
- Magnetic scanning

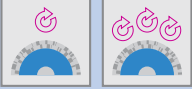
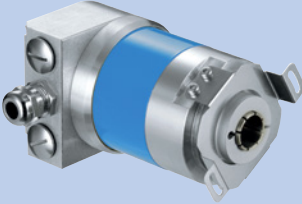

→ E-226

- 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 or software
- 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

→ E-236



Product family overview

	 <p style="text-align: center;">ATM60 DeviceNet</p>	 <p style="text-align: center;">ATM90 SSI</p>
	Reliable, established and modular	Reliable, established and modular

Technical data overview			
Electrical interface	DeviceNet	SSI	
Resolution	Up to max. 12 bit singleturn and multiturn 12 bit	Up to max. 13 bit singleturn and multiturn 13 bit	
Mechanical interface	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft	Through hollow shaft	
Connection type	Bus adapter	Connector radial Cable radial	
Ambient temperature	-20 °C ... +80 °C	-20 °C ... +70 °C	
Enclosure rating	Up to IP 67	IP 65	
Programmable	✓	✓	

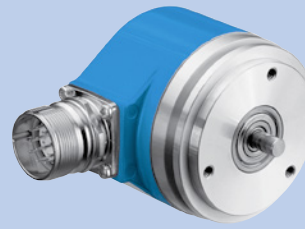
At a glance			
	<ul style="list-style-type: none"> • Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits • Mechanical interface: face mount, servo flange, blind hollow shaft and adapter accessories • Zero set and preset functions via hardware/software • Electrical interface: CAN/DeviceNet specification 2.0B, electrically isolated; device profile: Generic [0] • Electronically adjustable, configurable resolution • Network status info via duo LED • Magnetic scanning 	<ul style="list-style-type: none"> • Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 25 bits • Mechanical interface: through hollow shaft with shallow installation depth • Zero-set and preset functions via hardware or software • Electrical interface: SSI with gray or binary code type • Electronically adjustable, configurable resolution • Magnetic scanning 	
Detailed information	→ E-244	→ E-252	





ATM90 PROFIBUS

Reliable, established and modular



ARS60 SSI/Parallel

Reliable and established

	PROFIBUS	SSI/Gray SSI/Gray Excess Parallel/Gray Parallel/Gray Excess Parallel/BIN Parallel/BCD
	Up to max. 12 bit singleturn and multiturn 12 bit	Up to max. 13 bit
	Through hollow shaft	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft Through hollow shaft
	3 x connector radial 3 x PG radial	Connector radial Connector axial Cable radial Cable axial
	-20 °C ... +80 °C	-20 °C ... +85 °C
	IP 65	Up to IP 66
	✓	-

- 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
- Electrical interface: PROFIBUS DP as per IEC61158 / RS-485, electrically isolated
- Electronically adjustable, configurable resolution
- Magnetic scanning

→ E-258

- Absolute singleturn encoder
- Resolution: up to 15 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 IP 66

→ E-266

E

Precise, flexible, versatile



Product description

With a high resolution of 18 bits (AFS60) or 30 bits (AFM60) and a large selection of programmable parameters, the AFS60 absolute singleturn encoder and the AFM60 absolute multiturn encoder set new standards when it comes to rotary encoders. The high resolution combined with the high IP enclosure rating enables use in a multitude of industrial applications. Both encoders are equipped with the SSI interface while the AFM60 is also available with the SSI + Incremental and SSI + Sin/Cos combined interfaces.

A shaft bearing distance of 30 mm means the AFS60/AFM60 product family has significantly better rotation accuracy than encoders with blocked ball bearings. Yet despite their large bearing distance, the AFS60/AFM60 have a compact design.

The AFS60 and AFM60 can be programmed via the same programming tool (PGT-08-S) as the DFS60 product family from SICK.

At a glance

- High-resolution absolute encoders with up to 30 bits (AFM60) or up to 18 bits (AFS60)
- Face mount flange, servo flange, blind or through hollow shaft
- SSI, SSI + Incremental or SSI + Sin/Cos interface
- Programmable resolution and offset (dependent on type)
- Connection system: M12, M23 connector or cable outlet
- Enclosure rating: IP 67 (housing), IP 65 (shaft)
- Operating temperature: -30 °C to +100 °C (depends on type)

Your benefits

- Programmability of the encoders means less storage, greater machine availability and easy installation
- Precise positioning due to high resolutions
- Large selection of mechanical interfaces and electrical contacting possibilities: Suitable for all applications
- Suitable for applications with limited space requirements (extremely short installation depth of 30 mm)
- Very good rotation accuracy due to increased bearing distance
- One programming tool and software with automatic encoder detection for AFS60/AFM60/DFS60



Additional information

Detailed technical data E-117

Maximum speed consideration . . E-119

Ordering information E-120

Dimensional drawings E-138

Pin and wire allocation E-148

Output signals E-150

Interfaces E-151

Accessories E-152

→ www.mysick.com/en/AFS_AFM60_SSI

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.



E

Detailed technical data

Performance

	E	B	A
Number of steps per revolution (SSI Interface)			
Max. singleturn and multiturn ¹⁾	4096	32768	262144
Number of revolutions (AFM60)	4096 multiturn		
Error limits	± 0.2°	± 0.05°	± 0.03°
Repeatability	0.002°		
Initialization time ²⁾	50 ms		
Position sample time (SSI)	< 1 µs		

¹⁾ See "Maximum speed consideration" on page E-119.

²⁾ Valid positional data can be read once this time has elapsed.

Mechanical data

Shaft diameter			
Face mount flange	10 x 19 mm		
Servo flange	6 x 10 mm		
Blind hollow shaft, through hollow shaft	8, 10, 12, 14, 15 mm and 3/8", 1/2", 5/8" ¹⁾		
Material shaft	Stainless steel		
Material flange	Aluminium		
Material housing	Aluminium		
Mass ²⁾			
Face mount flange, servo flange	0.3 kg		
Blind hollow shaft, through hollow shaft	0.2 kg		
Start up torque at 20 °C			
Face mount flange, servo flange	0.5 Ncm		
Blind hollow shaft, through hollow shaft	0.8 Ncm		
Operating torque at 20 °C			
Face mount flange, servo flange	0.3 Ncm		
Blind hollow shaft, through hollow shaft	0.6 Ncm		
Max. shaft loading			
Face mount flange, servo flange	80 N radial 40 N axial		
Permissible shaft movement of the drive element static/dynamic			
Blind hollow shaft, through hollow shaft	± 0.3/± 0.1 mm radial ± 0.5/± 0.2 mm axial	± 0.3/± 0.05 mm radial ± 0.5/± 0.1 mm axial	
Max. angular acceleration	5 x 10 ⁵ rad/s ²		
Max. operating speed ³⁾			
Face mount flange, servo flange	9,000 min ⁻¹		
Blind hollow shaft	6,000 min ⁻¹		
Through hollow shaft	9,000 min ⁻¹		
Moment of inertia of the rotor			
Face mount flange, servo flange	6.2 gcm ²		
Blind hollow shaft, through hollow shaft	40 gcm ²		
Bearing lifetime	3 x 10 ⁹ revolutions		

¹⁾ 5/8" not available for multiturn.

²⁾ Based on encoders with a connector outlet.

³⁾ Self-warming. 3.3 K/1,000 min⁻¹, when applying note working temperature range.

Electrical data

	E	B	A
Power consumption, no load	0.7 W		
Operating voltage	4.5 ... 32 V		
Reverse voltage protection	✓		
MTTFd: mean time to dangerous failure ¹⁾	250 years (EN ISO 13849-1)		

¹⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive.

Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Interfaces

SSI Interface			
Code type	Gray		
Code sequence adjustable	CW/ $\overline{\text{CCW}}$		
Measuring step	360°/number of lines		
	0.09°	0.01°	0.0014°
Number of steps per revolution	Max. singleturn and multiturn ¹⁾		
	4096	32768	262144
Number of revolutions (AFM60)	4096 multiturn		
Measuring step deviation	Number of steps per revolution		
	1 ... 399	± 0.2°	± 0.08°
	400 ... 40000	± 0.2°	± 0.01°
	> 40000	–	± 0.002°
Clock+, Clock-, Data+, Data-	SSI clock frequency 2 MHz, or min. LOW level (Clock+): 500 ns		
	1 MHz	2 MHz	2 MHz
SET (electronic adjustment)	H-active (L = 0 - 3 V; H = 4 - U _S V)		
CW/ $\overline{\text{CCW}}$ (Counting sequence when turning)	L-active (L = 0 - 1.5 V; H = 2.0 - U _S V)		
Incremental interface TTL/HTL/programmable (AFM60 SSI + Incremental)			
Number of lines per revolution	1/4 of number of SSI steps per revolution		
Measuring step	90° electric/number of lines		
Measuring step deviation	Number of lines per revolution 1 ... 99		
	± 0.2°	± 0.08°	± 0.04°
	Number of lines per revolution 100 ... 10000	± 0.2°	± 0.01°
	Number of lines per revolution > 10000	–	± 0.002°
Interface signals A, \bar{A} , B, \bar{B}	Digital differential		
Max. output frequency	300 kHz	600 kHz	820 kHz
Load current	30 mA		
Incremental interface sine/cosine 4.5 V ... 5.5 V, sine 0.5 V_{pp} (AFM60 SSI + Sin/Cos)			
Number of lines per revolution	1,024		
Max. output frequency	200 kHz		
Load resistance	Min. 120 Ω		

¹⁾ Maximum speed consideration see on page E-119.

	E	B	A
Interface signals Sin+, Sin-, Cos+, Cos-	Analog differential		
Signal before differential generation at load 120 Ω	0.5 V _{pp} ± 20 %		
Signal offset	2.5 V ± 10 %		

¹⁾ See "Maximum speed consideration" on page E-119.

¹⁾ Maximum speed consideration see on page E-119.

Ambient data

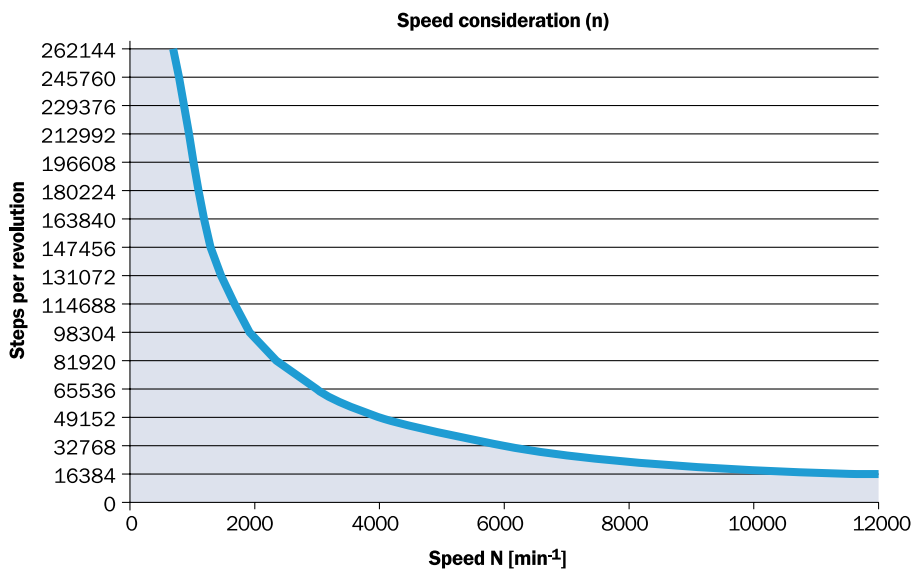
EMC ¹⁾	Acc. to EN 61000-6-2 and EN 61000-6-3		
Enclosure rating acc. IEC 60529			
Shaft side	IP 65		
Housing side connector outlet ²⁾	IP 67		
Housing side cable outlet	IP 67		
Permissible relative humidity ³⁾	90 %		
Working temperature range	0 ... +85 °C	-30 ... +100 °C	
Storage temperature range (without packaging)	-40 ... +100 °C		
Resistance			
To shocks (EN 60068-2-27)	50 g/6 ms	70 g/6 ms	60 g/6 ms
To vibration (EN 60068-2-6)	20 g/10 ... 2,000 Hz	30 g/10 ... 2,000 Hz	20 g/10 ... 2,000 Hz

¹⁾ The EMC according to the standards quoted is achieved if screened cables are used.

²⁾ When the mating connector is fitted.

³⁾ Condensation of the optical scanning not permitted.

Maximum speed consideration dependent on the selected number of steps per revolution

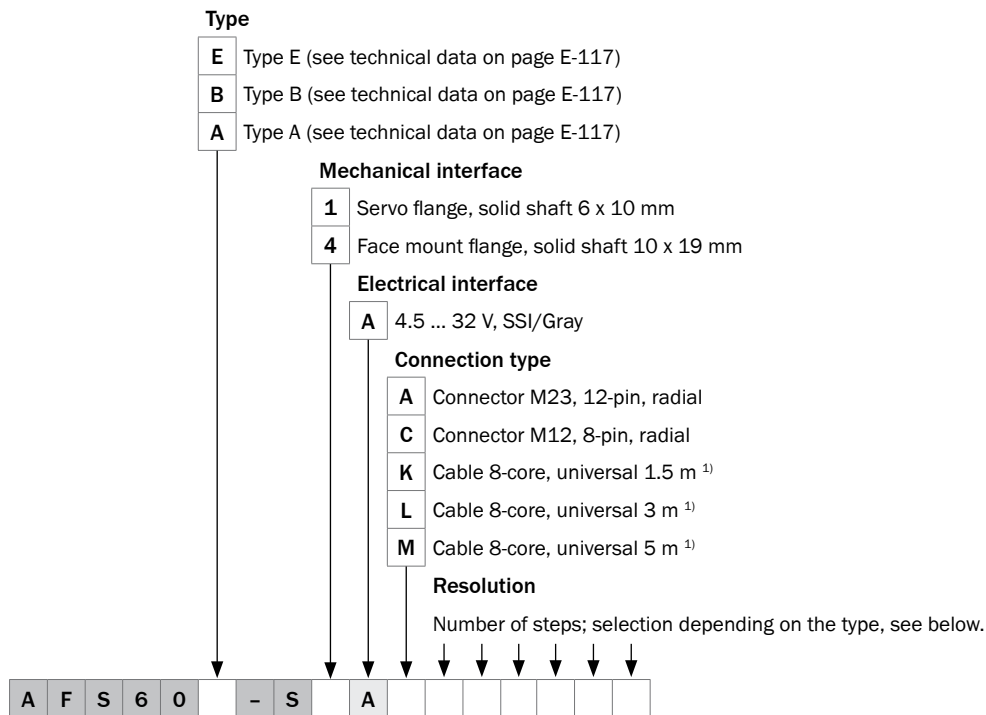


The maximum speed is also dependent on the shaft type. See "Mechanical data" on page E-117.



Ordering information

Type code AFS60 SSI Absolute Encoder singleturn, solid shaft



¹⁾ The universal cable outlet is positioned in such a way, that it is possible to lay the cable in a radial or axial direction without kinking it.

Number of lines per revolution

- Type E

000256	8 Bit	001024	10 Bit	004096	12 Bit
000512	9 Bit	002048	11 Bit		

- Type B ¹⁾

000256	8 Bit	002048	11 Bit	016384	14 Bit
000512	9 Bit	004096	12 Bit	032768	15 Bit
001024	10 Bit	008192	13 Bit		

¹⁾ Others on request

- Type A ¹⁾

000256	8 Bit	002048	11 Bit	016384	14 Bit	131072	17 Bit
000512	9 Bit	004096	12 Bit	032768	15 Bit	262144	18 Bit
001024	10 Bit	008192	13 Bit	065536	16 Bit		

¹⁾ Others on request

Ordering examples

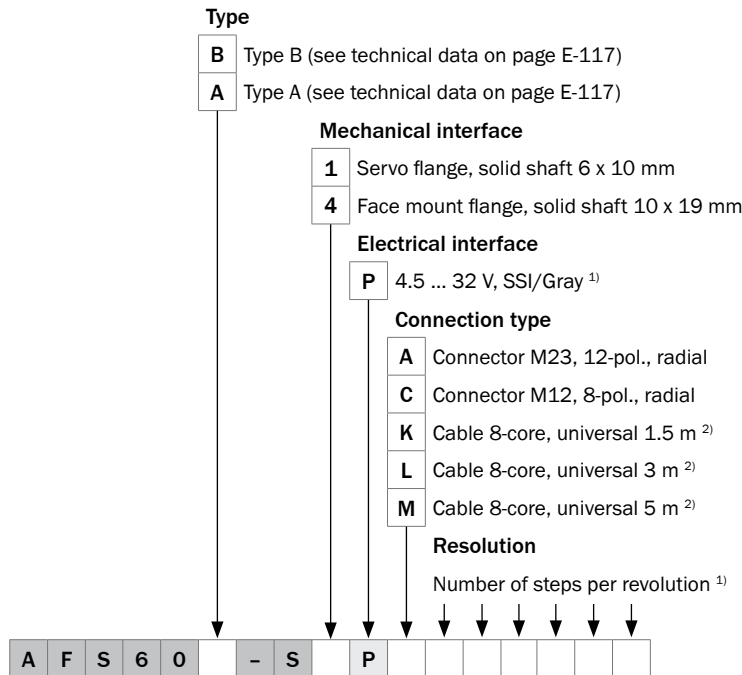
- Servo flange

Mechanical interface servo flange	Model name
Type E, connector M12, 8-pin, radial, number of lines per revolution 1024 (10 Bit)	AFS60E-S1AC001024

- Face mount flange

Mechanical interface face mount flange	Model name
Type E, connector M12, 8-pin, radial, number of lines per revolution 1024 (10 Bit)	AFS60E-S4AC001024

Type code AFS60 SSI Absolute Encoder singleturn, solid shaft, **programmable**



¹⁾ Number of steps of 2 to 262144 freely programmable by customer. Factory-programmed to Type B: 032768; Type A: 262144.

²⁾ The universal cable outlet is positioned in such a way, that it is possible to lay the cable in a radial or axial direction without kinking it.

Ordering examples

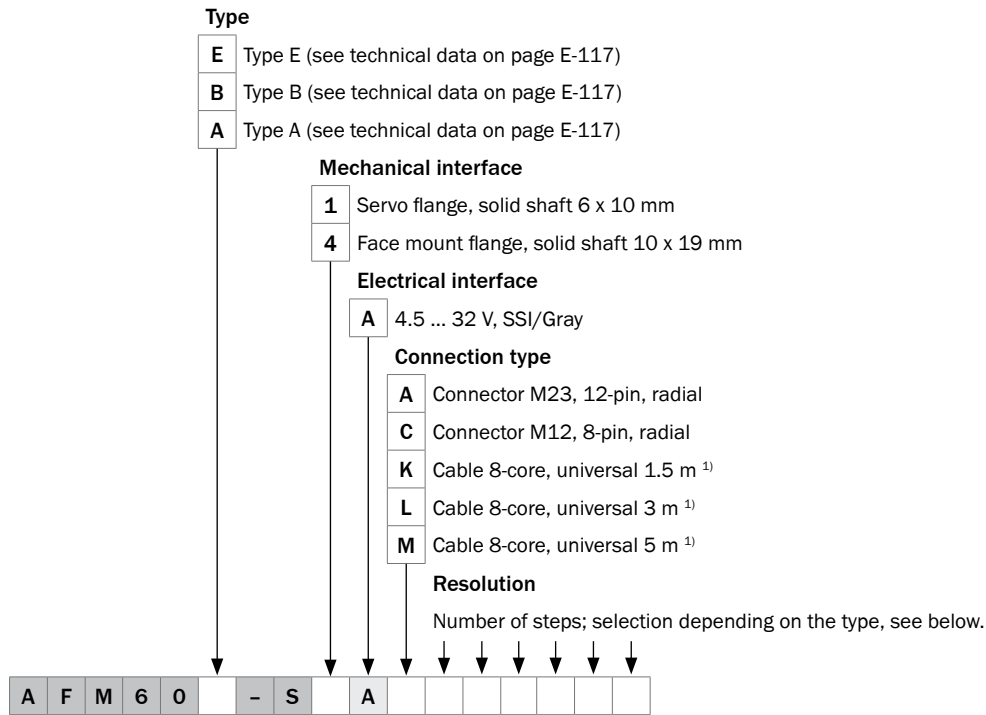
- Servo flange

Mechanical interface servo flange		Model name	Part no.
Type B	Connector M23, 12-pin, radial, number of lines per revolution 32768	AFS60B-S1PA032768	1037493
	Connector M12, 8-pin, radial, number of lines per revolution 32768	AFS60B-S1PC032768	1037494
	Cable 8-core, universal 1.5 m, number of lines per revolution 32768	AFS60B-S1PK032768	1037495
	Cable 8-core, universal 3 m, number of lines per revolution 32768	AFS60B-S1PL032768	1037496
	Cable 8-core, universal 5 m, number of lines per revolution 32768	AFS60B-S1PM032768	1037497
Type A	Connector M23, 12-pin, radial, number of lines per revolution 262144	AFS60A-S1PA262144	1037498
	Connector M12, 8-pin, radial, number of lines per revolution 262144	AFS60A-S1PC262144	1037499
	Cable 8-core, universal 1.5 m, number of lines per revolution 262144	AFS60A-S1PK262144	1037500
	Cable 8-core, universal 3 m, number of lines per revolution 262144	AFS60A-S1PL262144	1037501
	Cable 8-core, universal 5 m, number of lines per revolution 262144	AFS60A-S1PM262144	1037502

- Face mount flange

Mechanical interface face mount flange		Model name	Part no.
Type B	Connector M23, 12-pin, radial, number of lines per revolution 32768	AFS60B-S4PA032768	1037483
	Connector M12, 8-pin, radial, number of lines per revolution 32768	AFS60B-S4PC032768	1037484
	Cable 8-core, universal 1.5 m, number of lines per revolution 32768	AFS60B-S4PK032768	1037485
	Cable 8-core, universal 3 m, number of lines per revolution 32768	AFS60B-S4PL032768	1037486
	Cable 8-core, universal 5 m, number of lines per revolution 32768	AFS60B-S4PM032768	1037487
Type A	Connector M23, 12-pin, radial, number of lines per revolution 262144	AFS60A-S4PA262144	1037488
	Connector M12, 8-pin, radial, number of lines per revolution 262144	AFS60A-S4PC262144	1037489
	Cable 8-core, universal 1.5 m, number of lines per revolution 262144	AFS60A-S4PK262144	1037490
	Cable 8-core, universal 3 m, number of lines per revolution 262144	AFS60A-S4PL262144	1037491
	Cable 8-core, universal 5 m, number of lines per revolution 262144	AFS60A-S4PM262144	1037492

Type code AFM60 SSI/Gray Absolute Encoder multiturn, 4,096 revolutions, solid shaft



¹⁾ The universal cable outlet is positioned in such a way, that it is possible to lay the cable in a radial or axial direction without kinking it.

Number of lines per revolution x 4096 (12 Bit)

- Type E

000256	8 Bit	001024	10 Bit	004096	12 Bit
000512	9 Bit	002048	11 Bit		

- Type B

000256	8 Bit	002048	11 Bit	016384	14 Bit
000512	9 Bit	004096	12 Bit	032768	15 Bit
001024	10 Bit	008192	13 Bit		

- Type A

000256	8 Bit	002048	11 Bit	016384	14 Bit	131072	17 Bit
000512	9 Bit	004096	12 Bit	032768	15 Bit	262144	18 Bit
001024	10 Bit	008192	13 Bit	065536	16 Bit		

Ordering examples

- Servo flange

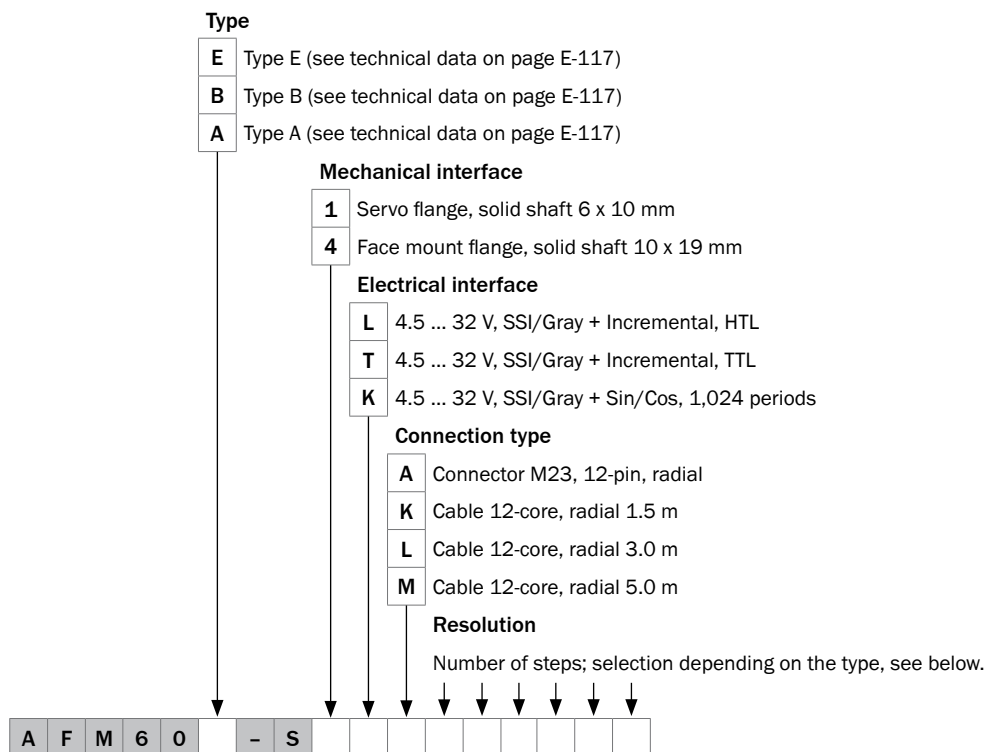
Mechanical interface servo flange	Model name
Type E, cable 8-core, universal 1.5 m, number of lines per revolution 4096 (12 Bit)	AFM60E-S1AK004096

- Face mount flange

Mechanical interface face mount flange	Model name
Type E, cable 8-core, universal 1.5 m, number of lines per revolution 4096 (12 Bit)	AFM60E-S4AK004096

E

Type code AFM60 SSI/Gray + Incremental and SSI/Gray + Sin/Cos Absolute Encoder multiturn, 4,096 revolutions, solid shaft



Number of lines per revolution x 4096 (12 Bit), number of incremental lines in brackets

- Type E

000256	8 Bit (64)	001024	10 Bit (256)	004096	12 Bit (1024)
000512	9 Bit (128)	002048	11 Bit (512)		

- Type B

000256	8 Bit (64)	002048	11 Bit (512)	016384	14 Bit (4096)
000512	9 Bit (128)	004096	12 Bit (1024)	032768	15 Bit (8192)
001024	10 Bit (256)	008192	13 Bit (2048)		

- Type A

000256	8 Bit (64)	002048	11 Bit (512)	016384	14 Bit (4096)	131072	17 Bit (32768)
000512	9 Bit (128)	004096	12 Bit (1024)	032768	15 Bit (8192)	262144	18 Bit (65536)
001024	10 Bit (256)	008192	13 Bit (2048)	065536	16 Bit (16384)		

Ordering examples

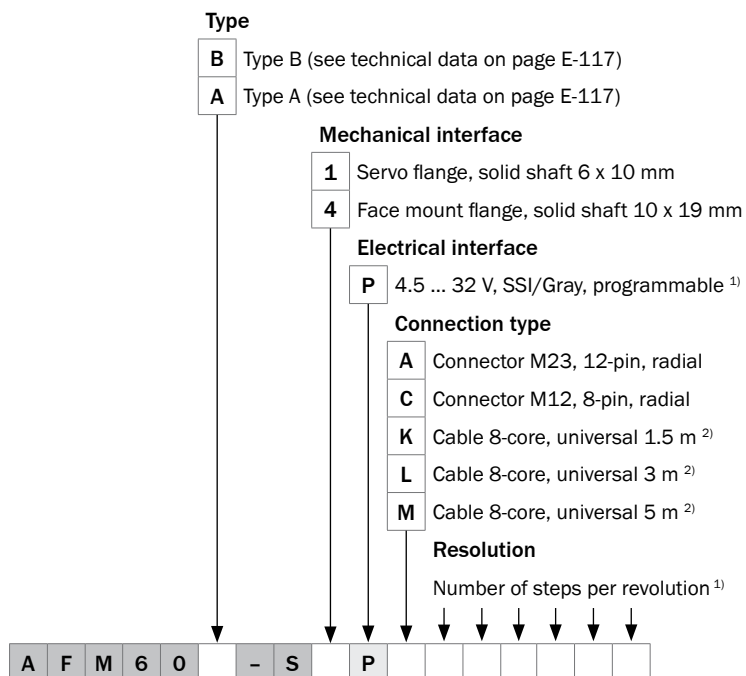
- Servo flange

Mechanical interface servo flange	Model name
Type E, 4.5 ... 32 V, SSI/Gray + Incremental, TTL, connector M23, 12-pin, radial, number of lines per revolution 2048 (11 Bit)	AFM60E-S1TA002048

- Face mount flange

Mechanical interface face mount flange	Model name
Type E, 4.5 ... 32 V, SSI/Gray + Incremental, TTL, connector M23, 12-pin, radial, number of lines per revolution 2048 (11 Bit)	AFM60E-S4TA002048

Type code AFM60 SSI/Gray Absolute Encoder multiturn, 4,096 revolutions, solid shaft, **programmable**



¹ Number of steps of 256 (8 Bit) to 262144 (18 Bit) freely programmable by customer. Factory-programmed to Type B: 032768; Type A: 262144.

² The universal cable outlet is positioned in such a way, that it is possible to lay the cable in a radial or axial direction without kinking it.

Ordering examples

- Servo flange

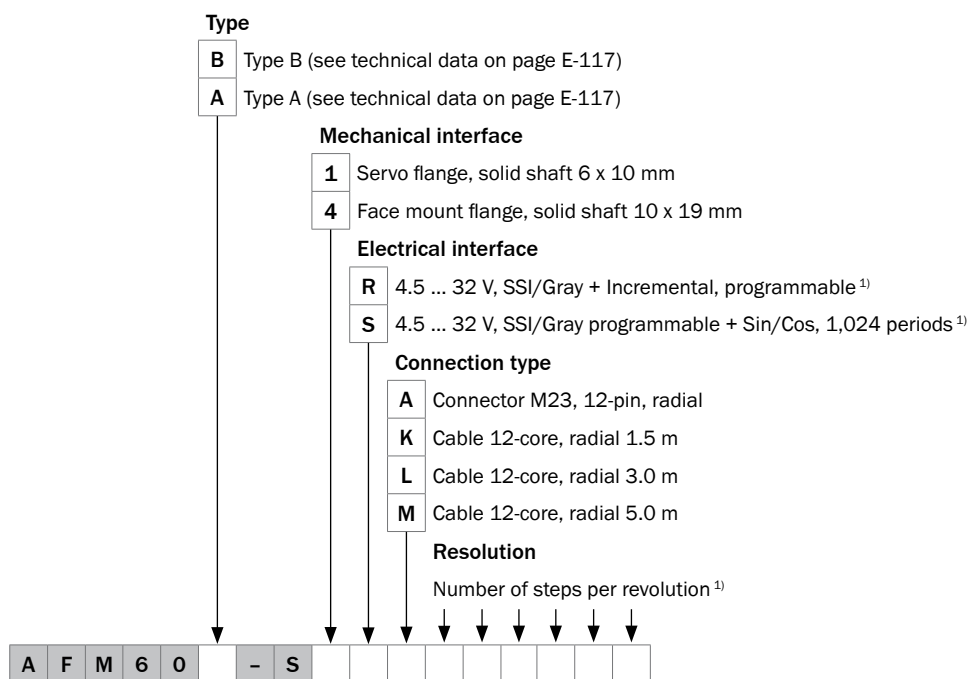
Mechanical interface servo flange		Model name	Part no.
Type B	Connector M23, 12-pin, radial, number of lines per revolution 32768	AFM60B-S1PA032768	1037513
	Connector M12, 8-pin, radial, number of lines per revolution 32768	AFM60B-S1PC032768	1037514
	Cable 8-core, universal 1.5 m, number of lines per revolution 32768	AFM60B-S1PK032768	1037515
	Cable 8-core, universal 3 m, number of lines per revolution 32768	AFM60B-S1PL032768	1037516
	Cable 8-core, universal 5 m, number of lines per revolution 32768	AFM60B-S1PM032768	1037517
Type A	Connector M23, 12-pin, radial, number of lines per revolution 262144	AFM60A-S1PA262144	1037518
	Connector M12, 8-pin, radial, number of lines per revolution 262144	AFM60A-S1PC262144	1037519
	Cable 8-core, universal 1.5 m, number of lines per revolution 262144	AFM60A-S1PK262144	1037520
	Cable 8-core, universal 3 m, number of lines per revolution 262144	AFM60A-S1PL262144	1037521
	Cable 8-core, universal 5 m, number of lines per revolution 262144	AFM60A-S1PM262144	1037522

- Face mount flange

Mechanical interface face mount flange		Model name	Part no.
Type B	Connector M23, 12-pin, radial, number of lines per revolution 32768	AFM60B-S4PA032768	1037503
	Connector M12, 8-pin, radial, number of lines per revolution 32768	AFM60B-S4PC032768	1037504
	Cable 8-core, universal 1.5 m, number of lines per revolution 32768	AFM60B-S4PK032768	1037505
	Cable 8-core, universal 3 m, number of lines per revolution 32768	AFM60B-S4PL032768	1037506
	Cable 8-core, universal 5 m, number of lines per revolution 32768	AFM60B-S4PM032768	1037507
Type A	Connector M23, 12-pin, radial, number of lines per revolution 262144	AFM60A-S4PA262144	1037508
	Connector M12, 8-pin, radial, number of lines per revolution 262144	AFM60A-S4PC262144	1037509
	Cable 8-core, universal 1.5 m, number of lines per revolution 262144	AFM60A-S4PK262144	1037510
	Cable 8-core, universal 3 m, number of lines per revolution 262144	AFM60A-S4PL262144	1037511
	Cable 8-core, universal 5 m, number of lines per revolution 262144	AFM60A-S4PM262144	1037512



Type code AFM60 SSI/Gray + Incremental and SSI/Gray + Sin/Cos Absolute Encoder multiturn, 4,096 revolutions, solid shaft, **programmable**



¹⁾ Number of steps of 256 (8 Bit) to 262144 (18 Bit) freely programmable by customer. Factory-programmed to Type B: 032768; Type A: 262144. Number of incremental lines is always 1/4 of number of SSI/Gray steps.

Ordering examples

- Servo flange

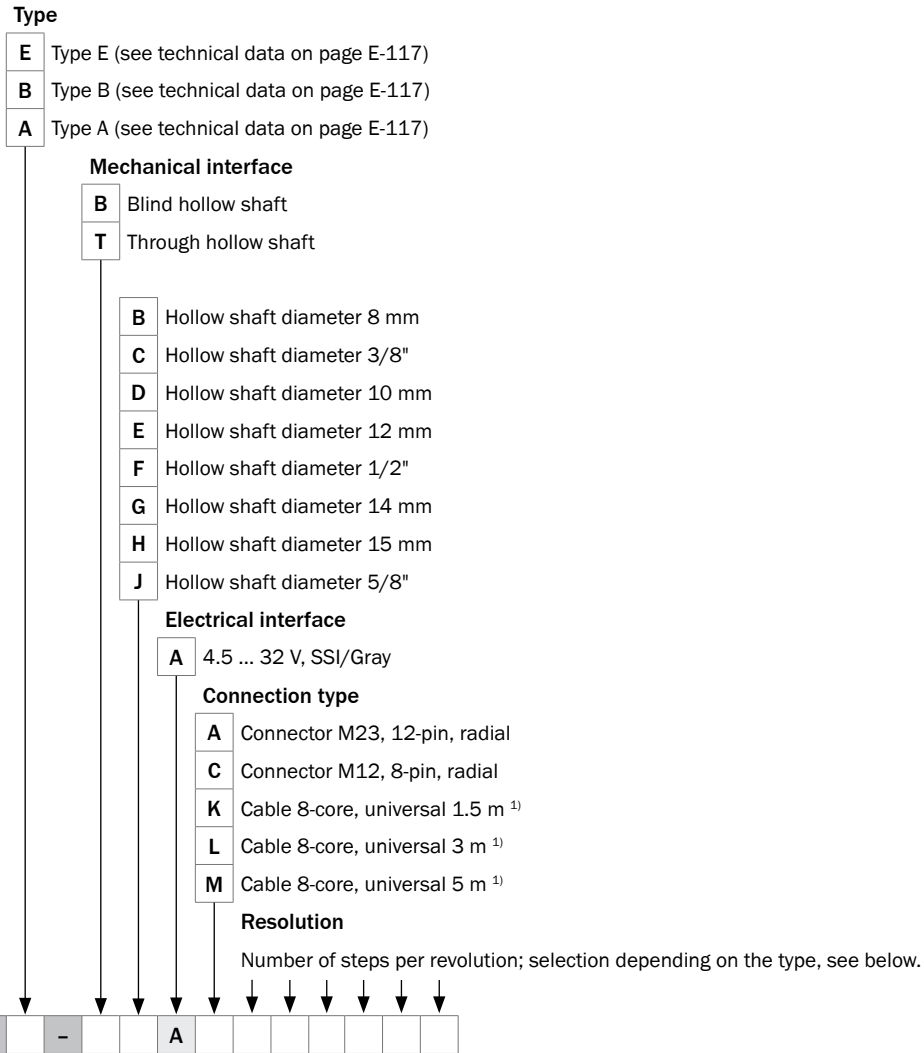
	Mechanical interface servo flange	Model name	Part no.
Type B	4.5 ... 32 V, SSI/Gray + Incremental, programmable, connector M23, 12-pin, radial, number of lines per revolution 32768	AFM60B-S1RA032768	1052835
Type A	4.5 ... 32 V, SSI/Gray + Incremental, programmable, connector M23, 12-pin, radial, number of lines per revolution 262144	AFM60A-S1RA262144	1052837
Type B	4.5 ... 32 V, SSI/Gray programmable + Sin/Cos, 1,024 periods, connector M23, 12-pin, radial, number of lines per revolution 32768	AFM60B-S1SA032768	1054220
Type A	4.5 ... 32 V, SSI/Gray programmable + Sin/Cos, 1,024 periods, connector M23, 12-pin, radial, number of lines per revolution 262144	AFM60A-S1SA262144	1054219

- Face mount flange

	Mechanical interface face mount flange	Model name	Part no.
Type B	4.5 ... 32 V, SSI/Gray + Incremental, programmable, connector M23, 12-pin, radial, number of lines per revolution 32768	AFM60B-S4RA032768	1052833
Type A	4.5 ... 32 V, SSI/Gray + Incremental, programmable, connector M23, 12-pin, radial, number of lines per revolution 262144	AFM60A-S4RA262144	1052624
Type B	4.5 ... 32 V, SSI/Gray programmable + Sin/Cos, 1,024 periods, connector M23, 12-pin, radial, number of lines per revolution 32768	AFM60B-S4SA032768	1054222
Type A	4.5 ... 32 V, SSI/Gray programmable + Sin/Cos, 1,024 periods, connector M23, 12-pin, radial, number of lines per revolution 262144	AFM60A-S4SA262144	1054221

Type code AFS60 SSI Absolute Encoder singleturn, hollow shaft

E



¹⁾ The universal cable outlet is positioned in such a way, that it is possible to lay the cable in a radial or axial direction without kinking it.

Number of lines per revolution

- Type E

000256	8 Bit	001024	10 Bit	004096	12 Bit
000512	9 Bit	002048	11 Bit		

- Type B ¹⁾

000256	8 Bit	002048	11 Bit	016384	14 Bit
000512	9 Bit	004096	12 Bit	032768	15 Bit
001024	10 Bit	008192	13 Bit		

¹⁾ Others on request

- Type A ¹⁾

000256	8 Bit	002048	11 Bit	016384	14 Bit	131072	17 Bit
000512	9 Bit	004096	12 Bit	032768	15 Bit	262144	18 Bit
001024	10 Bit	008192	13 Bit	065536	16 Bit		

¹⁾ Others on request

Ordering examples

- Blind hollow shaft

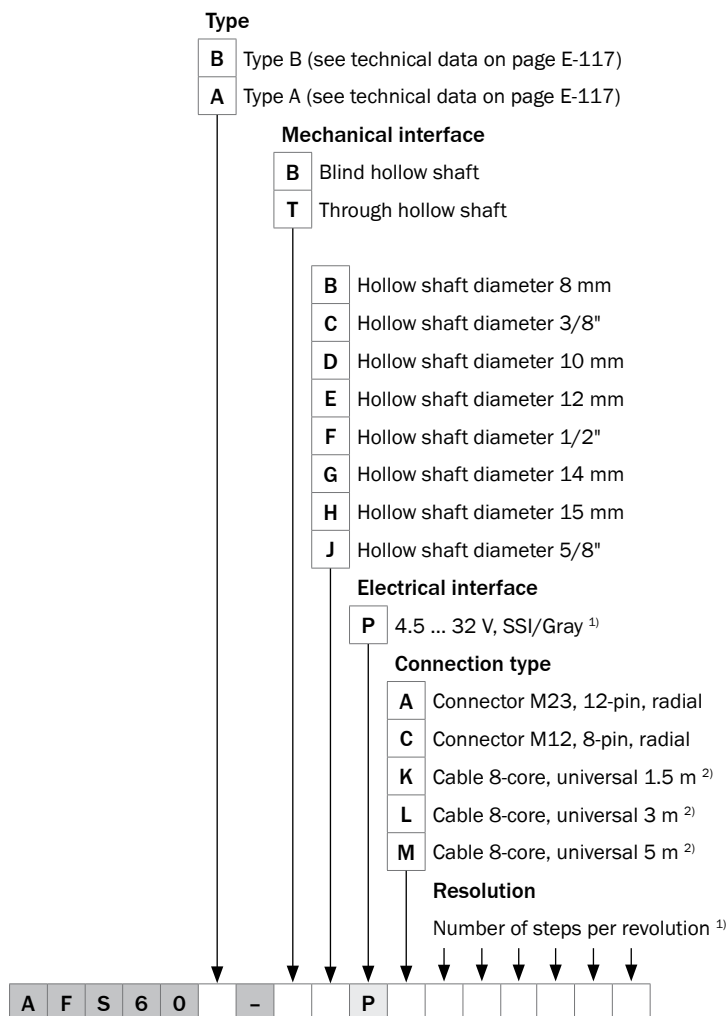
Mechanical interface blind hollow shaft	Model name
Type E, hollow shaft diameter 8 mm, connector M12, 8-pin, radial, number of lines per revolution 1024 (10 Bit)	AFS60E-BBAC001024

- Through hollow shaft

Mechanical interface through hollow shaft	Model name
Type E, hollow shaft diameter 8 mm, connector M12, 8-pin, radial, number of lines per revolution 1024 (10 Bit)	AFS60E-TBAC001024

Type code AFS60 SSI Absolute Encoder singleturn, hollow shaft, **programmable**

E



¹⁾ Number of steps of 2 to 262144 freely programmable by customer. Factory-programmed to Type B: 032768; Type A: 262144.

²⁾ The universal cable outlet is positioned in such a way, that it is possible to lay the cable in a radial or axial direction without kinking it.

Ordering examples¹⁾

- Blind hollow shaft

Mechanical interface blind hollow shaft		Model name
Type B	Connector M23, 12-pin, radial, number of lines per revolution 32768	AFS60B-BxPA032768
	Connector M12, 8-pin, radial, number of lines per revolution 32768	AFS60B-BxPC032768
	Cable 8-core, universal 1.5 m, number of lines per revolution 32768	AFS60B-BxPK032768
Type A	Connector M23, 12-pin, radial, number of lines per revolution 262144	AFS60A-BxPA262144
	Connector M12, 8-pin, radial, number of lines per revolution 262144	AFS60A-BxPC262144
	Cable 8-core, universal 1.5 m, number of lines per revolution 262144	AFS60A-BxPK262144

¹⁾ x stands for hollow shaft diameter B to J, put in the corresponding letter at point 9.

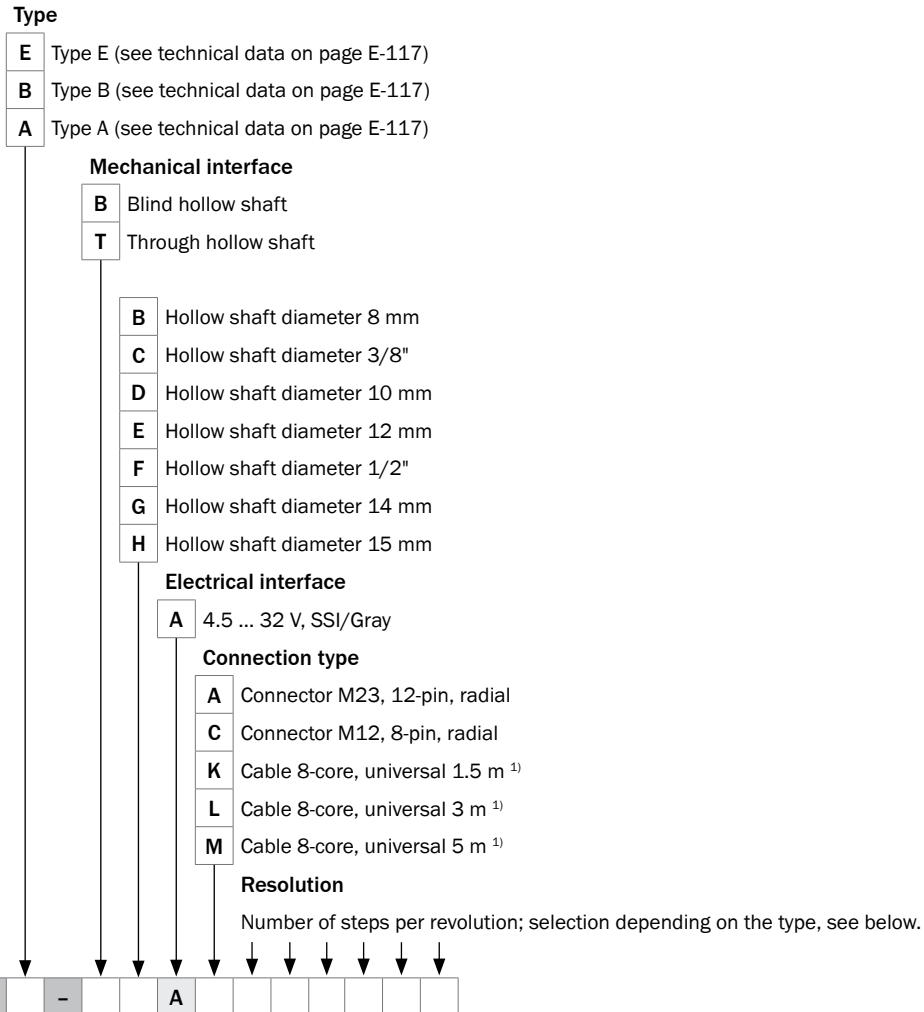
- Through hollow shaft

Mechanical interface through hollow shaft		Model name
Type B	Connector M23, 12-pin, radial, number of lines per revolution 32768	AFS60B-TxPA032768
	Connector M12, 8-pin, radial, number of lines per revolution 32768	AFS60B-TxPC032768
	Cable 8-core, universal 1.5 m, number of lines per revolution 32768	AFS60B-TxPK032768
Type A	Connector M23, 12-pin, radial, number of lines per revolution 262144	AFS60A-TxPA262144
	Connector M12, 8-pin, radial, number of lines per revolution 262144	AFS60A-TxPC262144
	Cable 8-core, universal 1.5 m, number of lines per revolution 262144	AFS60A-TxPK262144

¹⁾ x stands for hollow shaft diameter B to J, put in the corresponding letter at point 9.

Type code AFM60 SSI/Gray Absolute Encoder multiturn, 4,096 revolutions, hollow shaft

E



¹⁾ The universal cable outlet is positioned in such a way, that it is possible to lay the cable in a radial or axial direction without kinking it.

Number of lines per revolution x 4096 (12 Bit)

- Type E

000256	8 Bit	001024	10 Bit	004096	12 Bit
000512	9 Bit	002048	11 Bit		

- Type B

000256	8 Bit	002048	11 Bit	016384	14 Bit
000512	9 Bit	004096	12 Bit	032768	15 Bit
001024	10 Bit	008192	13 Bit		

- Type A

000256	8 Bit	002048	11 Bit	016384	14 Bit	131072	17 Bit
000512	9 Bit	004096	12 Bit	032768	15 Bit	262144	18 Bit
001024	10 Bit	008192	13 Bit	065536	16 Bit		

Ordering examples

- Blind hollow shaft

Mechanical interface blind hollow shaft	Model name
Type E, hollow shaft diameter 8 mm, cable 8-core, universal 1.5 m, number of lines per revolution 4096 (12 Bit)	AFM60E-BBAK004096

- Through hollow shaft

Mechanical interface through hollow shaft	Model name
Type E, hollow shaft diameter 8 mm, cable 8-core, universal 1.5 m, number of lines per revolution 4096 (12 Bit)	AFM60E-TBAK004096

E

Ordering examples

- Blind hollow shaft

Mechanical interface blind hollow shaft	Model name
Type E, hollow shaft diameter 8 mm, 4.5 ... 32 V, SSI/Gray + Incremental, TTL, connector M23, 12-pin, radial, number of lines per revolution 2048 (11 Bit)	AFM60E-BBTA002048

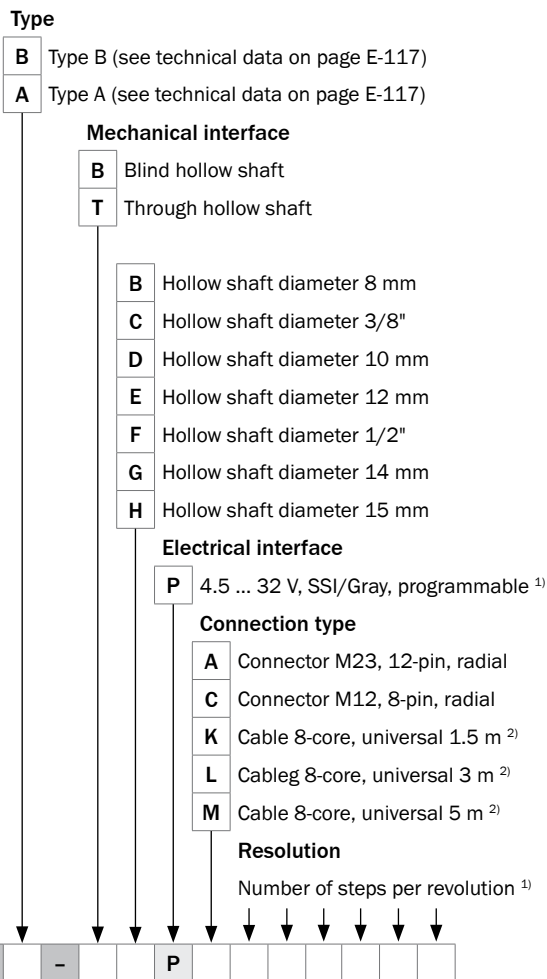
- Through hollow shaft

Mechanical interface through hollow shaft	Model name
Type E, hollow shaft diameter 8 mm, 4.5 ... 32 V, SSI/Gray + Incremental, TTL, connector M23, 12-pin, radial, number of lines per revolution 2048 (11 Bit)	AFM60E-TBTA002048

E

Type code AFM60 SSI/Gray Absolute Encoder multiturn, 4,096 revolutions, hollow shaft, **programmable**

E



¹⁾ Number of steps of 256 (8 Bit) to 262144 (18 Bit) freely programmable by customer. Factory-programmed to Type B: 032768; Type A: 262144.

²⁾ The universal cable outlet is positioned in such a way, that it is possible to lay the cable in a radial or axial direction without kinking it.

Ordering examples¹⁾

- Blind hollow shaft

Mechanical interface blind hollow shaft		Model name
Type B	Connector M23, 12-pin, radial, number of lines per revolution 32768	AFM60B-BxPA032768
	Connector M12, 8-pin, radial, number of lines per revolution 32768	AFM60B-BxPC032768
	Cable 8-core, universal 1.5 m, number of lines per revolution 32768	AFM60B-BxPK032768
Type A	Connector M23, 12-pin, radial, number of lines per revolution 262144	AFM60A-BxPA262144
	Connector M12, 8-pin, radial, number of lines per revolution 262144	AFM60A-BxPC262144
	Cable 8-core, universal 1.5 m, number of lines per revolution 262144	AFM60A-BxPK262144

¹⁾ x stands for hollow shaft diameter B to H, put in the corresponding letter at point 9.

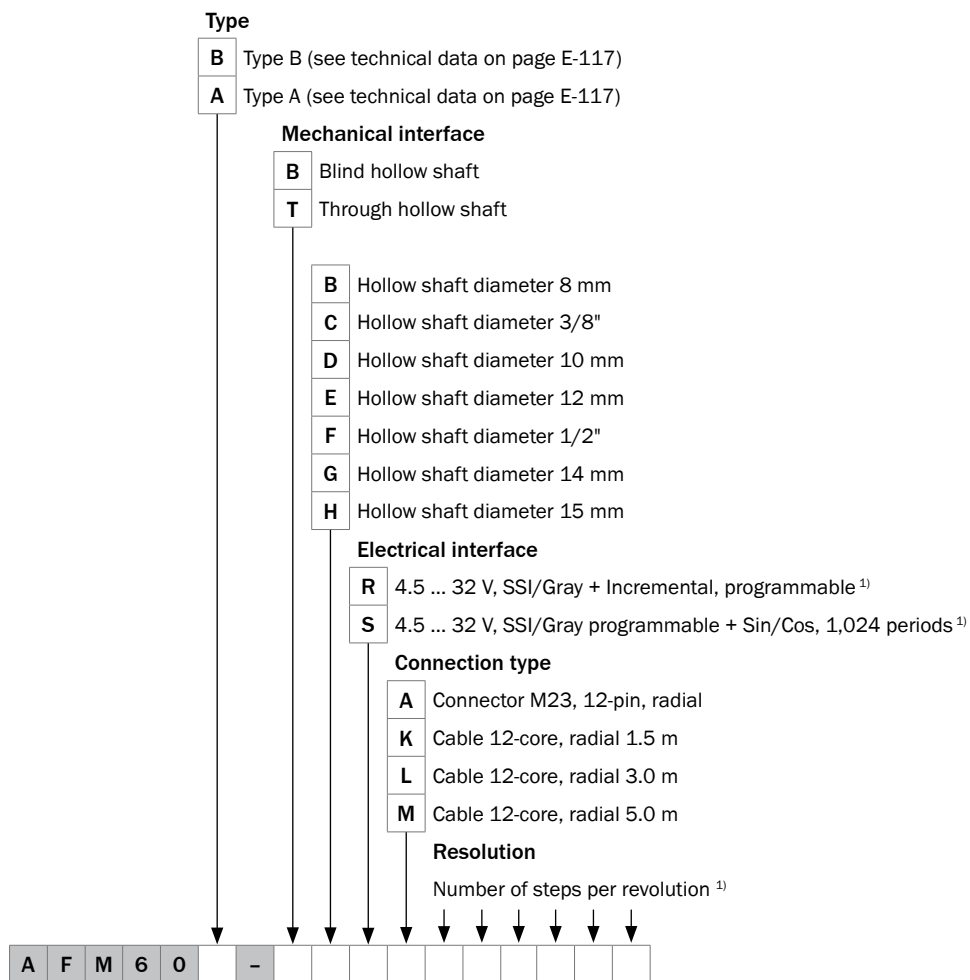
- Through hollow shaft

Mechanical interface through hollow shaft		Model name
Type B	Connector M23, 12-pin, radial, number of lines per revolution 32768	AFM60B-TxPA032768
	Connector M12, 8-pin, radial, number of lines per revolution 32768	AFM60B-TxPC032768
	Cable 8-core, universal 1.5 m, number of lines per revolution 32768	AFM60B-TxPK032768
Type A	Connector M23, 12-pin, radial, number of lines per revolution 262144	AFM60A-TxPA262144
	Connector M12, 8-pin, radial, number of lines per revolution 262144	AFM60A-TxPC262144
	Cable 8-core, universal 1.5 m, number of lines per revolution 262144	AFM60A-TxPK262144

¹⁾ x stands for hollow shaft diameter B to H, put in the corresponding letter at point 9.

Type code AFM60 SSI/Gray + Incremental and SSI/Gray + Sin/Cos Absolute Encoder multiturn, 4,096 revolutions, hollow shaft, **programmable**

E



¹⁾ Number of steps of 256 (8 Bit) to 262144 (18 Bit) freely programmable by customer. Factory-programmed to Type B: 032768; Type A: 262144. Number of incremental lines is always 1/4 of number of SSI/Gray steps.

Ordering examples¹⁾

- Blind hollow shaft

Mechanical interface blind hollow shaft		Model name
Type B	4.5 ... 32 V, SSI/Gray + Incremental, programmable, connector M23, 12-pin, radial, number of lines per revolution 32768	AFM60B-BxRA032768
Type A	4.5 ... 32 V, SSI/Gray + Incremental, programmable, connector M23, 12-pin, radial, number of lines per revolution 262144	AFM60A-BxRA262144
Type B	4.5 ... 32 V, SSI/Gray programmable + Sin/Cos, 1,024 periods, connector M23, 12-pin, radial, number of lines per revolution 32768	AFM60B-BxSA032768
Type A	4.5 ... 32 V, SSI/Gray programmable + Sin/Cos, 1,024 periods, connector M23, 12-pin, radial, number of lines per revolution 262144	AFM60A-BxSA262144

¹⁾ x stands for hollow shaft diameter B to H, put in the corresponding letter at point 9.

- Through hollow shaft

Mechanical interface through hollow shaft		Model name
Type B	4.5 ... 32 V, SSI/Gray + Incremental, programmable, connector M23, 12-pin, radial, number of lines per revolution 32768	AFM60B-TxRA032768
Type A	4.5 ... 32 V, SSI/Gray + Incremental, programmable, connector M23, 12-pin, radial, number of lines per revolution 262144	AFM60A-TxRA262144
Type B	4.5 ... 32 V, SSI/Gray programmable + Sin/Cos, 1,024 periods, connector M23, 12-pin, radial, number of lines per revolution 32768	AFM60B-TxSA032768
Type A	4.5 ... 32 V, SSI/Gray programmable + Sin/Cos, 1,024 periods, connector M23, 12-pin, radial, number of lines per revolution 262144	AFM60A-TxSA262144

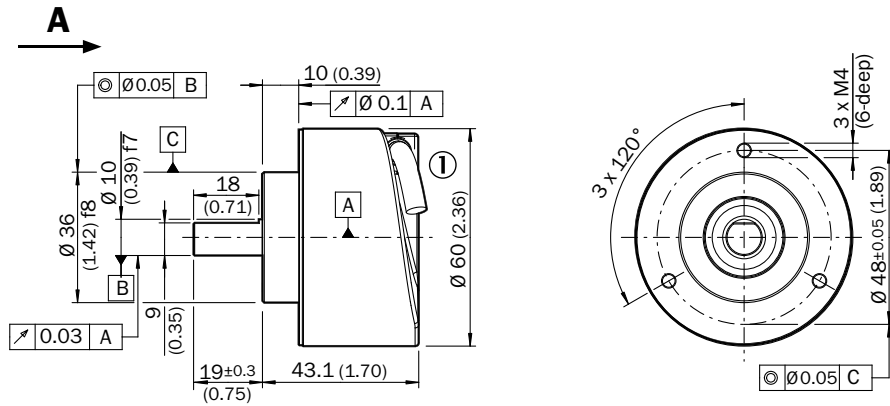
¹⁾ x stands for hollow shaft diameter B to H, put in the corresponding letter at point 9.

Dimensional drawings

dimensions in mm (inch)

Face mount flange

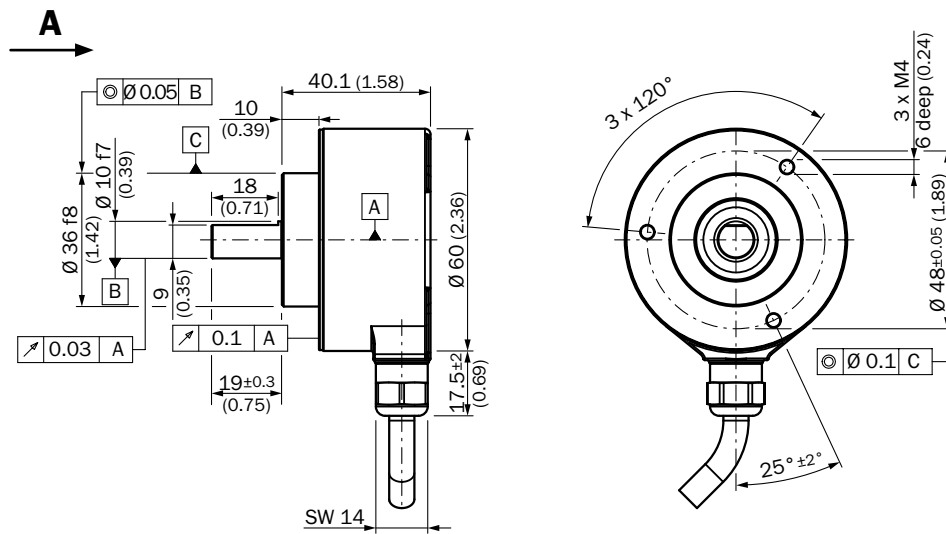
Cable outlet universal



General tolerances as per DIN ISO 2768-mk

① Cable- $\varnothing = 5.6 \pm 0.2$ mm, bending radius R = 30 mm

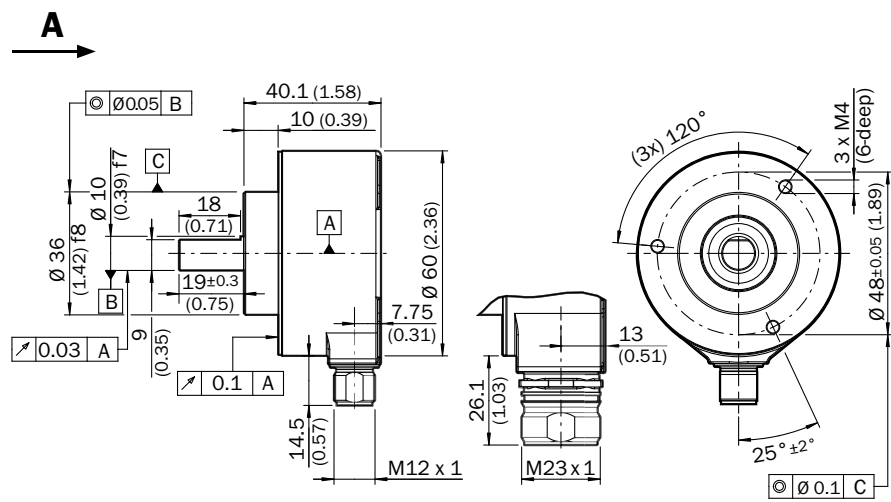
Cable outlet radial for AFM60 SSI + Incremental and AFM60 SSI + Sin/Cos



General tolerances as per DIN ISO 2768-mk

E

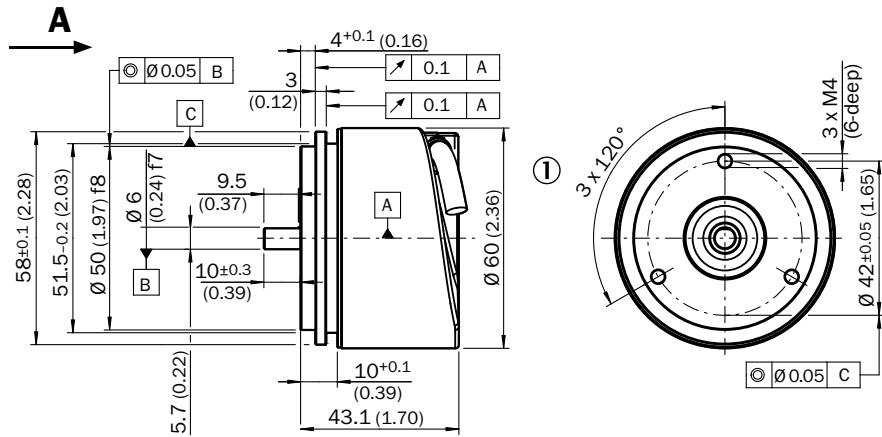
Connector outlet M12 and M23



General tolerances as per DIN ISO 2768-mk

Servo flange

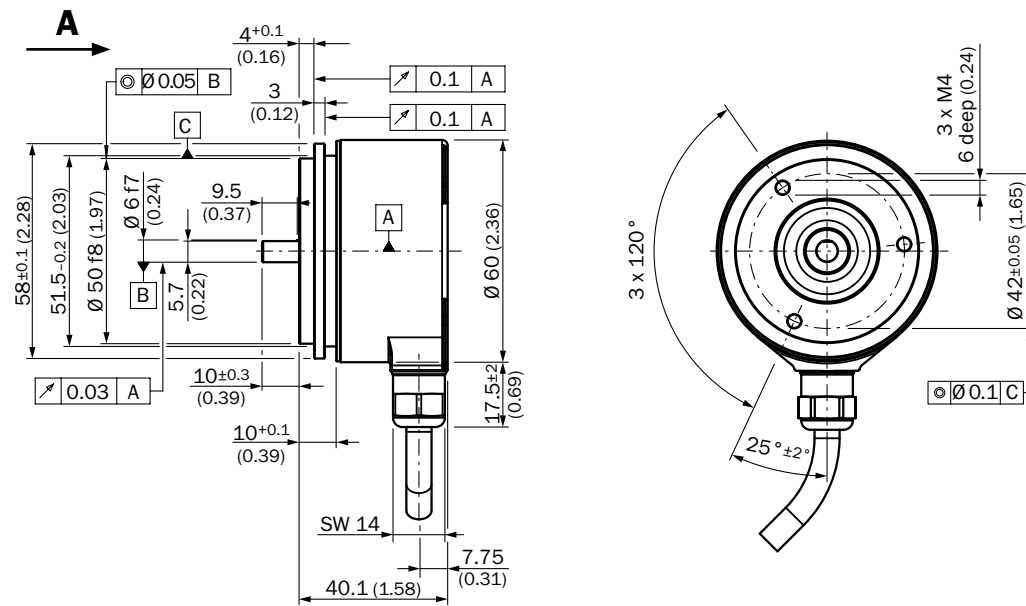
Cable outlet universal



General tolerances as per DIN ISO 2768-mk

① Cable- $\varnothing = 5.6 \pm 0.2$ mm, bending radius R = 30 mm

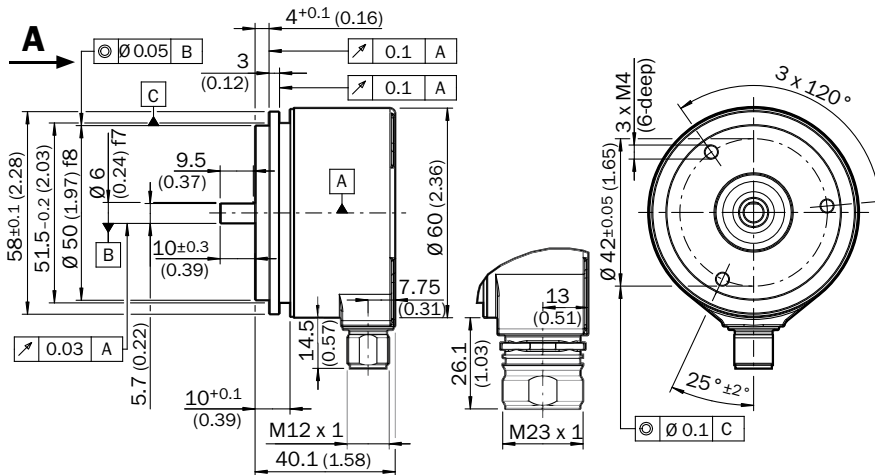
Cable outlet radial for AFM60 SSI + Incremental and AFM60 SSI + Sin/Cos



General tolerances as per DIN ISO 2768-mk

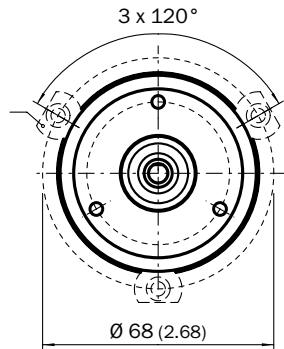


Connector outlet M12 and M23

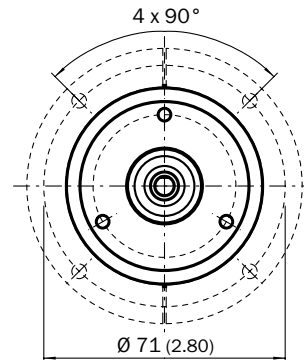


General tolerances as per DIN ISO 2768-mk

Proposed customer fitting for servo clamp small (part no. 2029166)



Proposed customer fitting for servo clamp half-shell (part no. 2029165)

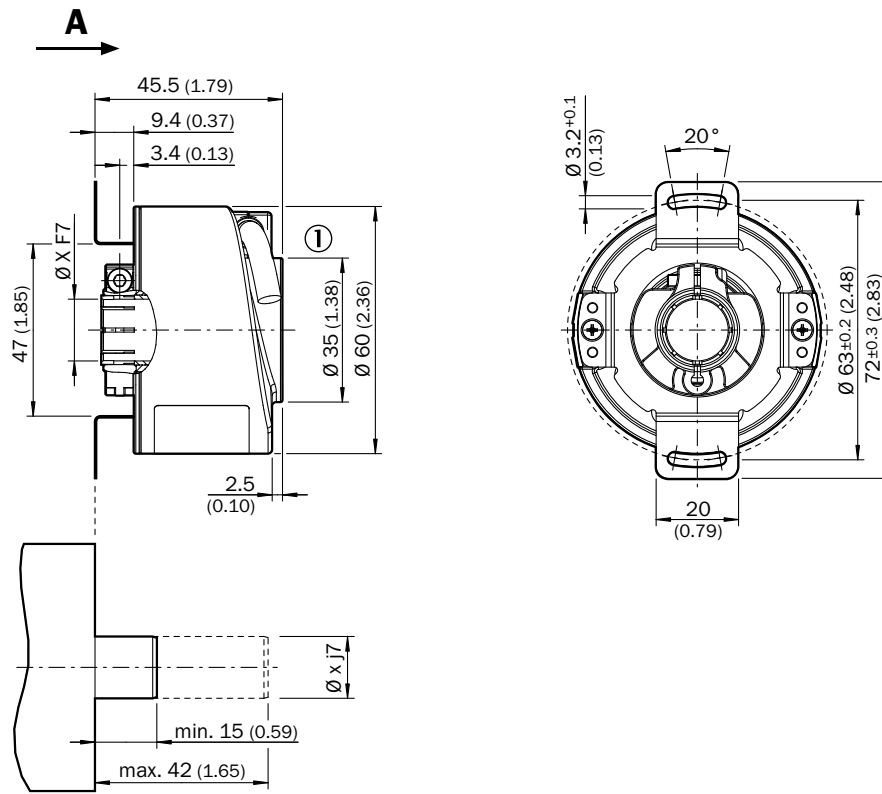


General tolerances as per DIN ISO 2768-mk

E

Blind hollow shaft

Cable outlet universal



E

Customer-side

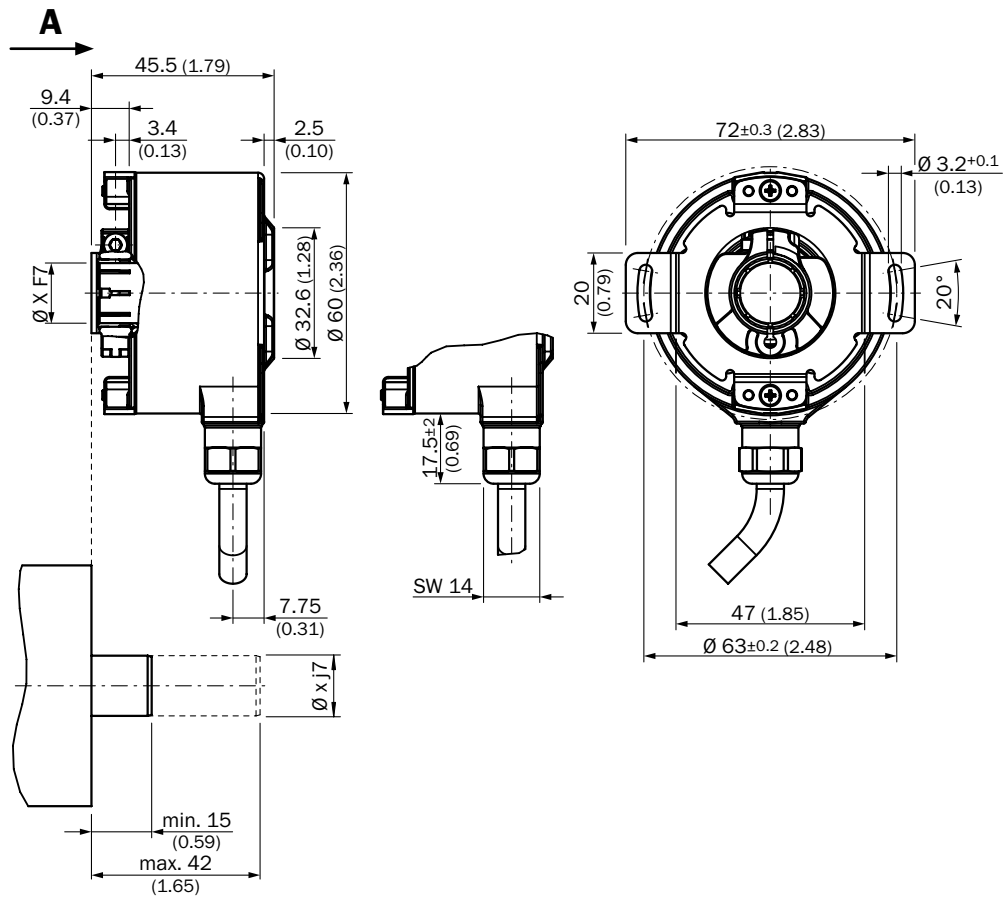
General tolerances as per DIN ISO 2768-mk

① Cable- $\varnothing = 5.6 \pm 0.2$ mm, bending radius R = 30 mm

XF7 = shaft diameter encoder, see type code

xj7 = shaft diameter, on the customer side

Cable outlet radial for AFM60 SSI + Incremental and AFM60 SSI + Sin/Cos



Customer-side

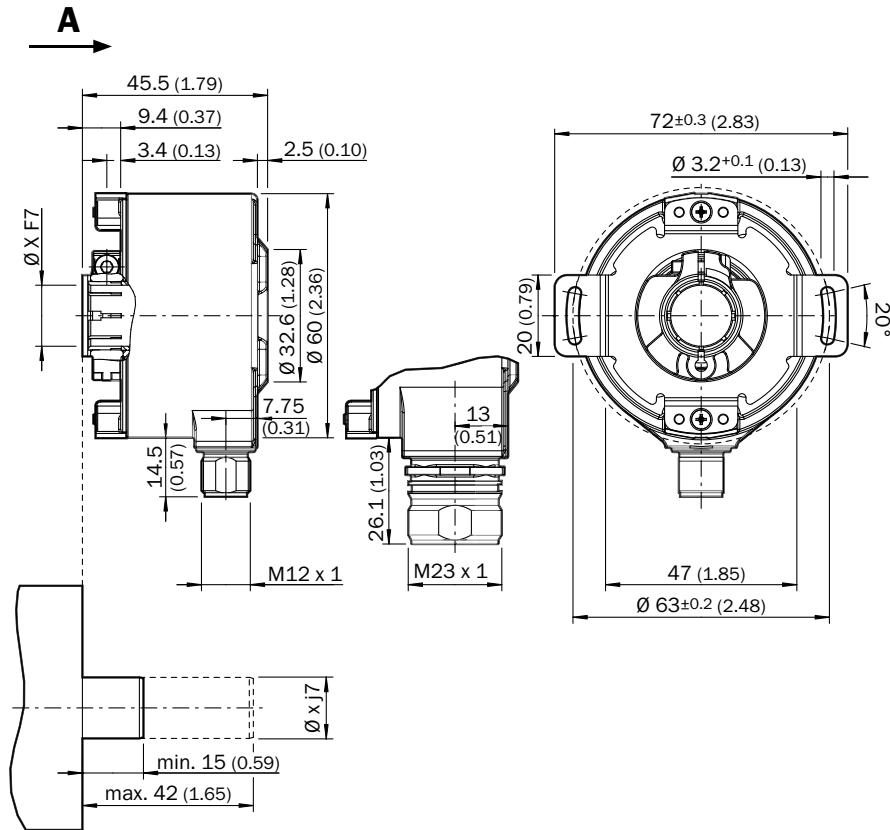
General tolerances as per DIN ISO 2768-mk

XF7 = shaft diameter encoder, see type code

xj7 = shaft diameter, on the customer side



Connector outlet M12 and M23



Customer-side

General tolerances as per DIN ISO 2768-mk

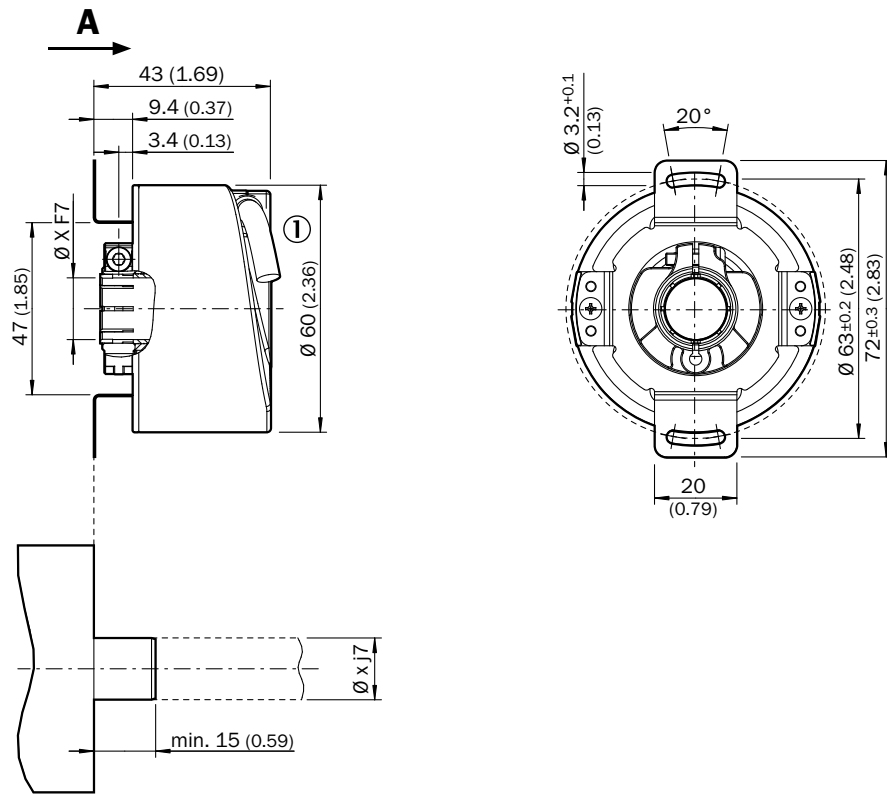
XF7 = shaft diameter encoder, see type code

xj7 = shaft diameter, on the customer side



Through hollow shaft

Cable outlet universal



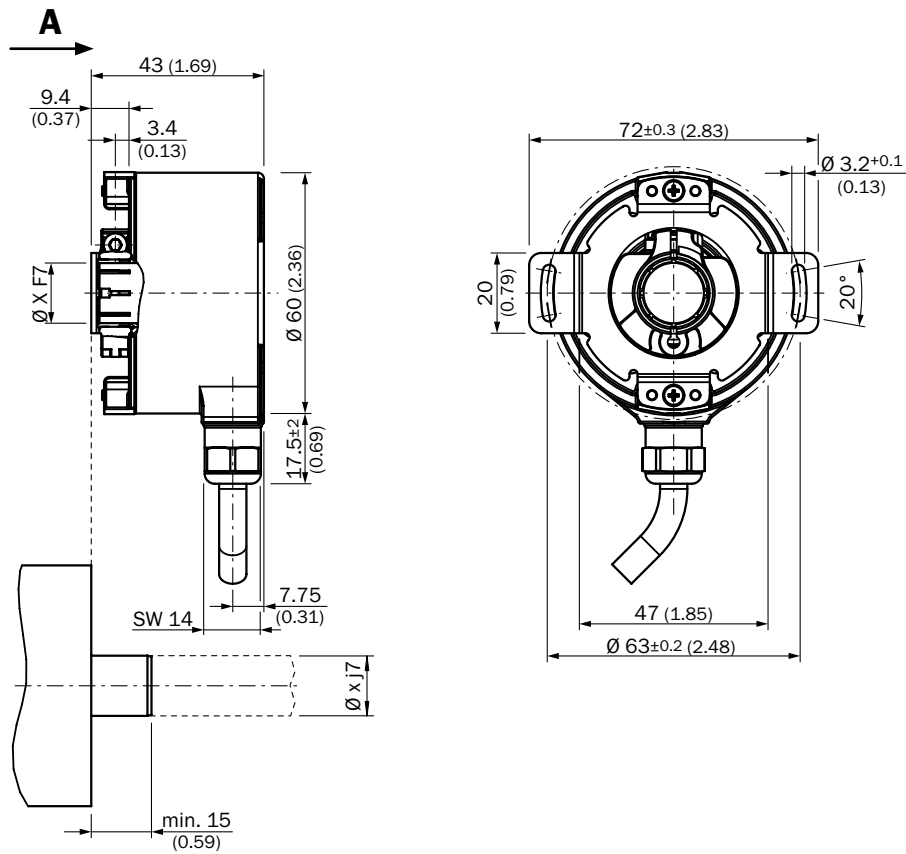
Customer-side

General tolerances as per DIN ISO 2768-mk

- ① Cable- $\varnothing = 5.6 \pm 0.2$ mm, bending radius $R = 30$ mm
- XF7 = shaft diameter encoder, see type code
- xj7 = shaft diameter, on the customer side

E

Cable outlet radial for AFM60 SSI + Incremental and AFM60 SSI + Sin/Cos



Customer-side

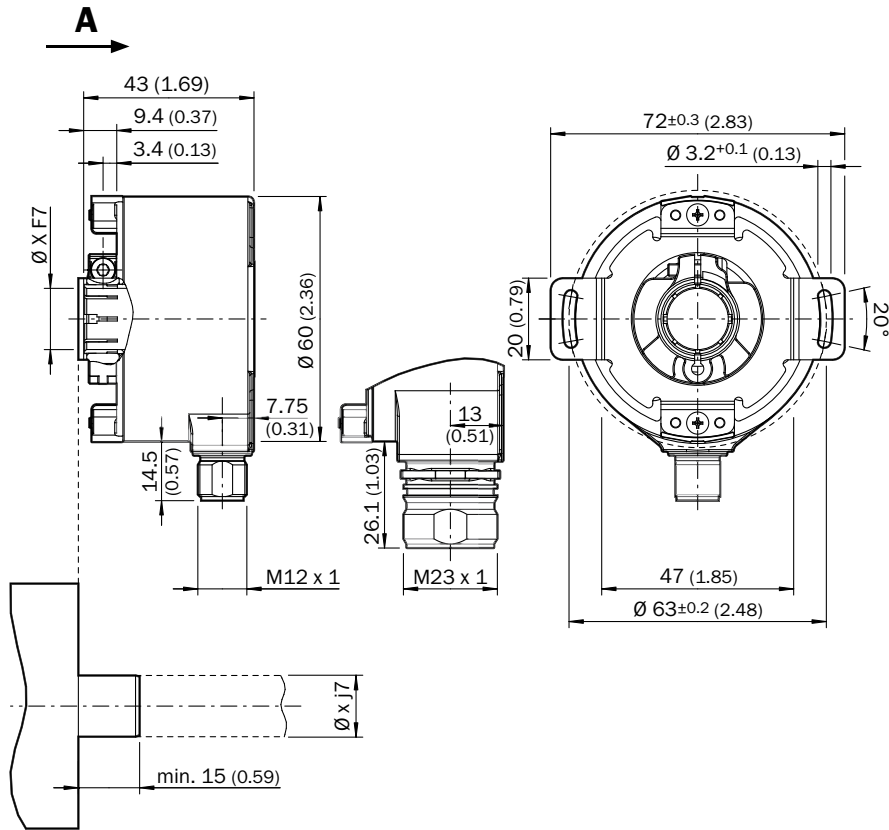
General tolerances as per DIN ISO 2768-mk

XF7 = shaft diameter encoder, see type code

xj7 = shaft diameter, on the customer side



Connector outlet M12 and M23



Customer-side

General tolerances as per DIN ISO 2768-mk

XF7 = shaft diameter encoder, see type code

j7 = shaft diameter, on the customer side

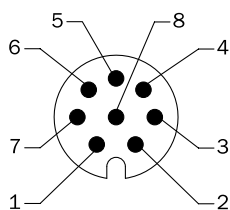


Pin and wire allocation

CW/ $\overline{\text{CCW}}$ Forward/reverse: This input programs the counting direction of the encoder. If not connected, this input is "HIGH". If the encoder shaft, as viewed on the drive shaft, rotates in the clockwise direction, it counts in an increasing sequence. If it should count upwards when the shaft rotates in the anti-clockwise direction, this connection must be connected permanently to "LOW" level (zero volts).

SET This input activates the electronic zero set. When the SET line is connected to US for more than 250 ms, after it was not connected for at least 1000 ms or connected to GND, the current mechanical position is assigned the value 0 or the pre-programmed SET-value.

Connector M12, 8-pin and cable outlet, cable 8-core SSI/Gray

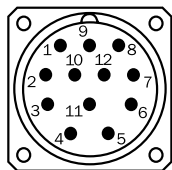


View to the connector M12 fitted to the encoder body

Pin	Color wires	Signal SSI	Explanation
1	Brown	Data-	Interface signals
2	White	Data+	Interface signals
3	Black	CW/ $\overline{\text{CCW}}$	Counting sequence when turning
4	Pink	SET	Electronic adjustment
5	Yellow	Clock+	Interface signals
6	Lilac	Clock-	Interface signals
7	Blue	GND	Ground connection
8	Red	+U _s	Supply voltage
		Screen	Screen on the encoder side connected to the housing. On the control side connected to earth.

E

Connector M23, 12-pin SSI/Gray



View to the connector M23 fitted to the encoder body

Pin	Signal	Explanation
1	GND	Ground connection
2	Data+	Interface signals
3	Clock+	Interface signals
4	N. C.	Not connected
5	N. C.	Not connected
6	N. C.	Not connected
7	N. C.	Not connected
8	U _s	Supply voltage
9	SET	Electronic adjustment
10	Data-	Interface signals
11	Clock-	Interface signals
12	CW/ $\overline{\text{CCW}}$	Counting sequence when turning
	Screen	Screen on the encoder side connected to the housing. On the control side connected to earth.

**Connector M23, 12-pin and cable outlet, cable 12-core
SSI/Gray + Incremental**

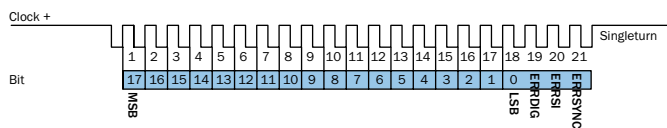
Pin	Color wires	Signal	Explanation
1	Red	+U _s	Supply voltage
2	Blue	GND	Ground connection
3	Yellow	Clock+	Interface signal
4	White	Data+	Interface signal
5	Orange	SET	Electronic adjustment
6	Brown	Data-	Interface signal
7	Violet	Clock-	Interface signal
8	Black	\bar{B}	Signal line
9	Orange/black	CW/ \overline{CCW}	Counting sequence when turning
10	Green	\bar{A}	Signal line
11	Gray	A	Signal line
12	Pink	B	Signal line
		Screen	Screen on the encoder side connected to the housing. On the control side connected to earth.

**Connector M23, 12-pin and cable outlet, cable 12-core
SSI/Gray + Sin/Cos**

Pin	Color wires	Signal	Explanation
1	Red	+U _s	Supply voltage
2	Blue	GND	Ground connection
3	Yellow	Clock+	Interface signal
4	White	Data+	Interface signal
5	Orange	SET	Electronic adjustment
6	Brown	Data-	Interface signal
7	Violet	Clock-	Interface signal
8	Black	Sin-	Signal line
9	Orange/black	CW/ \overline{CCW}	Counting sequence when turning
10	Green	Cos-	Signal line
11	Gray	Cos+	Signal line
12	Pink	Sin+	Signal line
		Screen	Screen on the encoder side connected to the housing. On the control side connected to earth.

Output signals

SSI data format singleturn



Bit 1–18: Position Bits

- LSB: Least significant Bit
- MSB: Most significant Bit

Bit 19–21: Error Bits

- ERRDIG: Failure message about speed. If this failure occurs during the position building procedure it will be indicated by the ERRDIG-Bit.
- ERRSI: Light source monitoring failure.
- ERRSYNC: Contamination of the disc or scanning system. During the determination of the position, an error has occurred since the last SSI transmission. The error bit will be deleted during the next data transmission.

The evaluation of the error bits has to be realized in the PLC.

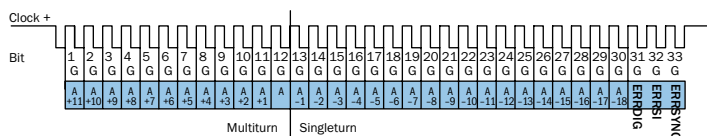
The provided error bits don't have to be used by the PLC compulsorily.

Example

If the resolution of the absolute encoder is set on 13 bits, 16 bits are provided by the encoder: 13 data bits and 3 error bits. If the PLC is not able to evaluate the error bits, the PLC has to be set on a resolution of 13 bits. Then the error bits have to be masked out by the PLC.

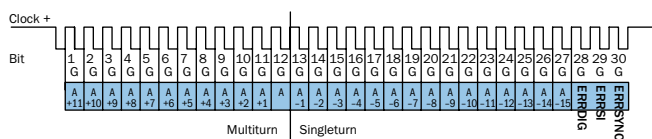
SSI data format multiturn

30 Bits



Bit 1–12: Position Bits multiturn
 Bit 13–30: Position Bits singleturn
 Bit 31–33: Error Bits

27 Bits



Bit 1–12: Position Bits multiturn
 Bit 13–27: Position Bits singleturn
 Bit 28–30: Error Bits

Error Bits

- ERRDIG: Failure message about speed. If this failure occurs during the position building procedure it will be indicated by the ERRDIG-Bit.
- ERRSI: Light source monitoring failure.
- ERRSYNC: Contamination of the disc or scanning system. During the determination of the position, an error has occurred since the last SSI transmission. The error bit will be deleted during the next data transmission.

The evaluation of the error bits has to be realized in the PLC.

The provided error bits don't have to be used by the PLC compulsorily. The multiturn resolution is fixed on 12 bits.

Example

If the resolution of the absolute encoder is set on 27 bits, 30 bits are provided by the encoder: 27 data bits and 3 error bits. If the PLC is not able to evaluate the error bits, the PLC has to be set on a resolution of 27 bits. Then the error bits have to be masked out by the PLC.



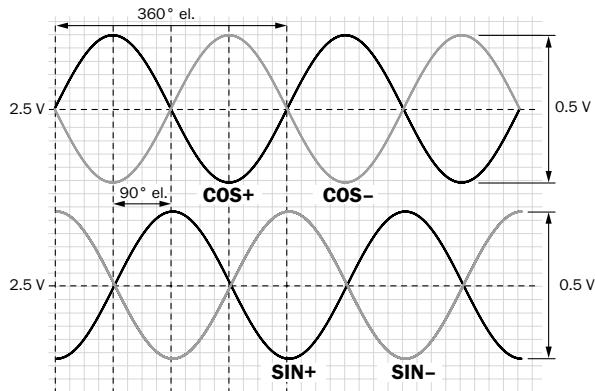
Interfaces

Electrical interfaces sine $0.5 V_{pp}$

Power supply	Output
4.5 ... 5.5 V	Sine $0.5 V_{pp}$

Signal before differential generation at load 120Ω at $U_s = 5 V$

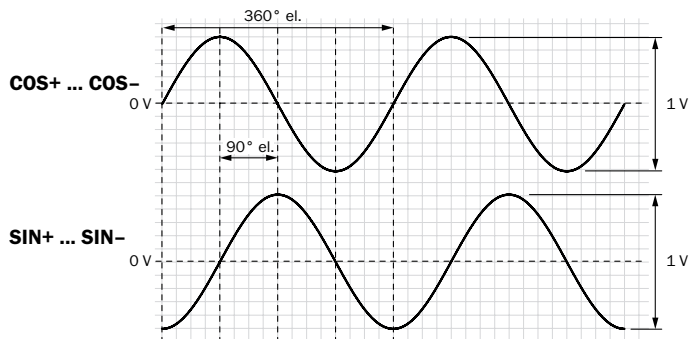
Signal diagram for clockwise rotation of the shaft looking in direction "A" (shaft)



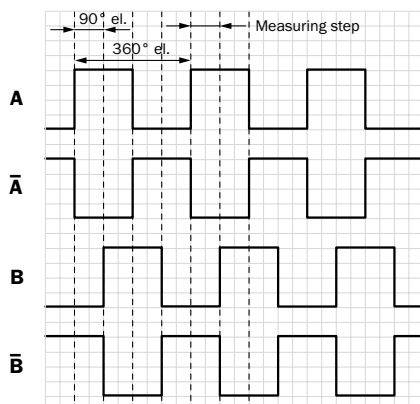
Interface signals $\text{Sin}, \overline{\text{Sin}}, \text{Cos}, \overline{\text{Cos}}$	Signal before differential generation at load 120Ω	Signal offset
Analog differential	$0.5 V_{pp} \pm 20 \%$	$2.5 V \pm 10 \%$

Signal after differential generation at load 120Ω at $U_s = 5 V$

Signal diagram for clockwise rotation of the shaft looking in direction "A" (shaft)



Incremental pulse diagram for clockwise rotation of the shaft looking in direction "A", see dimensional drawing



Accessories

Programming Tools

Description	Model name	Part no.
Programming tool for connection to standard PC or notebook via USB port	PGT-08-S	1036616

Adapter cable for Programming Tools

For programming SICK Absolute Encoders with M12 or M23 connectors the following adapter cables are appropriate:

CAUTION: Attempting to programme an AFS/AFM60 Absolute Encoder with the adapter cables intended for use with the DFS60 incremental encoder will cause damage to the Absolute Encoder. Please ensure the correct adapter cable is used!

Description	Model name	Part no.
Adapter cable for absolute programming tool with SUB-D 9-pin cable connector and M12 8-pin cable socket, pre-wired with 8-core cable, 4 x 2 x 0.08 mm ² , shielded, suitable for SSI encoder with M12 plug connector	DSL-2D08-G0M5AC2	2048439
Adapter cable for absolute programming tool (SSI) with SUB-D 9-pin cable connector and M23 12-pin cable socket, pre-wired with 8-core cable, 4 x 2 x 0.15 mm ² , shielded, suitable for SSI encoder with M23 plug connector	DSL-3D08-G0M5AC2	2048440
Adapter cable for absolute programming tool with SUB-D 9-pin cable connector and M23 12-pin cable socket, pre-wired with 8-core cable, 4 x 2 x 0.15 mm ² , shielded, suitable for SSI + incremental and SSI + sin/cos encoder with M23 plug connector	DSL-3D08-G0M5AC4	2059270

Plug connector and cables

Round screw system M12

- Straight, screened, for field assembly (adapter side)

Description	Model name	Part no.
Cable connector, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	STE-1208-GA01	6044892
Cable socket, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	DOS-1208-GA01	6045001

- Straight, screened

Description	Cable length	Model name	Part no.
Cable socket, 8-pin, straight, pre-wired with 8-core cable, 4 x 2 x 0.25 mm ² , shielded, cable diameter 7.0 mm	2.0 m	DOL-1208-G02MAC1	6032866
	5.0 m	DOL-1208-G05MAC1	6032867
	10.0 m	DOL-1208-G10MAC1	6032868
	20.0 m	DOL-1208-G20MAC1	6032869

Round screw system M23

- Straight, screened

Description	Model name	Part no.
Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	STE-2312-G	6027537
Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	DOS-2312-G	6027538

E

Description	Cable length	Model name	Part no.
Cable socket, M23, 12-pin, straight, pre-wired with 8-core cable, 4 x 2 x 0.15 mm ² , shielded, cable diameter 5.6 mm	0.5 m	DOL-2308-G0M5AA6	2048595
	1.5 m	DOL-2308-G1M5AA6	2048596
	3.0 m	DOL-2308-G03MAA6	2048597
	5.0 m	DOL-2308-G05MAA6	2048598
	10.0 m	DOL-2308-G10MAA6	2048599

Description	Cable length	Model name	Part no.
Cable socket, M23, 12-pin, straight, pre-wired with 12-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , shielded, suitable for drag chain, cable diameter 7.8 mm, suitable for AFM60 SSI + incremental and AFM60 SSI + sin/cos interface	1.5 m	DOL-2312-G1M5MD2	2062284
	3.0 m	DOL-2312-G03MMD2	2062300
	5.0 m	DOL-2312-G05MMD2	2062301
	10.0 m	DOL-2312-G10MMD2	2062302
	20.0 m	DOL-2312-G20MMD2	2062303
	30.0 m	DOL-2312-G30MMD2	2062304

Cables

- With screening

Description	Model name	Part no.
Data cable by the meter 4 x 2 x 0.15 mm ² with shielding, diam. 5.6 mm	LTG-2308-MWENC	6027529
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, UV and salt water resistant, diam. 7.8 mm	LTG-2612-MW	6028516

Female connectors

Description	Cable length	Model name	Part no.
Cables including seal, 4 x 2 x 0.15 mm ² for absolute encoder with universal cable outlet, with shielding, diam. 5.6 mm	0.5 m	DOL-0J08-G0M5AA6	2048589
	1.5 m	DOL-0J08-G1M5AA6	2048590
	3.0 m	DOL-0J08-G03MAA6	2048591
	5.0 m	DOL-0J08-G05MAA6	2048593
	10.0 m	DOL-0J08-G10MAA6	2048594



Attention!

The flexible wires twisted in pairs must be assigned in accordance with the signals.

“Pin and wire allocation” on page E-148

Couplings

- Bellows coupling, max. shaft offset radial ± 0.3 mm, axial 0.4 mm, angle ± 4 degrees, torsion spring stiffness 120 Nm/rad, bellows of stainless steel, hubs of aluminium.

Description	Model name	Part no.
Bellows coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad, material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
Bellows coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983
Bellows coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984

- Spring-disc coupling, max. shaft offset radial ± 0.3 mm, axial 0.4 mm, angle ± 2.5 degrees, torsion spring stiffness 50 Nm/rad, flange of aluminium, spring-discs of glass-fibre-reinforced plastic

Description	Model name	Part no.
Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985
Spring washer coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

Mechanical adapters

Adapter flanges

- Adapter flange of aluminium for face mount flange, spigot 36 mm.

Description	Model name	Part no.
Flange adapter, adapts face mount flange with 36 mm centering collar to 50 mm servo flange	BEF-FA-036-050	2029160
Flange adapter, adapts face mount flange with 36 mm centering collar to 60 mm square mounting plate	BEF-FA-036-060REC	2029162
Flange adapter, adapts face mount flange with 36 mm centering collar to 58 mm square mounting plate with shock absorber	BEF-FA-036-060RSA	2029163
Flange adapter, adapts face mount flange with 36 mm centering collar to 63 mm square mounting plate	BEF-FA-036-063REC	2034225

Mounting bells

- Mounting bell incl. fixing set for encoder with servo flange.

Description	Model name	Part no.
Mounting bell for servo flange encoder with 50 mm centering collar incl. mounting kit	BEF-MG-50	5312987

Mounting angles

- Mounting angle incl. fixing set for encoder with face mount flange.

Description	Model name	Part no.
Mounting bracket for encoder with 36 mm centering collar	BEF-WF-36	2029164

Servo clamps

Description	Model name	Part no.
Servo clamp half-shells (set of 2) for 50 mm centering collar	BEF-WG-SF050	2029165
Servo clamps (set of 3), large	BEF-WK-SF	2029166

E

Bearing block

Description	Model name	Part no.
Bearing block for hollow shaft encoder	BEF-FA-B12-010	2042728

Measuring wheels

- Circumference 200 mm, plastic

Description	Model name	Part no.
Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678

- Circumference 500 mm, plastic

Description	Model name	Part no.
Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989

- Circumference 200 mm, O-ring

Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224

- Circumference 300 mm, O-ring

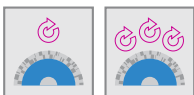
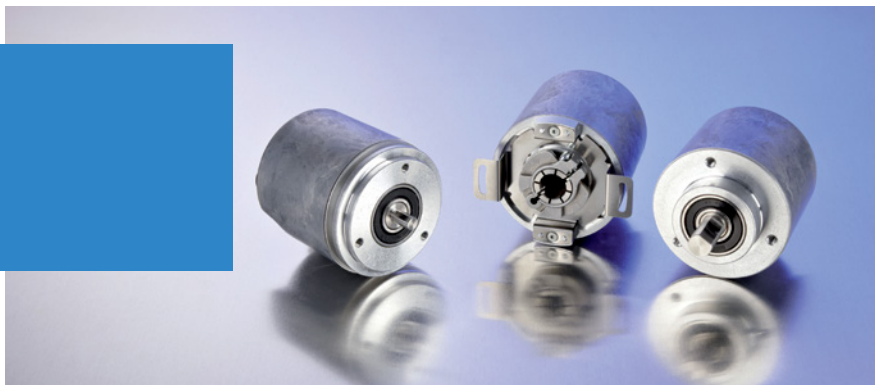
Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278

- Circumference 500 mm, O-ring

Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227



Intelligent, powerful, precise



E



Additional information

Detailed technical data E-157
 Maximum speed consideration . . E-158
 Ordering information E-159
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 Pin allocation E-165
 Sales kits E-166
 Accessories E-168

Product description

With its extensive self-monitoring and diagnostics possibilities the AFS60/AFM60 EtherNet/IP encoder clearly offers more when it comes to availability. With a 30-bit resolution and a highly robust, the new AFM60 absolute multiturn encoder sets new standards and the same is true for the 18-bit absolute singleturn encoder. This makes them particularly suitable for harsh application conditions in which maximum accuracy and availability are of the essence. A shaft bearing distance of 30 mm means the AFS60/AFM60 family is

significantly more robust than encoders with blocked ball bearings. The AFS60/AFM60 with EtherNet/IP interface is equipped with a configuration assembly, which makes configuration of controls significantly easier. Maximum machine availability is assured even in case of cable breakages due to the Device Level Ring (DLR) function. Additionally equipped with a multitude of diagnostics functions, the AFS60/AFM60 opens up entirely new options for the user for evaluation.

At a glance

- High-resolution, 30-bit absolute encoder (18 bit singleturn and 12 bit multiturn)
- Device Level Ring (DLR functionality)
- Extensive diagnostics: Min/max values for temperature, position, speed. Operating hours counter, display of flags, alarms and warnings using e.g. a fault header (32 bit)
- Status display via 5 duo LEDs
- Rotary axis function
- IP address via DHCP / DEC switches
- Ethernet/IP interface (extended profile 0x22)
- Function block

Your benefits

- DLR functionality for reliability with simple maintenance and a simple adaptation to existing network topologies
- Lower installation costs due to fewer external switches
- High level of productivity thanks to superior diagnostics with 32-bit fault header, fast communication and high level of redundancy
- Optimal machine availability thanks to early warning and fault detection system
- Simple setting for various applications thanks to rotary axis function
- Simple installation due to user-friendly on-board configuration assembly
- Industrial-application design for use in particularly cramped space conditions

→ www.mysick.com/en/AFS_AFM60_EtherNet_IP

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

Performance

Max. number of steps per revolution, AFS60 and AFM60	262,144 (18 bit) (Maximum speed consideration, see page E-158)
Max. number of revolutions, AFM60	4,096 (12 bit)
Error limits	± 0.03°
Repeatability	± 0.002°

Interfaces

Bus interface	EtherNet/IP IEC 61784-1
Transmission rate	10/100 Mbit/s
Initialization time	Approx. 12 s
RPI (requested packet interval)	5 ... 750 ms
Transmission medium	CAT-5e cable
DLR (Device Level Ring)	✓
Endless operating functionality	✓
Encoder device profile	0 x 22

Mechanical data

Operating speed ¹⁾	Solid shaft	9,000 min ⁻¹ (Maximum speed consideration, see page E-158)
	Blind hollow shaft	6,000 min ⁻¹ (Maximum speed consideration, see page E-158)
Mass		0.2 kg
Max. shaft loading solid shaft		80 N (radial); 40 N (axial)
Permissible movement of the drive element, blind hollow shaft		± 0.3 / ± 0.05 mm (radial, static/dynamic) ± 0.5 / ± 0.1 mm (axial, static/dynamic)
Moment of inertia of the rotor	Solid shaft	≤ 6.2 gcm ²
	Blind hollow shaft	≤ 40 gcm ²
Bearing lifetime		3 x 10 ⁹ revolutions
Start up torque at 20 °C	Solid shaft	0.5 Ncm
	Blind hollow shaft	0.8 Ncm
Operating torque at 20 °C	Solid shaft	0.3 Ncm
	Blind hollow shaft	0.6 Ncm
Max. angular acceleration		5 x 10 ⁵ rad/s ²
Shaft diameter	Face mount flange, solid shaft	10 x 19 mm, 3/8"
	Servo flange, solid shaft	6 x 10 mm
	Blind hollow shaft AFM60	8, 10, 12, 14, 15 mm, 1/4", 1/2", 3/8"
	Blind hollow shaft AFS60	8, 10, 12, 14, 15 mm, 1/4", 1/2", 3/8", 5/8"
Material shaft		Stainless steel

¹⁾ Self-warming. 3.3 k/1,000 min⁻¹, when applying note working temperature.

Material flange	Solid shaft	Aluminium
	Blind hollow shaft AFM60	Aluminium
	Blind hollow shaft AFS60	Zinc
Material housing		Aluminium

¹⁾ Self-warming. 3.3 k/1,000 min⁻¹, when applying note working temperature.

Electrical data

Max. power consumption	3.0 W
Operating voltage range with inverse-polarity protection	10 ... 30 V
MTTFd: mean time to dangerous failure ¹⁾	80 years (EN ISO 13849-1)

¹⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

Enclosure rating acc. IEC 60529	Housing with mating connector fitted	IP 67 only with mating connector or sealing cap
	Shaft	IP 65
Permissible relative humidity ¹⁾		90 %
Working temperature range		-30 ... +85 °C
Storage temperature range (without packaging)		-40 ... +100 °C
Resistance	To shocks (EN 60068-2-27)	100 g/6 ms
	To vibration (EN 60068-2-6)	30 g/10 ... 2,000 Hz
EMC		EN 61000-6-2 und EN 61000-6-3

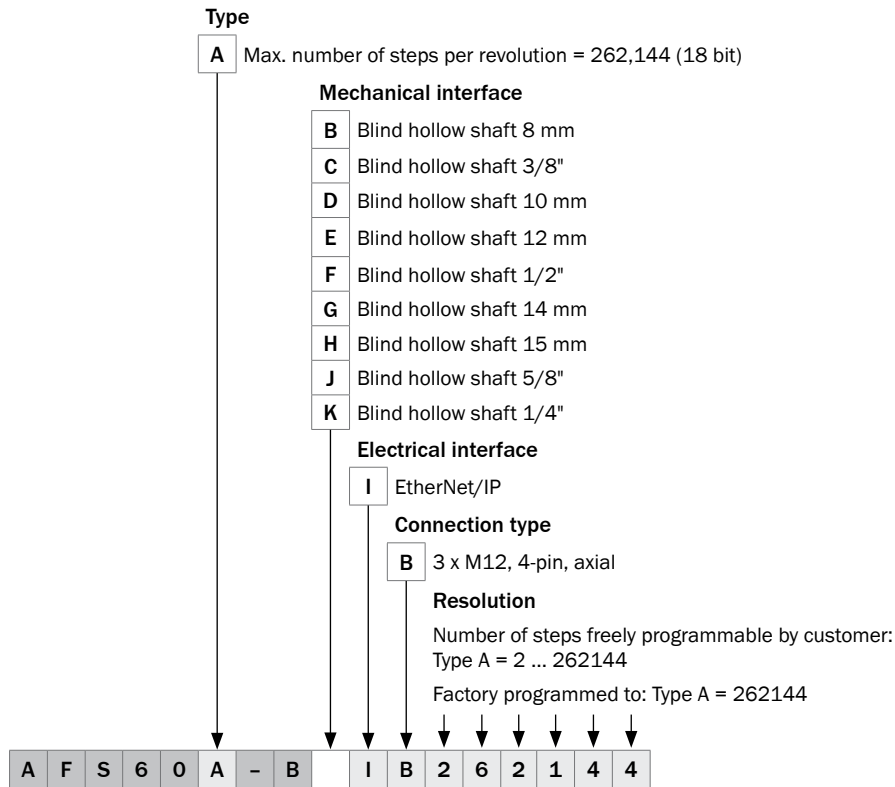
¹⁾ Condensation of the optical scanning not permitted.

Maximum speed consideration

The maximum singleturn resolution (= 18 bit) can be operated with the respective maximum operating speed (hollow shaft 6,000 min⁻¹ and solid shaft 9,000 min⁻¹).



Type code AFS Absolute Encoder singleturn, blind hollow shaft

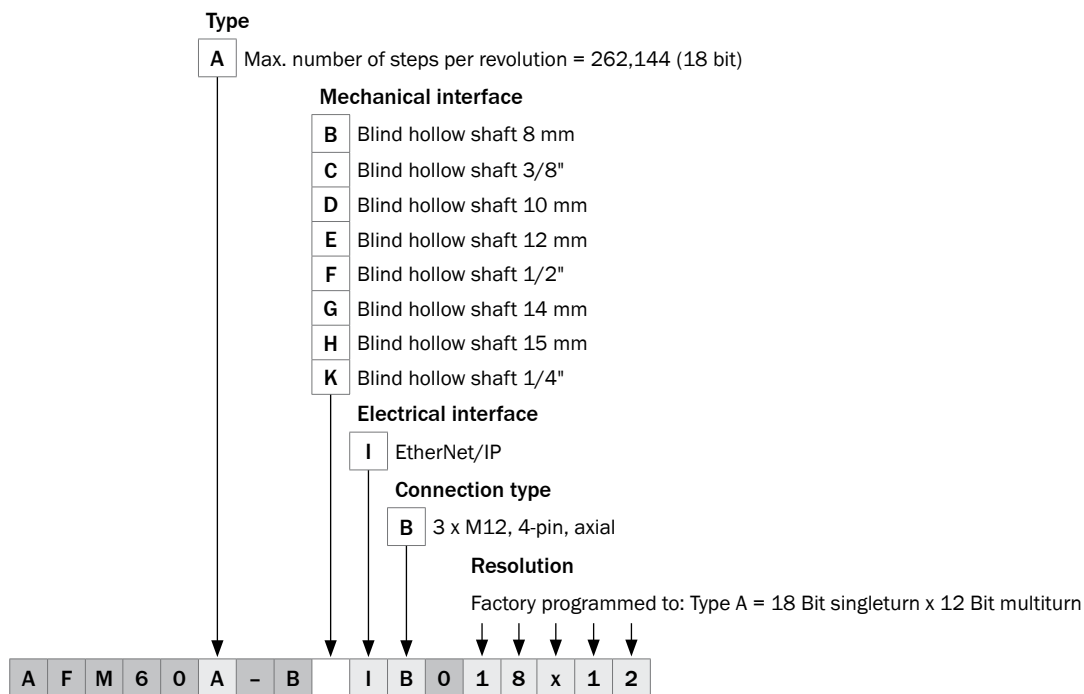


Ordering examples

Mechanical interface	Model name	Part no.
Blind hollow shaft 10 mm	AFS60A-BDIB262144	1055356
Blind hollow shaft 12 mm	AFS60A-BEIB262144	1055358
Blind hollow shaft 15 mm	AFS60A-BHIB262144	1055360



Type code AFM Absolute Encoder multiturn, blind hollow shaft



Ordering examples

Mechanical interface	Model name	Part no.
Blind hollow shaft 10 mm	AFM60A-BDIB018x12	1055325
Blind hollow shaft 12 mm	AFM60A-BEIB018x12	1055326
Blind hollow shaft 15 mm	AFM60A-BHIB018x12	1055328

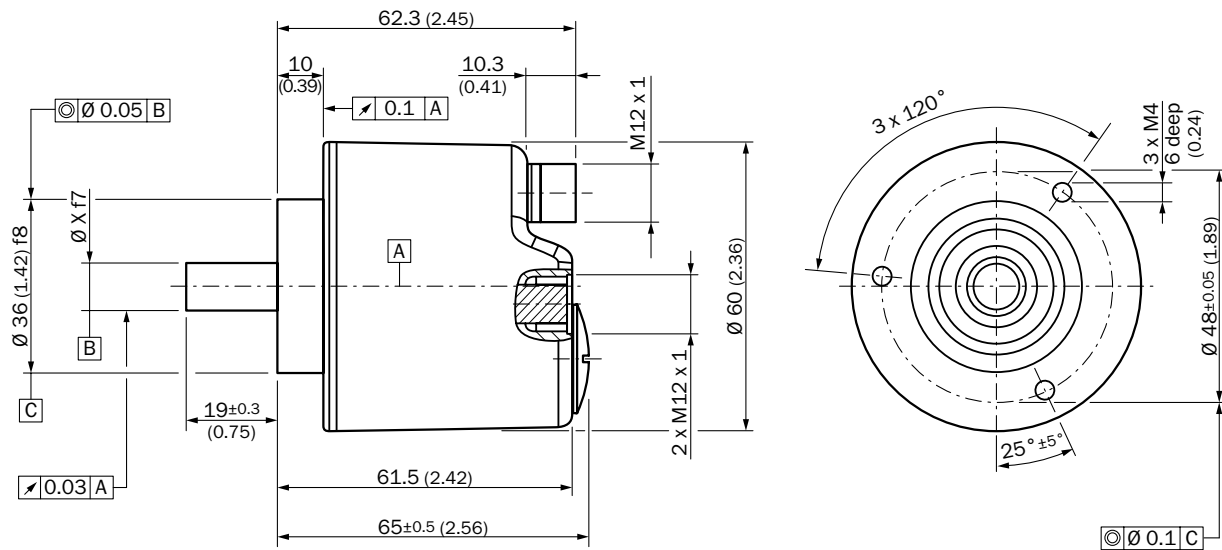


Dimensional drawings

dimensions in mm (inch)

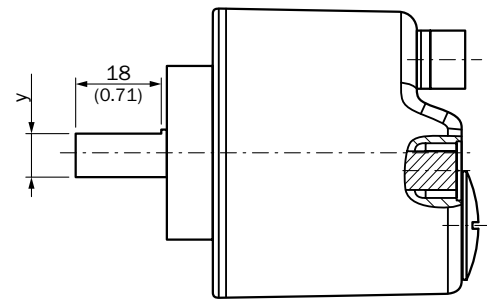
Face mount flange

Face mount flange round



General tolerances as per DIN ISO 2768-mk

Face mount flange flat

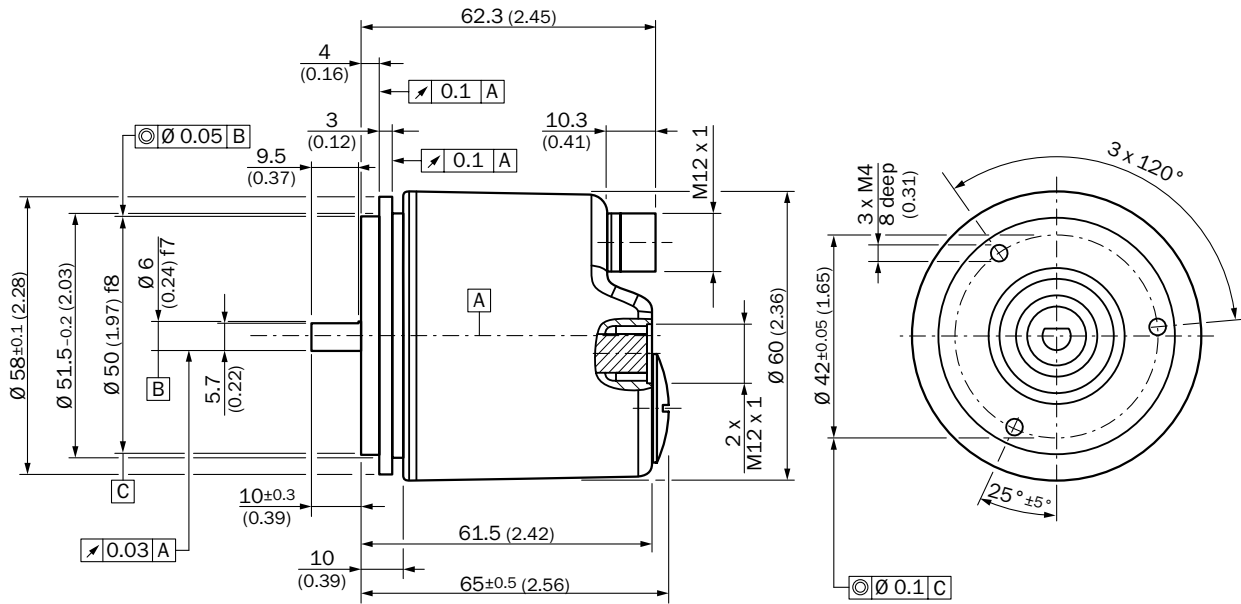


General tolerances as per DIN ISO 2768-mk

Diameter X f7	y
Face mount flange 10 x 19 mm	9 mm
Face mount flange 10 x 19 mm round	-
Face mount flange 3/8" round	-
Face mount flange 3/8"	0.35"



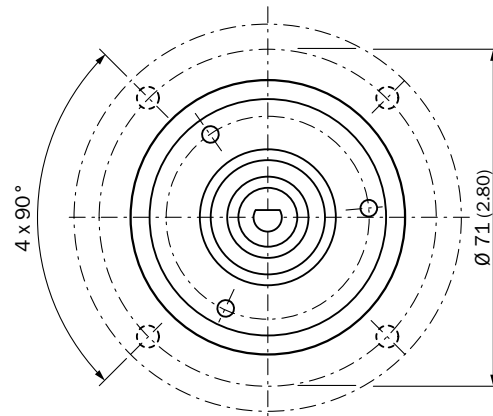
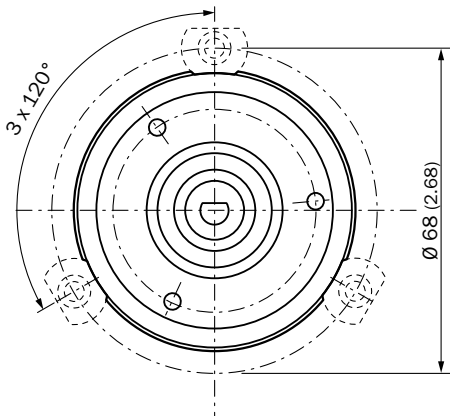
Servo flange



General tolerances as per DIN ISO 2768-mk

Proposed customer fitting for servo clamp small (part no. 2029166)

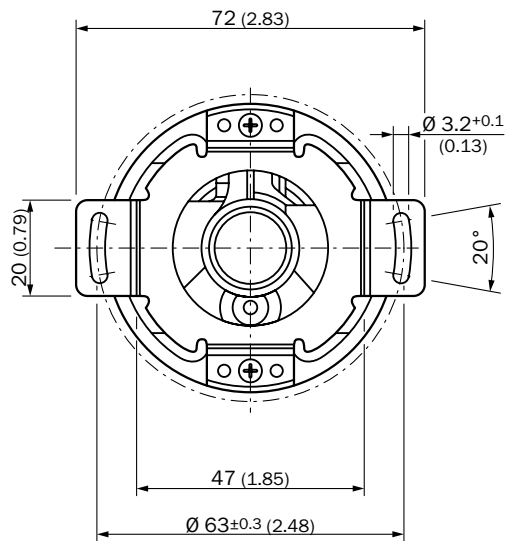
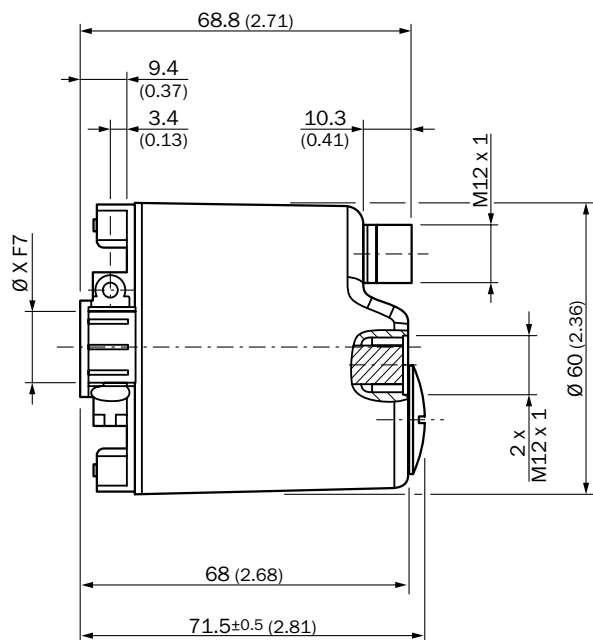
Proposed customer fitting for servo clamp half-shell (part no. 2029165)



General tolerances as per DIN ISO 2768-mk

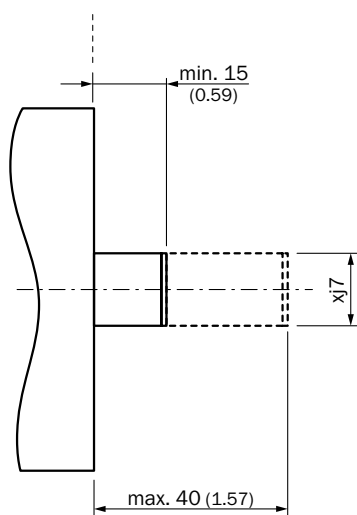


Blind hollow shaft



General tolerances as per DIN ISO 2768-mk

Proposed customer fitting



General tolerances as per DIN ISO 2768-mk

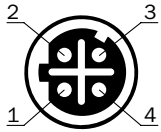
xj7 = shaft diameter, on the customer side

Diameter X F7	
Absolute Encoder Singelturm AFS60	Absolute Encoder multiturm AFM60
Blind hollow shaft 1/4"	Blind hollow shaft 1/4"
Blind hollow shaft 8 mm	Blind hollow shaft 8 mm
Blind hollow shaft 3/8"	Blind hollow shaft 3/8"
Blind hollow shaft 10 mm	Blind hollow shaft 10 mm
Blind hollow shaft 12 mm	Blind hollow shaft 12 mm
Blind hollow shaft 1/2"	Blind hollow shaft 1/2"
Blind hollow shaft 14 mm	Blind hollow shaft 14 mm
Blind hollow shaft 15 mm	Blind hollow shaft 15 mm
Blind hollow shaft 5/8"	

E

Pin allocation

M12 - 4 x D coding

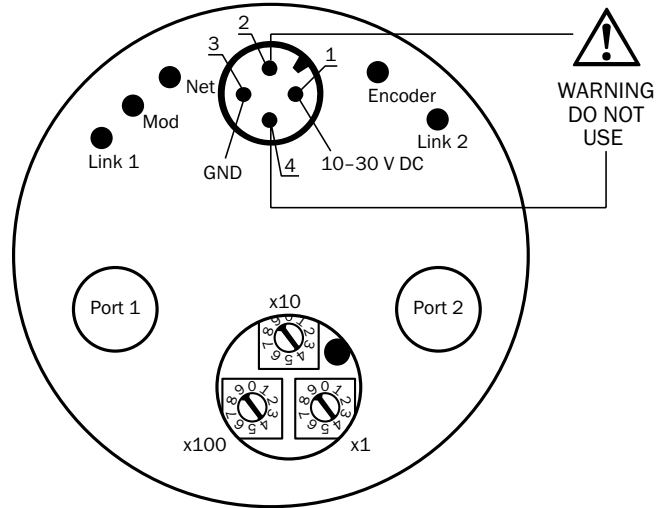


Port 1

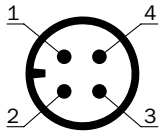
Signal	T x D+	R x D+	T x D-	R x D-
Pin	1	2	3	4

Port 2

Signal	T x D+	R x D+	T x D-	R x D-
Pin	1	2	3	4



M12 - 4 x A coding



Power supply

Signal	10 ... 30 V	Not connected	GND	Not connected
Pin	1	2	3	4





Sales kits

Sales kit 01

EtherNet/IP-Encoder

- + 1 male connector M12 4-pin angled (STE-1204-WE, part no. 6048152)
- + 1 female connector M12 4-pin angled (DOS-1204-W, part no. 6007303)

	Encoder type (singleturn)	Description	Model name	Part no.
	AFS60A-S1IB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1IB Sales Kit 01	1057693
	AFS60A-S4IB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4IB Sales Kit 01	1057718
	AFS60A-BDIB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDIB Sales Kit 01	1057719
	AFS60A-BEIB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEIB Sales Kit 01	1057720
	AFS60A-BHIB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHIB Sales Kit 01	1057721


	Encoder type (multiturn)	Description	Model name	Part no.
	AFM60A-S1IB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1IB Sales Kit 01	1057722
	AFM60A-S4IB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4IB Sales Kit 01	1057723
	AFM60A-BDIB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDIB Sales Kit 01	1057724
	AFM60A-BEIB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEIB Sales Kit 01	1057725
	AFM60A-BHIB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHIB Sales Kit 01	1057726


E

Sales kit 02

EtherNet/IP-Encoder

- + 1 male connector M12 4-pin angled, pre-wired with cable 5 m (STL-1204-W05ME90, part no. 6047913)
- + 1 female connector M12 4-pin angled, pre-wired with cable 5 m (DOL-1204-W05MC, part no. 6025904)


	Encoder type (singleturn)	Description	Model name	Part no.
	AFS60A-S1IB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1IB Sales Kit 02	1057737
	AFS60A-S4IB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4IB Sales Kit 02	1057738
	AFS60A-BDIB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDIB Sales Kit 02	1057739
	AFS60A-BEIB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEIB Sales Kit 02	1057740
	AFS60A-BHIB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHIB Sales Kit 02	1057741


	Encoder type (multiturn)	Description	Model name	Part no.
	AFM60A-S1IB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1IB Sales Kit 02	1057742
	AFM60A-S4IB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4IB Sales Kit 02	1057743
	AFM60A-BDIB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDIB Sales Kit 02	1057744
	AFM60A-BEIB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEIB Sales Kit 02	1057745
	AFM60A-BHIB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHIB Sales Kit 02	1057746

Sales kit 03

EtherNet/IP-Encoder

- + 2 male connector M12 4-pin angled (STE-1204-WE, part no. 6048152)
- + 1 female connector M12 4-pin angled (DOS-1204-W, part no. 6007303)


	Encoder type (singleturn)	Description	Model name	Part no.
	AFS60A-S1IB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1IB Sales Kit03	1057727
	AFS60A-S4IB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4IB Sales Kit 03	1057728
	AFS60A-BDIB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDIB Sales Kit 03	1057729
	AFS60A-BEIB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEIB Sales Kit 03	1057730
	AFS60A-BHIB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHIB Sales Kit 03	1057731


	Encoder type (multiturn)	Description	Model name	Part no.
	AFM60A-S1IB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1IB Sales Kit 03	1057732
	AFM60A-S4IB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4IB Sales Kit 03	1057733
	AFM60A-BDIB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDIB Sales Kit 03	1057734
	AFM60A-BEIB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEIB Sales Kit 03	1057735
	AFM60A-BHIB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHIB Sales Kit 03	1057736

Sales kit 04

EtherNet/IP-Encoder

- + 2 male connector M12 4-pin angled, pre-wired with cable 5 m (STL-1204-W05ME90, part no. 6047913)
- + 1 female connector M12 4-pin angled, pre-wired with cable 5 m (DOL-1204-W05MC, part no. 6025904)

	Encoder type (singleturn)	Description	Model name	Part no.
	AFS60A-S1IB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1IB Sales Kit 04	1057747
	AFS60A-S4IB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4IB Sales Kit 04	1057748
	AFS60A-BDIB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDIB Sales Kit 04	1057749
	AFS60A-BEIB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEIB Sales Kit 04	1057750
	AFS60A-BHIB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHIB Sales Kit 04	1057751

	Encoder type (multiturn)	Description	Model name	Part no.
	AFM60A-S1IB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1IB Sales Kit 04	1057752
	AFM60A-S4IB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4IB Sales Kit 04	1057753
	AFM60A-BDIB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDIB Sales Kit 04	1057754
	AFM60A-BEIB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEIB Sales Kit 04	1057755
	AFM60A-BHIB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHIB Sales Kit 04	1057756

Accessories

Plug connector and cables

Round screw system M12

	Data line D-coded
Mechanical characteristics	
Number of positions	4
External cable diameter	6.4 mm
Smallest bending radius, fixed installation	26 mm
Smallest bending radius, flexible installation	26 mm
Length of cable, between the participants max.	100 m
Material	
External sheath	PUR
Conductor	Bare Cu litz wires
External sheath, color	Water blue RAL 5021
Electrical characteristics	
Transmission characteristics (category)	CAT5 (IEC 11801:2002), CAT5e (TIA 568B:2001)
Characteristics of cable	
Cable structure	2 x 2 x AWG26/7 PIMF
Conductor cross section	0.14 mm ²
Wire colors	White-green, white-orange
Conductor resistance	≤ 150 Ω/km
Shielding	Tinned copper braided shield
Temperature range	
Fixed installation	-20 °C ... +80 °C
Flexible installation	-20 °C ... +80 °C
Special properties	
Flame resistance	In accordance with IEC 60332-1-2
Halogen-free	In accordance with IEC 60754-1
Resistance to oil	In accordance with DIN EN 60811-2-1
Other resistance	Microbe resistance as per VDE 0282 section 10 Hydrolysis resistance as per DIN 53504
Concentration of fumes	In accordance with IEC 61034

E

Description	Cable length	Model name	Part no.
Cable connector, M12, 4-pin, straight to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-G02ME90	6045222
	5.0 m	SSL-1204-G05ME90	6045277
	10.0 m	SSL-1204-G10ME90	6045279
Cable connector, M12, 4-pin, straight to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-G02ME60	6047916
	5.0 m	SSL-2J04-G05ME60	6047917
	10.0 m	SSL-2J04-G10ME60	6047918

Description	Cable length	Model name	Part no.
Cable connector, M12, 4-pin, straight, to open end, shielded	2.0 m	STL-1204-G02ME90	6045284
	5.0 m	STL-1204-G05ME90	6045285
	10.0 m	STL-1204-G10ME90	6045286
Cable connector, M12, 4-pin, angled to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-H02ME90	6047908
	5.0 m	SSL-1204-H05ME90	6047909
	10.0 m	SSL-1204-H10ME90	6047910
Cable connector, M12, 4-pin, angled to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-H02ME	6047911
	5.0 m	SSL-2J04-H05ME	6045287
	10.0 m	SSL-2J04-H10ME	6045288
Cable connector, M12, 4-pin, angled, to open end, shielded	2.0 m	STL-1204-W02ME90	6047912
	5.0 m	STL-1204-W05ME90	6047913
	10.0 m	STL-1204-W10ME90	6047914
	25.0 m	STL-1204-W25ME90	6047915

Description	Contacts	Type of connector	Model name	Part no.
Cable connector, M12, 4-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	4	Male connector	STE-1204-GE01	6048151
		Female connector	DOS-1204-GE	6048153
Cable connector, M12, 4-pin, angled, shielded, suitable for cable diameter 4 - 8 mm	4	Male connector	STE-1204-WE	6048152
		Female connector	DOS-1204-WE	6048154
Cable connector, RJ45, suitable for cable diameter 4.5 - 8 mm	4	Male connector	STE-0J08-GE	6048150

Power supply

	Power supply (A coding)
Mechanical characteristics	
Number of positions	4
External cable diameter	4.7 mm
Smallest bending radius, fixed installation	47 mm
Smallest bending radius, flexible installation	47 mm
Length of cable, between the participants max.	100 m
Material	
External sheath	PUR
Conductor	Bare Cu litz wires
External sheath, color	Black RAL 9005
Characteristics of cable	
AWG sense cable	22
Conductor cross section	0.34 mm ²
Wire colors	Brown, white, blue, black
Conductor resistance	≤ 58 Ω/km
Temperature range	
Fixed installation	-50 °C ... +80 °C
Flexible installation	-25 °C ... +80 °C
Special properties	
Flame resistance	UL Horizontal Flametest/CSA FT2
Halogen-free	PUR halogen-free
Microbe resistance	Excellent
Hydrolysis resistance	Excellent



Description	Cable length	Model name	Part no.
Cable socket, M12, 4-pin, straight, pre-wired for voltage supply, 4-core, 4 x 0.34 mm ² , shielded, diam. 4.7 mm	2.0 m	DOL-1204-G02MC	6025900
	5.0 m	DOL-1204-G05MC	6025901
	10.0 m	DOL-1204-G10MC	6025902
	25.0 m	DOL-1204-G25MC	6034751
Cable socket, M12, 4-pin, angled, pre-wired for voltage supply, 4-core, 4 x 0.34 mm ² , shielded, diam. 4.7 mm	2.0 m	DOL-1204-W02MC	6025903
	5.0 m	DOL-1204-W05MC	6025904
	10.0 m	DOL-1204-W10MC	6025905
	25.0 m	DOL-1204-W25MC	6034754

Description	Model name	Part no.
Cable socket for voltage supply, M12, 4-pin, angled, suitable for cable diameter 4 - 6 mm	DOS-1204-W	6007303

Connector for wall mounting RJ45 on M12

Description	Model name	Part no.
Switch cabinet feedthrough M12 cable socket, 4-pin, D-coded to RJ45 cable socket, 90 degree bush input	Passage jack Ethernet RJ45	6048180

Mounting technology

Couplings

- Bellows coupling, max. shaft offset radial ± 0.3 mm, axial 0.4 mm, angle ± 4 degrees, torsion spring stiffness 120 Nm/rad, bellows of stainless steel, hubs of aluminium.

Description	Model name	Part no.
Bellows coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad, material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
Bellows coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983
Bellows coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984

- Spring-disc coupling, max. shaft offset radial ± 0.3 mm, axial 0.4 mm, angle ± 2.5 degrees, torsion spring stiffness 50 Nm/rad, flange of aluminium, spring-discs of glass-fibre-reinforced plastic

Description	Model name	Part no.
Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985
Spring washer coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

Mechanical adapters

Adapter flanges

- Adapter flange of aluminium for face mount flange, spigot 36 mm.

Description	Model name	Part no.
Flange adapter, adapts face mount flange with 36 mm centering collar to 50 mm servo flange	BEF-FA-036-050	2029160
Flange adapter, adapts face mount flange with 36 mm centering collar to 60 mm square mounting plate	BEF-FA-036-060REC	2029162
Flange adapter, adapts face mount flange with 36 mm centering collar to 58 mm square mounting plate with shock absorber	BEF-FA-036-060RSA	2029163
Flange adapter, adapts face mount flange with 36 mm centering collar to 63 mm square mounting plate	BEF-FA-036-063REC	2034225

Mounting bells

- Mounting bell incl. fixing set for encoder with servo flange.

Description	Model name	Part no.
Mounting bell for servo flange encoder with 50 mm centering collar incl. mounting kit	BEF-MG-50	5312987

Mounting angles

- Mounting angle incl. fixing set for encoder with face mount flange.

Description	Model name	Part no.
Mounting bracket for encoder with 36 mm centering collar	BEF-WF-36	2029164

Servo clamps

Description	Model name	Part no.
Servo clamp half-shells (set of 2) for 50 mm centering collar	BEF-WG-SF050	2029165
Servo clamps (set of 3), large	BEF-WK-SF	2029166

Bearing blocks

Description	Model name	Part no.
Bearing block for hollow shaft encoder	BEF-FA-B12-010	2042728

Measuring wheels

- Circumference 200 mm, plastic

Description	Model name	Part no.
Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678

- Circumference 500 mm, plastic

Description	Model name	Part no.
Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989

- Circumference 200 mm, O-ring

Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224

- Circumference 300 mm, O-ring

Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278

- Circumference 500 mm, O-ring

Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227

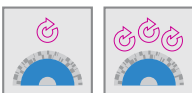
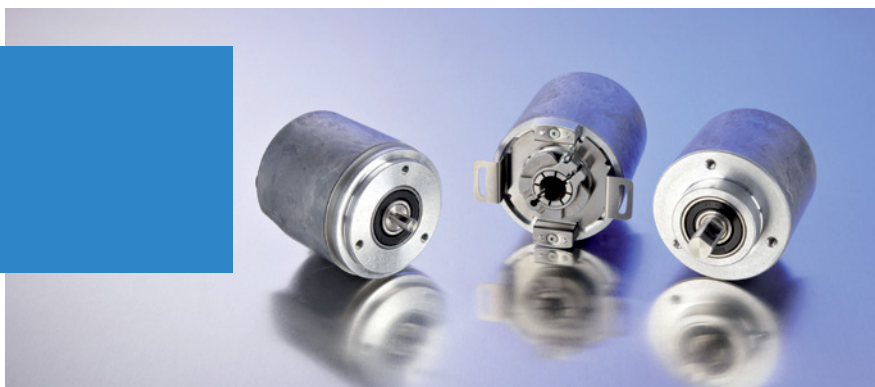
Further mounting versions for hollow shaft encoders

Description	Model name	Part no.
Torque support, one-sided, 81 mm long with slot	BEF-DS01DFS/VFS	2047428
Torque support, one-sided, 179 mm long with slots	BEF-DS02DFS/VFS	2047430
Torque support, one-sided, 248 mm long with slots	BEF-DS03DFS/VFS	2047431

E



Intelligent, powerful, precise



Product description

Intelligent diagnostic functions and rapid data transfer: High-resolution AFS/AFM60 PROFINET absolute encoders represent high-precision measurement of absolute position and speed in the area of industrial automation. Comprehensive functions for diagnosing parameters such as temperature or operating time and early error detection increase network reliability. Various configuration options, such as modification of resolu-

tion, rotational direction or unit of speed measurement simplify installation and enable customized adjustment to each application. Their compact design makes AFS/AFM60 PROFINET absolute encoders suitable for use in applications with tight space available. Embedded switch technology ensures maximum system and equipment availability and thus contributes to increased productivity.

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
- 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

Your benefits

- Increased productivity as a result of intelligent diagnostics functions and rapid data transfer
- Increase in network reliability due to early error detection
- Simple installation with various configuration options
- Flexible, easy setup and high resolutions for various applications with binary, integer and “decimal point” values based on round axis functionality
- Maximum system availability through embedded switch technology
- Compact and cost-efficient design



Additional information

Detailed technical data E-175
 Maximum speed consideration . . E-176
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 Sales kits E-184
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→ www.mysick.com/en/AFS_AFM60_PROFINET

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.



E

Detailed technical data

Performance

Max. number of steps per revolution, AFS60 and AFM60	262,144 (18 bit) (Maximum speed consideration, see page E-176)
Max. number of revolutions, AFM60	4,096 (12 bit)
Error limits	± 0.03°
Repeatability	± 0.002°

Interfaces

Bus interface	PROFINET IO / RT Class B
Transmission rate	10/100 Mbit/s
Initialization time	Approx. 12 s
Transmission medium	CAT-5e cable
Round axis functionality	✓
Encoder device profile	V4.1 Class3

Mechanical data

Operating speed ¹⁾	Solid shaft	9,000 min ⁻¹ (Maximum speed consideration, see page E-176)
	Blind hollow shaft	6,000 min ⁻¹ (Maximum speed consideration, see page E-176)
Mass		0.2 kg
Max. shaft loading solid shaft		80 N (radial); 40 N (axial)
Permissible movement of the drive element, blind hollow shaft		± 0.3 / ± 0.05 mm (radial, static/dynamic) ± 0.5 / ± 0.1 mm (axial, static/dynamic)
Moment of inertia of the rotor	Solid shaft	≤ 6.2 gcm ²
	Blind hollow shaft	≤ 40 gcm ²
Bearing lifetime		3 x 10 ⁹ revolutions
Start up torque at 20 °C	Solid shaft	0.5 Ncm
	Blind hollow shaft	0.8 Ncm
Operating torque at 20 °C	Solid shaft	0.3 Ncm
	Blind hollow shaft	0.6 Ncm
Max. angular acceleration		5 x 10 ⁵ rad/s ²
Shaft diameter	Face mount flange, solid shaft	10 x 19 mm
	Servo flange, solid shaft	6 x 10 mm
	Blind hollow shaft AFM60	8, 10, 12, 14, 15 mm, 1/4", 1/2", 3/8"
	Blind hollow shaft AFS60	8, 10, 12, 14, 15 mm, 1/4", 1/2", 3/8", 5/8"
Material shaft		Stainless steel
Material flange	Solid shaft	Aluminium
	Blind hollow shaft AFM60	Aluminium
	Blind hollow shaft AFS60	Zinc
Material housing		Aluminium

¹⁾ Self-warming. 3.3 k/1,000 min⁻¹, when applying note working temperature.

Electrical data

Max. power consumption	3.0 W
Operating voltage range with inverse-polarity protection	10 ... 30 V
MTTFd: mean time to dangerous failure ¹⁾	80 years (EN ISO 13849-1)

¹⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

Enclosure rating acc. IEC 60529	
Housing with mating connector fitted	IP 67 only with mating connector or sealing cap
Shaft	IP 65
Permissible relative humidity ¹⁾	90 %
Working temperature range	-30 ... +85 °C
Storage temperature range (without packaging)	-40 ... +100 °C
Resistance	
To shocks (EN 60068-2-27)	100 g/6 ms
To vibration (EN 60068-2-6)	30 g/10 ... 2,000 Hz
EMC	EN 61000-6-2 and EN 61000-6-3

¹⁾ Condensation of the optical scanning not permitted.

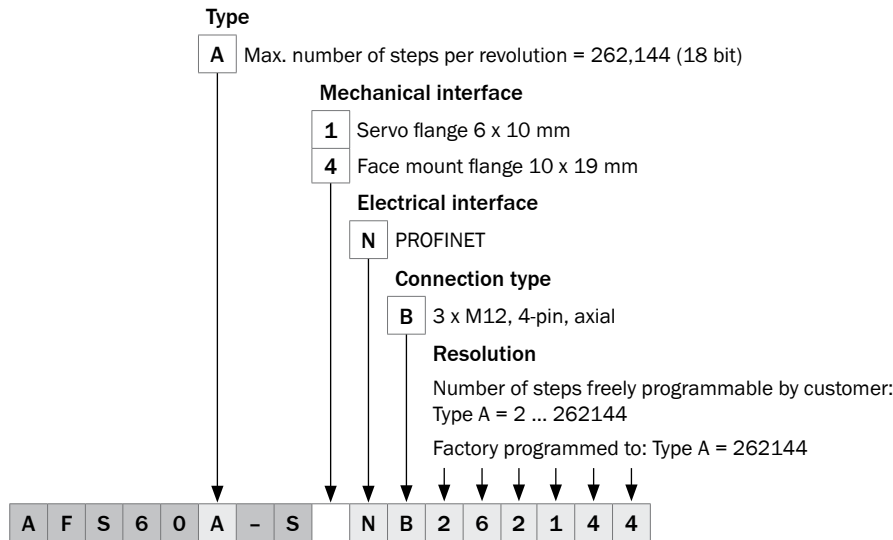
Maximum speed consideration

The maximum singleturn resolution (= 18 bit) can be operated with the respective maximum operating speed (hollow shaft 6,000 min⁻¹ and solid shaft 9,000 min⁻¹).

E

Ordering information

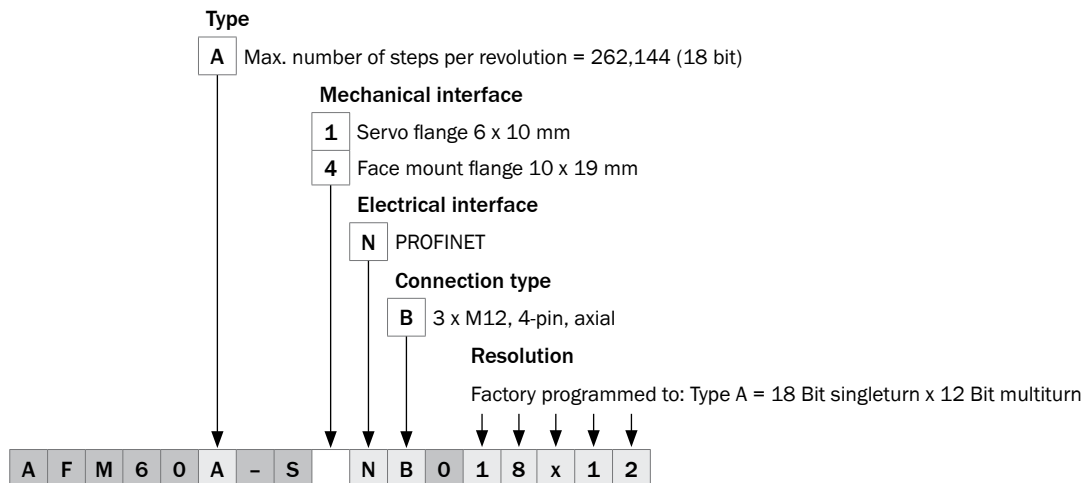
Type code AFS Absolute Encoder singleturn, solid shaft



Ordering examples

Mechanical interface	Model name	Part no.
Solid shaft, servo flange, Ø 6 mm, length 10 mm	AFS60A-S1NB262144	1059051
Solid shaft, face mount flange, Ø 10 mm, length 19 mm	AFS60A-S4NB262144	1059050

Type code AFM Absolute Encoder multiturn, solid shaft

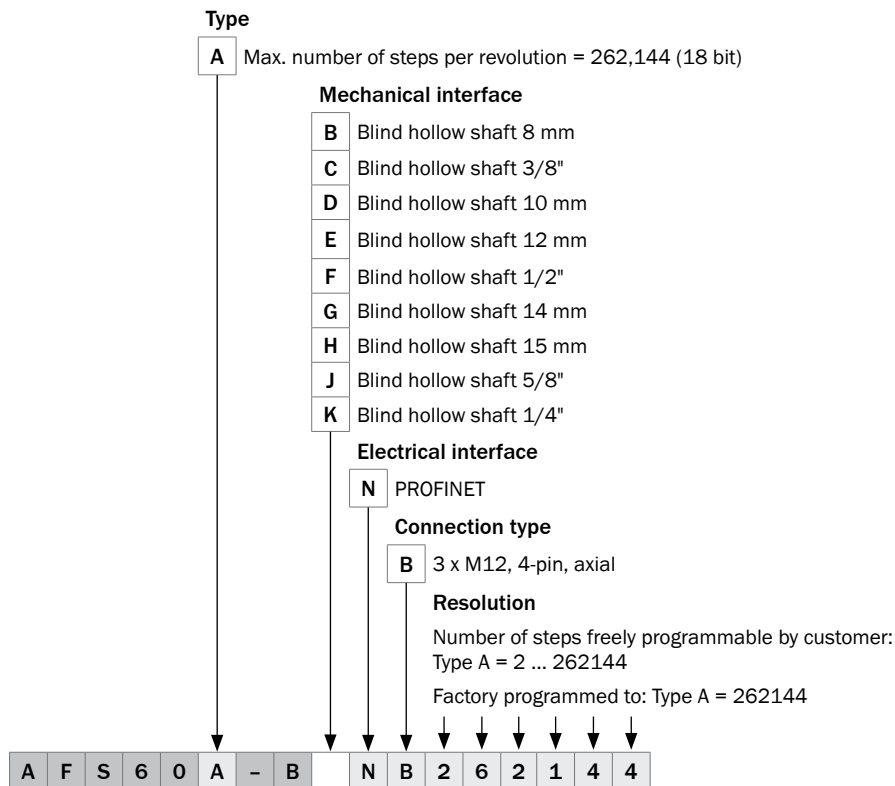


Ordering examples

Mechanical interface	Model name	Part no.
Solid shaft, servo flange, Ø 6 mm, length 10 mm	AFM60A-S1NB018x12	1059040
Solid shaft, face mount flange, Ø 10 mm, length 19 mm	AFM60A-S4NB018x12	1059039



Type code AFS Absolute Encoder singleturn, blind hollow shaft

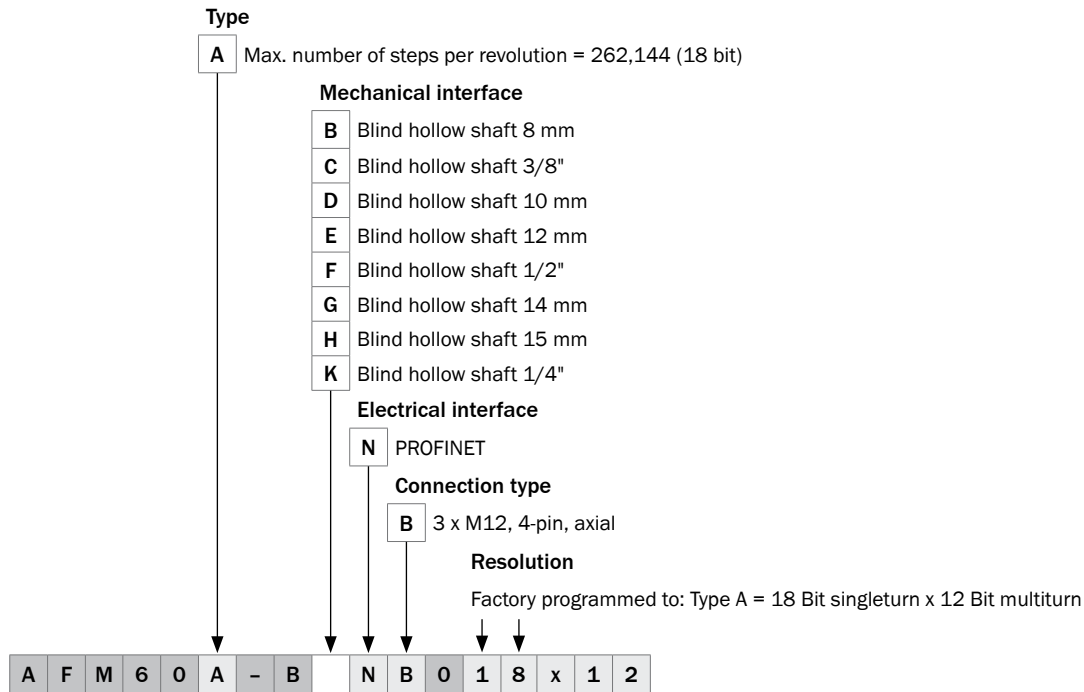


Ordering examples

Mechanical interface	Model name	Part no.
Blind hollow shaft, Ø 8 mm	AFS60A-BBNB262144	1059049
Blind hollow shaft, Ø 3/8"	AFS60A-BCNB262144	1059048
Blind hollow shaft, Ø 10 mm	AFS60A-BDNB262144	1059047
Blind hollow shaft, Ø 12 mm	AFS60A-BENB262144	1059046
Blind hollow shaft, Ø 1/2"	AFS60A-BFNB262144	1059045
Blind hollow shaft, Ø 14 mm	AFS60A-BGNB262144	1059044
Blind hollow shaft, Ø 15 mm	AFS60A-BHNB262144	1059043
Blind hollow shaft, Ø 5/8"	AFS60A-BJNB262144	1059042
Blind hollow shaft, Ø 1/4"	AFS60A-BKNB262144	1059041



Type code AFM Absolute Encoder multiturn, blind hollow shaft

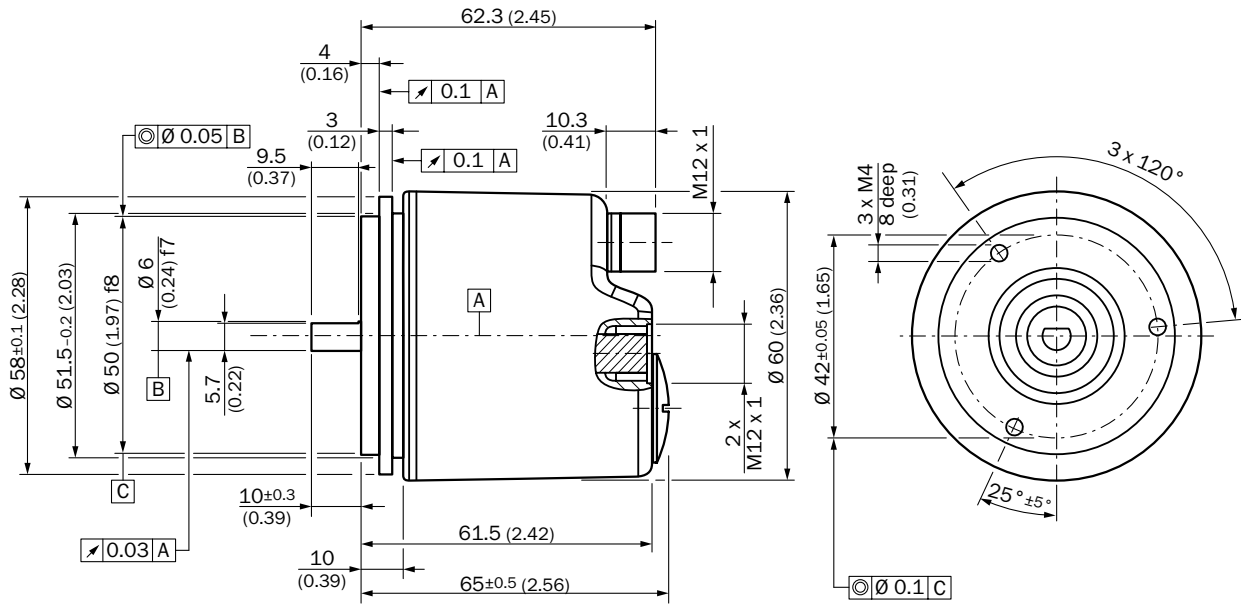


Ordering examples

Mechanical interface	Model name	Part no.
Blind hollow shaft, Ø 8 mm	AFM60A-BBNB018x12	1059038
Blind hollow shaft, Ø 3/8"	AFM60A-BCNB018x12	1059036
Blind hollow shaft, Ø 10 mm	AFM60A-BDNB018x12	1059035
Blind hollow shaft, Ø 12 mm	AFM60A-BENB018x12	1059034
Blind hollow shaft, Ø 1/2"	AFM60A-BFNB018x12	1059033
Blind hollow shaft, Ø 14 mm	AFM60A-BGNB018x12	1059032
Blind hollow shaft, Ø 15 mm	AFM60A-BHNB018x12	1059031
Blind hollow shaft, Ø 1/4"	AFM60A-BKNB018x12	1059029



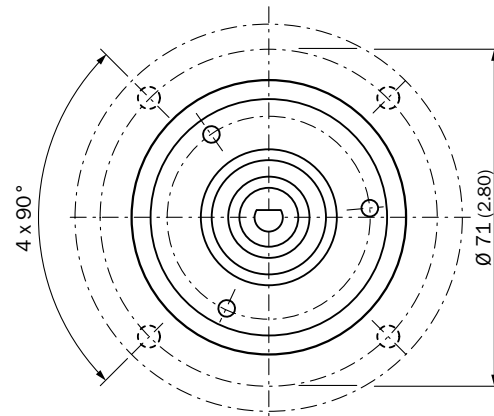
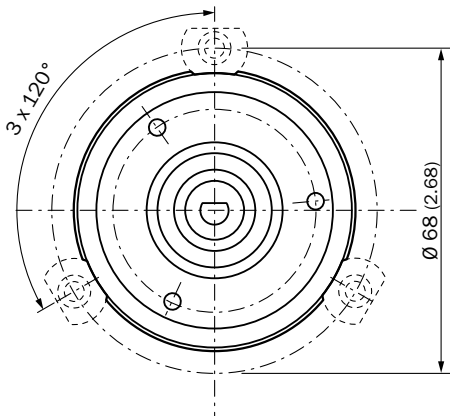
Servo flange



General tolerances as per DIN ISO 2768-mk

Proposed customer fitting for servo clamp small (part no. 2029166)

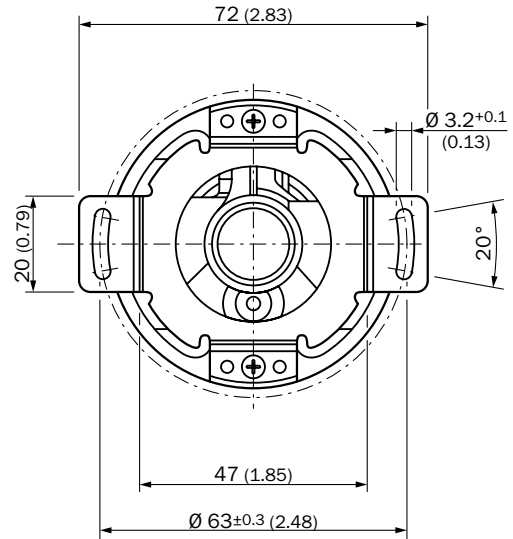
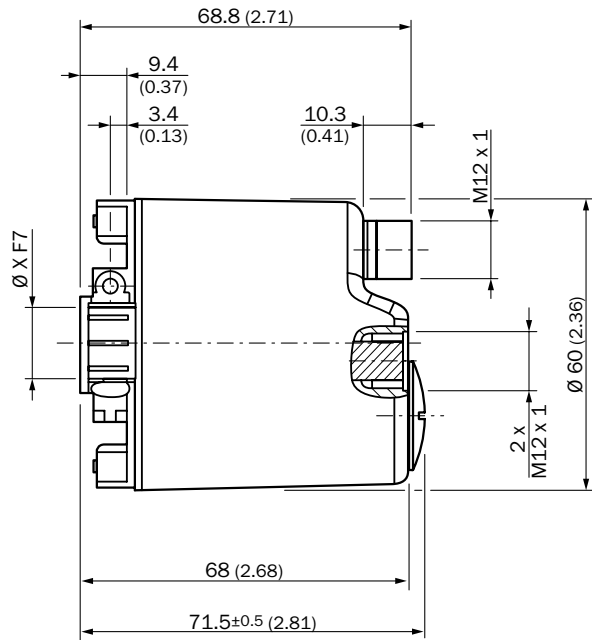
Proposed customer fitting for servo clamp half-shell (part no. 2029165)



General tolerances as per DIN ISO 2768-mk

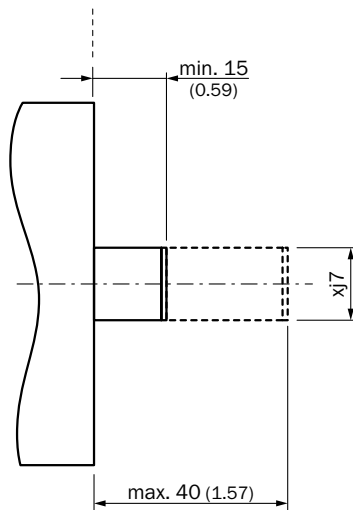


Blind hollow shaft



General tolerances as per DIN ISO 2768-mk

Proposed customer fitting



General tolerances as per DIN ISO 2768-mk

xj7 = shaft diameter, on the customer side

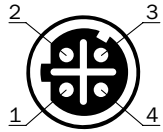
Diameter X F7

Absolute Encoder singleturn AFS60	Absolute Encoder multiturn AFM60
Blind hollow shaft 1/4"	Blind hollow shaft 1/4"
Blind hollow shaft 8 mm	Blind hollow shaft 8 mm
Blind hollow shaft 3/8"	Blind hollow shaft 3/8"
Blind hollow shaft 10 mm	Blind hollow shaft 10 mm
Blind hollow shaft 12 mm	Blind hollow shaft 12 mm
Blind hollow shaft 1/2"	Blind hollow shaft 1/2"
Blind hollow shaft 14 mm	Blind hollow shaft 14 mm
Blind hollow shaft 15 mm	Blind hollow shaft 15 mm
Blind hollow shaft 5/8"	

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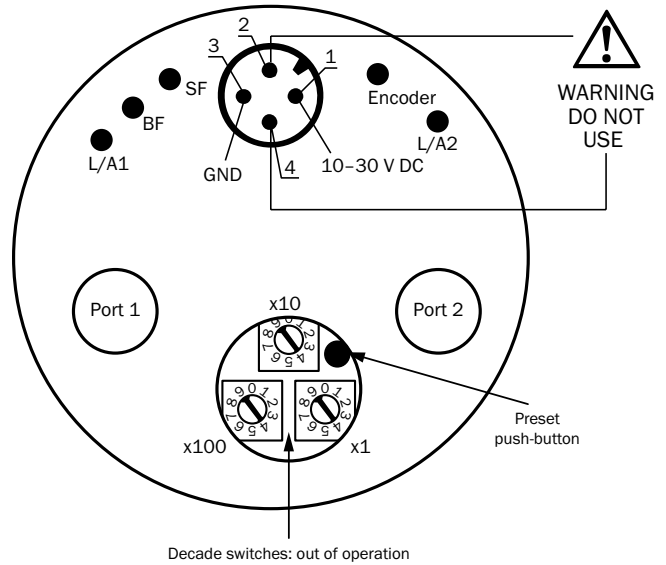
Pin allocation

M12 - 4-pin (D coding)

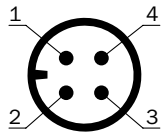


Port 1				
Signal	T x D+	R x D+	T x D-	R x D-
Pin	1	2	3	4
Color wires	Yellow	White	Orange	Blue

Port 2				
Signal	T x D+	R x D+	T x D-	R x D-
Pin	1	2	3	4
Color wires	Yellow	White	Orange	Blue



M12 - 4-pin (A coding)




Power supply				
Signal	U _s 10 ... 30 V	Not connected	GND	Not connected
Pin	1	2	3	4
Color wires	Brown	White	Blue	Black


Sales kits

Sales kit 01

PROFINET encoder

- + Female connector power supply angled (DOS-1204-W, part no. 6007303)
- + Male connector PROFINET-signal angled (STE-1204-WZ, part no. 6048262)


	Encoder type (singleturn)	Description	Model name	Part no.
	AFS60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1NB Sales Kit 01	1059352
	AFS60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4NB Sales Kit 01	1059356
	AFS60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDNB Sales Kit 01	1059357
	AFS60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BENB Sales Kit 01	1059358
	AFS60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHNB Sales Kit 01	1059359


	Encoder type (multiturn)	Description	Model name	Part no.
	AFM60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1NB Sales Kit 01	1059360
	AFM60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4NB Sales Kit 01	1059361
	AFM60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFM60A-BDNB Sales Kit 01	1059362
	AFM60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFM60A-BENB Sales Kit 01	1059363
	AFM60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFM60A-BHNB Sales Kit 01	1059364

Sales kit 02

PROFINET encoder

- + Female connector power supply angled, pre-wired with cable 5 m (DOL-1204-W05MC, part no. 6025904)
- + Male connector PROFINET-signal angled, pre-wired with cable 5 m (STL-1204-W05MZ90, part no. 6048257)


	Encoder type (singleturn)	Description	Model name	Part no.
	AFS60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1NB Sales Kit 02	1059365
	AFS60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4NB Sales Kit 02	1059366
	AFS60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDNB Sales Kit 02	1059368
	AFS60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BENB Sales Kit 02	1059369
	AFS60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHNB Sales Kit 02	1059370


	Encoder type (multiturn)	Description	Model name	Part no.
	AFM60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1NB Sales Kit 02	1059372
	AFM60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4NB Sales Kit 02	1059373
	AFM60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFM60A-BDNB Sales Kit 02	1059375
	AFM60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFM60A-BENB Sales Kit 02	1059376
	AFM60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFM60A-BHNB Sales Kit 02	1059377

Sales kit 03

PROFINET encoder

- + Female connector power supply angled (DOS-1204-W, part no. 6007303)
- + 2 male connectors PROFINET-signal angled (STE-1204-WZ, part no. 6048262)


	Encoder type (singleturn)	Description	Model name	Part no.
	AFS60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1NB Sales Kit 03	1059379
	AFS60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4NB Sales Kit 03	1059380
	AFS60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDNB Sales Kit 03	1059381
	AFS60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BENB Sales Kit 03	1059382
	AFS60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHNB Sales Kit 03	1059383


	Encoder type (multiturn)	Description	Model name	Part no.
	AFM60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1NB Sales Kit 03	1059384
	AFM60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4NB Sales Kit 03	1059385
	AFM60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFM60A-BDNB Sales Kit 03	1059386
	AFM60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFM60A-BENB Sales Kit 03	1059387
	AFM60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFM60A-BHNB Sales Kit 03	1059388

Sales kit 04

PROFINET encoder

- + Female connector power supply angled, pre-wired with cable 5 m (DOL-1204-W05MC, part no.6025904)
- + 2 male connectors PROFINET-signal angled, pre-wired with cable 5 m (STL-1204-W05MZ90, part no. 6048257)

	Encoder type (singleturn)	Description	Model name	Part no.
	AFS60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1NB Sales Kit 04	1059426
	AFS60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4NB Sales Kit 04	1059427
	AFS60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDNB Sales Kit 04	1059428
	AFS60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BENB Sales Kit 04	1059429
	AFS60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHNB Sales Kit 04	1059430

	Encoder type (multiturn)	Description	Model name	Part no.
	AFM60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1NB Sales Kit 04	1059431
	AFM60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4NB Sales Kit 04	1059433
	AFM60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFM60A-BDNB Sales Kit 04	1059434
	AFM60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFM60A-BENB Sales Kit 04	1059437
	AFM60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFM60A-BHNB Sales Kit 04	1059439

Accessories

Plug connector and cables

		Data line
Mechanical characteristics		
Number of poles		4
Coding		D coding
Cable diameter		6.50 mm
Smallest bending radius, fixed installation		19.5 mm
Smallest bending radius, flexible installation		45.5 mm
Length of cable, between the participants max.		100 m
Material		
External sheath		PVC
Conductor		Tin-coated CU-litz wire
Color external sheath		Green RAL 6018
Electrical characteristics		
Transmission characteristics (category)		CAT5 (IEC 11801:2002), CAT5e (TIA 568B:2001)
Characteristics of cable		
Signal type		PROFINET
Cable structure		1x4xAWG22/7; SF/Q
Wire colors		White, yellow, blue, orange
Conductor cross section		0.34 mm ²
Conductor resistance		≤ 120 Ω/km
Shielding		Tinned copper braided shield
Temperature range		
Connector pre-wired with cable		
Fixed installation		-25 °C ... +60 °C
Flexible installation		-5 °C ... +50 °C
M12 connector		
Ambient temperature (operation)		-40 °C ... +85 °C
RJ45 connector		
Ambient temperature (operation)		-10 °C ... +60 °C
Special properties		
Flame resistance		In accordance with IEC 60332-1

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Description	Cable length	Model name	Part no.
Cable connector, M12, 4-pin, straight to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-G02MZ90	6048241
	5.0 m	SSL-1204-G05MZ90	6048242
	10.0 m	SSL-1204-G10MZ90	6048243
Cable connector, M12, 4-pin, straight to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-G02MZ60	6048244
	5.0 m	SSL-2J04-G05MZ60	6048245
	10.0 m	SSL-2J04-G10MZ60	6048246
Cable connector, M12, 4-pin, straight, to open end, shielded	2.0 m	STL-1204-G02MZ90	6048247
	5.0 m	STL-1204-G05MZ90	6048248
	10.0 m	STL-1204-G10MZ90	6048249
Cable connector, M12, 4-pin, angled to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-F02MZ90	6048250
	5.0 m	SSL-1204-F05MZ90	6048251
	10.0 m	SSL-1204-F10MZ90	6048252

Description	Cable length	Model name	Part no.
Cable connector, M12, 4-pin, angled to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-F02MZ	6047911
	5.0 m	SSL-2J04-F05MZ	6045287
	10.0 m	SSL-2J04-F10MZ	6045288
Cable connector, M12, 4-pin, angled, to open end, shielded	2.0 m	STL-1204-W02MZ90	6047912
	5.0 m	STL-1204-W05MZ90	6047913
	10.0 m	STL-1204-W10MZ90	6047914
	20.0 m	STL-1204-W25MZ90	6047915

Description	Contacts	Type of connector	Model name	Part no.
Cable connector, M12, 4-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	4	Male connector	STE-1204-GZ	6048261
		Female connector	DOS-1204-GZ	6048263
Cable connector, M12, 4-pin, angled, shielded, suitable for cable diameter 4 - 8 mm	4	Male connector	STE-1204-WZ	6048262
		Female connector	DOS-1204-WZ	6048264

RJ45 connector

Description	Contacts	Type of connector	Model name	Part no.
Cable connector, RJ45, suitable for cable diameter 4.5 - 8 mm	4	Male connector	STE-0J04-GZ	6048260

Power supply

	Power supply (A coding)	
Mechanical characteristics		
Number of positions	4	
External cable diameter	4.7 mm	
Smallest bending radius, fixed installation	47 mm	
Smallest bending radius, flexible installation	47 mm	
Length of cable, between the participants max.	100 m	
Material		
External sheath	PUR	
Conductor	Bare Cu litz wires	
External sheath, color	Black RAL 9005	
Characteristics of cable		
AWG sense cable	22	
Conductor cross section	0.34 mm ²	
Wire colors	Brown, white, blue, black	
Conductor resistance	≤ 58 Ω/km	
Temperature range		
Fixed installation	-50 °C ... +80 °C	
Flexible installation	-25 °C ... +80 °C	
Special properties		
Flame resistance	UL Horizontal Flametest/CSA FT2	
Halogen-free	PUR halogen-free	
Microbe resistance	Excellent	
Hydrolysis resistance	Excellent	

Description	Cable length	Model name	Part no.
Cable socket, M12, 4-pin, straight, pre-wired for voltage supply, 4-core, 4 x 0.34 mm ² , shielded, diam. 4.7 mm	2.0 m	DOL-1204-G02MC	6025900
	5.0 m	DOL-1204-G05MC	6025901
	10.0 m	DOL-1204-G10MC	6025902
	25.0 m	DOL-1204-G25MC	6034751
Cable socket, M12, 4-pin, angled, pre-wired for voltage supply, 4-core, 4 x 0.34 mm ² , shielded, diam. 4.7 mm	2.0 m	DOL-1204-W02MC	6025903
	5.0 m	DOL-1204-W05MC	6025904
	10.0 m	DOL-1204-W10MC	6025905
	25.0 m	DOL-1204-W25MC	6034754

Description	Model name	Part no.
Cable socket for voltage supply, M12, 4-pin, angled, suitable for cable diameter 4 - 6 mm	DOS-1204-W	6007303

Connector for wall mounting RJ45 on M12

Description	Model name	Part no.
Switch cabinet feedthrough M12 cable socket, 4-pin, D-coded to RJ45 cable socket, 90 degree bush input	Passage jack Ethernet RJ45	6048180

Mounting technology

Couplings

- Bellows coupling, max. shaft offset radial ± 0.3 mm, axial 0.4 mm, angle ± 4 degrees, torsion spring stiffness 120 Nm/rad, bellows of stainless steel, hubs of aluminium.

Description	Model name	Part no.
Bellows coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad, material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
Bellows coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983
Bellows coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984

- Spring-disc coupling, max. shaft offset radial ± 0.3 mm, axial 0.4 mm, angle ± 2.5 degrees, torsion spring stiffness 50 Nm/rad, flange of aluminium, spring-discs of glass-fibre-reinforced plastic

Description	Model name	Part no.
Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985
Spring washer coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

Mechanical adapters

Adapter flanges

- Adapter flange of aluminium for face mount flange, spigot 36 mm.

Description	Model name	Part no.
Flange adapter, adapts face mount flange with 36 mm centering collar to 50 mm servo flange	BEF-FA-036-050	2029160
Flange adapter, adapts face mount flange with 36 mm centering collar to 60 mm square mounting plate	BEF-FA-036-060REC	2029162
Flange adapter, adapts face mount flange with 36 mm centering collar to 58 mm square mounting plate with shock absorber	BEF-FA-036-060RSA	2029163
Flange adapter, adapts face mount flange with 36 mm centering collar to 63 mm square mounting plate	BEF-FA-036-063REC	2034225

Mounting bells

- Mounting bell incl. fixing set for encoder with servo flange.

Description	Model name	Part no.
Mounting bell for servo flange encoder with 50 mm centering collar incl. mounting kit	BEF-MG-50	5312987

Mounting angles

- Mounting angle incl. fixing set for encoder with face mount flange.

Description	Model name	Part no.
Mounting bracket for encoder with 36 mm centering collar	BEF-WF-36	2029164

Servo clamps

Description	Model name	Part no.
Servo clamp half-shells (set of 2) for 50 mm centering collar	BEF-WG-SF050	2029165
Servo clamps (set of 3), large	BEF-WK-SF	2029166

Bearing blocks

Description	Model name	Part no.
Bearing block for hollow shaft encoder	BEF-FA-B12-010	2042728

Measuring wheels

- Circumference 200 mm, plastic

Description	Model name	Part no.
Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678

- Circumference 500 mm, plastic

Description	Model name	Part no.
Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989

- Circumference 200 mm, O-ring

Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224

- Circumference 300 mm, O-ring

Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278

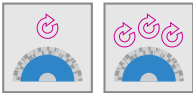
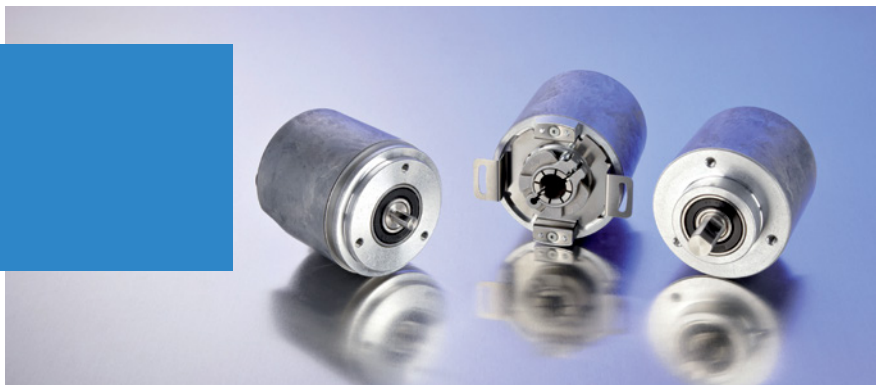
- Circumference 500 mm, O-ring

Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227

Further mounting versions for hollow shaft encoders

Stator couplings – versions	Model name	Part no.
Torque support, one-sided, 81 mm long with slot	BEF-DS01DFS/VFS	2047428
Torque support, one-sided, 179 mm long with slots	BEF-DS02DFS/VFS	2047430
Torque support, one-sided, 248 mm long with slots	BEF-DS03DFS/VFS	2047431

Intelligent, powerful, precise



E

EtherCAT®



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Additional information

Detailed technical data E-191
 Maximum speed consideration . . E-192
 Ordering information E-193
 Dimensional drawings E-196
 Pin allocation E-199
 Sales kits E-200
 Accessories E-202

Product description

Intelligent diagnostic functions and rapid on-the-fly data transfer: High-resolution AFS/AFM60 EtherCAT® absolute encoders represent high-precision measurement of absolute position and speed for applications in industrial automation. Comprehensive functions for diagnosing parameters such as temperature or operating time and early error detection increase network reliability. Various configuration options, such as modifica-

tion of resolution, rotational direction or unit of speed measurement simplify installation and enable customized adjustment to each application. Their compact design also makes AFS/AFM60 EtherCAT® absolute encoders suitable for applications in confined spaces. Embedded switch technology ensures maximum system and equipment availability and therefore helps increase productivity.

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
- Up to 125 µs on-the-fly data transfer speed
- 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

Your benefits

- Increased productivity as a result of intelligent diagnostics functions and rapid data transfer
- Increase in network reliability due to early error detection
- Simple installation with various configuration options
- Flexible, easy setup and high resolutions for various applications with binary, integer and “decimal point” values based on round axis functionality
- Maximum system availability through embedded switch technology
- Compact and cost-efficient design

→ www.mysick.com/en/AFS_AFM60_EtherCAT

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

Performance

Max. number of steps per revolution, AFS60 and AFM60	262,144 (18 bit) (Maximum speed consideration, see page E-192)
Max. number of revolutions, AFM60	4,096 (12 bit)
Error limits	± 0.03°
Repeatability	± 0.002°
Cycle time	125 µs bis 100 ms

Interfaces

Bus interface	EtherCAT® COE (CIA DS-301)
Transmission rate	10/100 Mbit/s
Initialization time	Approx. 12 s
Transmission medium	CAT-5e cable
Round axis functionality	✓
Encoder device profile	CIA DS-406

Mechanical data

Operating speed ¹⁾	Solid shaft	9,000 min ⁻¹ (Maximum speed consideration, see page E-192)
	Blind hollow shaft	6,000 min ⁻¹ (Maximum speed consideration, see page E-192)
Mass		0.2 kg
Max. shaft loading solid shaft		80 N (radial); 40 N (axial)
Permissible movement of the drive element, blind hollow shaft		± 0.3 / ± 0.05 mm (radial, static/dynamic) ± 0.5 / ± 0.1 mm (axial, static/dynamic)
Moment of inertia of the rotor	Solid shaft	≤ 6.2 gcm ²
	Blind hollow shaft	≤ 40 gcm ²
Bearing lifetime		3 x 10 ⁹ revolutions
Start up torque at 20 °C	Solid shaft	0.5 Ncm
	Blind hollow shaft	0.8 Ncm
Operating torque at 20 °C	Solid shaft	0.3 Ncm
	Blind hollow shaft	0.6 Ncm
Max. angular acceleration		5 x 10 ⁵ rad/s ²
Shaft diameter	Face mount flange, solid shaft	10 x 19 mm
	Servo flange, solid shaft	6 x 10 mm
	Blind hollow shaft AFM60	8, 10, 12, 14, 15 mm, 1/4", 1/2", 3/8"
	Blind hollow shaft AFS60	8, 10, 12, 14, 15 mm, 1/4", 1/2", 3/8", 5/8"
Material shaft		Stainless steel
Material flange	Solid shaft	Aluminium
	Blind hollow shaft AFM60	Aluminium
	Blind hollow shaft AFS60	Zinc
Material housing		Aluminium

¹⁾ Self-warming. 3.3 k/1,000 min⁻¹, when applying note working temperature.

Electrical data

Max. power consumption	3.0 W
Operating voltage range with inverse-polarity protection	10 ... 30 V
MTTFd: mean time to dangerous failure ¹⁾	80 years (EN ISO 13849-1)

¹⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

Enclosure rating acc. IEC 60529	
Housing with mating connector fitted	IP 67 only with mating connector or sealing cap
Shaft	IP 65
Permissible relative humidity ¹⁾	90 %
Working temperature range	-30 ... +85 °C
Storage temperature range (without packaging)	-40 ... +100 °C
Resistance	
To shocks (EN 60068-2-27)	100 g/6 ms
To vibration (EN 60068-2-6)	30 g/10 ... 2,000 Hz
EMC	EN 61000-6-2 and EN 61000-6-3

¹⁾ Condensation of the optical scanning not permitted.

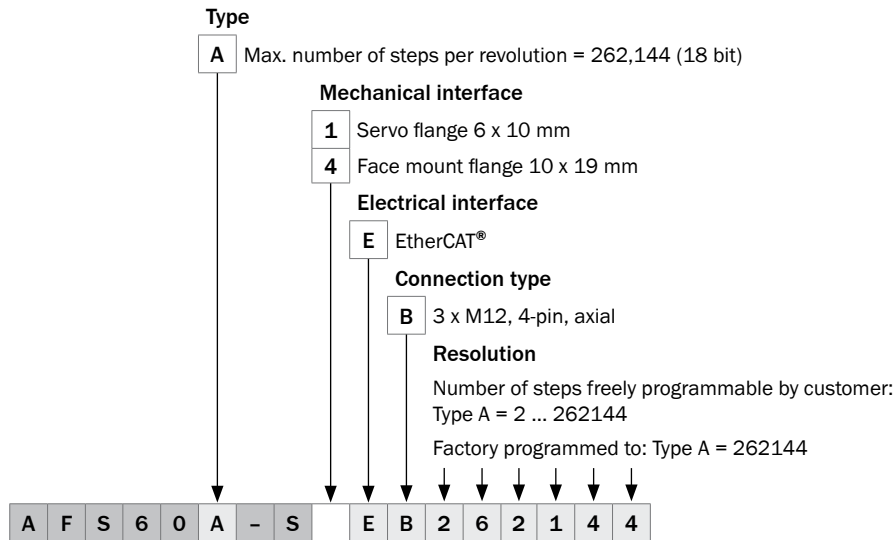
Maximum speed consideration

The maximum singleturn resolution (= 18 bit) can be operated with the respective maximum operating speed (hollow shaft 6,000 min⁻¹ and solid shaft 9,000 min⁻¹).

E

Ordering information

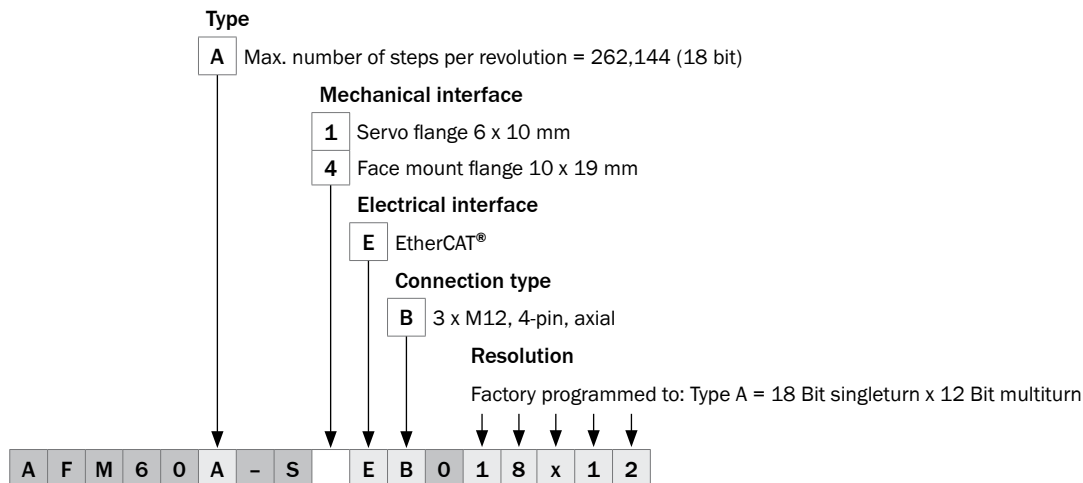
Type code AFS Absolute Encoder singleturn, solid shaft



Ordering examples

Mechanical interface	Model name	Part no.
Solid shaft, servo flange, Ø 6 mm, length 10 mm	AFS60A-S1EB262144	1059072
Solid shaft, face mount flange, Ø 10 mm, length 19 mm	AFS60A-S4EB262144	1059071

Type code AFM Absolute Encoder multiturn, solid shaft

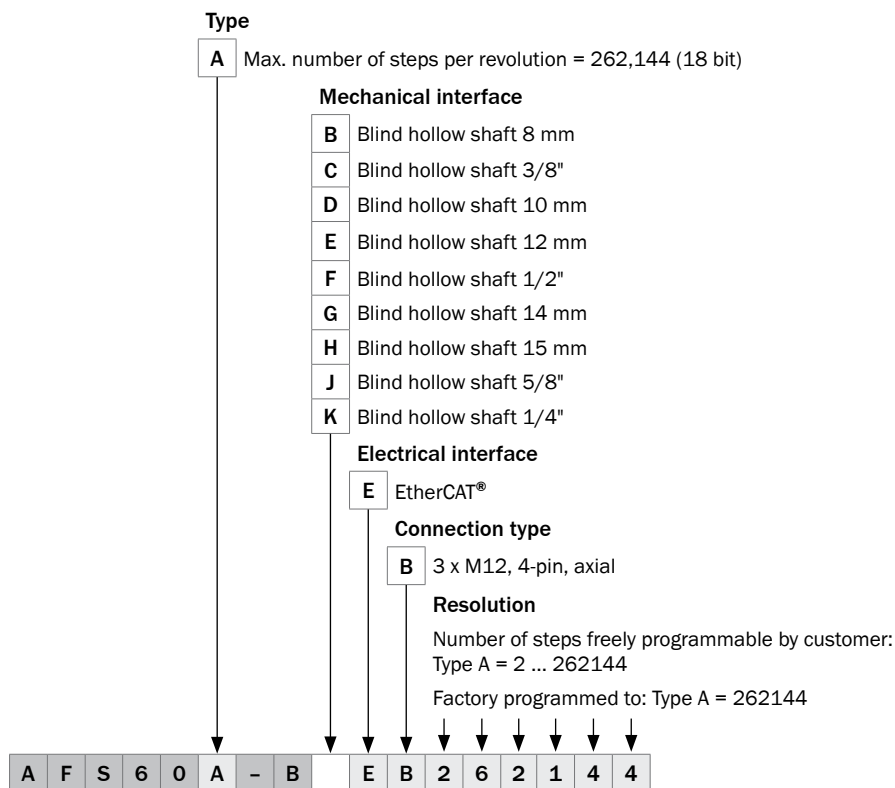


Ordering examples

Mechanical interface	Model name	Part no.
Solid shaft, servo flange, Ø 6 mm, length 10 mm	AFM60A-S1EB018x12	1059061
Solid shaft, face mount flange, Ø 10 mm, length 19 mm	AFM60A-S4EB018x12	1059060



Type code AFS Absolute Encoder singleturn, blind hollow shaft

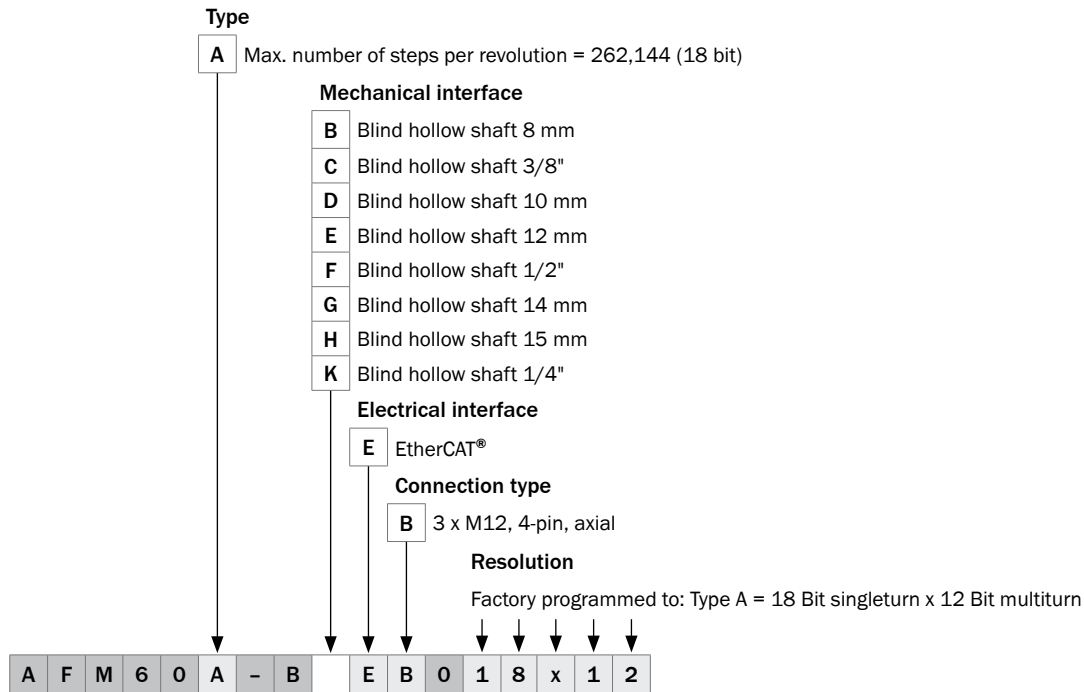


Ordering examples

Mechanical interface	Model name	Part no.
Blind hollow shaft, Ø 8 mm	AFS60A-BBEB262144	1059070
Blind hollow shaft, Ø 3/8"	AFS60A-BCEB262144	1059069
Blind hollow shaft, Ø 10 mm	AFS60A-BDEB262144	1059068
Blind hollow shaft, Ø 12 mm	AFS60A-BEEB262144	1059067
Blind hollow shaft, Ø 1/2"	AFS60A-BFEB262144	1059066
Blind hollow shaft, Ø 14 mm	AFS60A-BGEB262144	1059065
Blind hollow shaft, Ø 15 mm	AFS60A-BHEB262144	1059064
Blind hollow shaft, Ø 5/8"	AFS60A-BJEB262144	1059063
Blind hollow shaft, Ø 1/4"	AFS60A-BKEB262144	1059062



Type code AFM Absolute Encoder multiturn, blind hollow shaft



Ordering examples

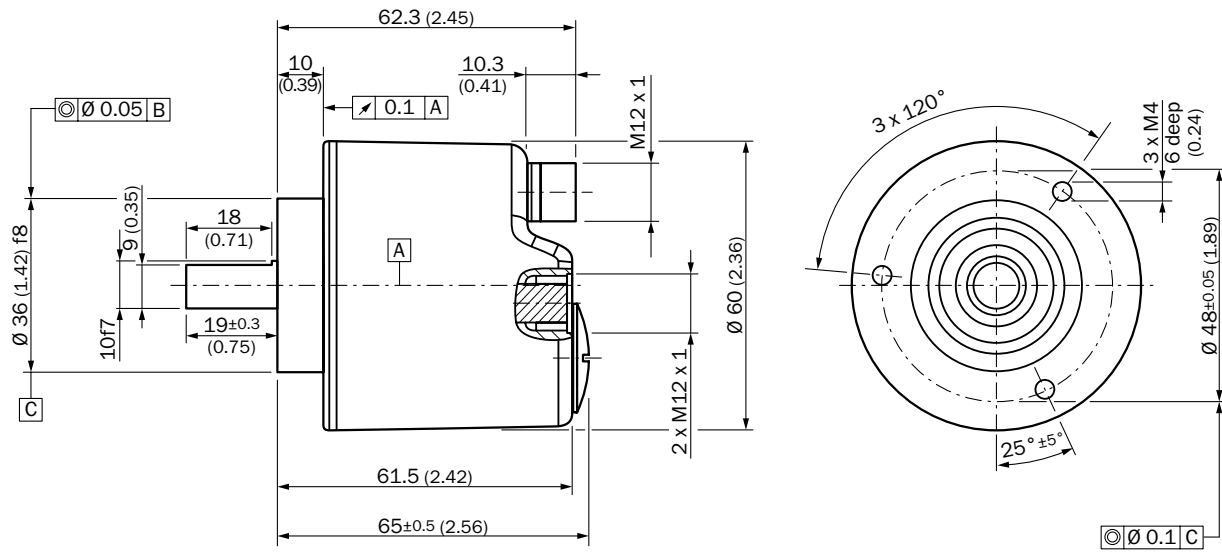
Mechanical interface	Model name	Part no.
Blind hollow shaft, Ø 8 mm	AFM60A-BBEB018x12	1059059
Blind hollow shaft, Ø 3/8"	AFM60A-BCEB018x12	1059058
Blind hollow shaft, Ø 10 mm	AFM60A-BDEB018x12	1059057
Blind hollow shaft, Ø 12 mm	AFM60A-BEEB018x12	1059056
Blind hollow shaft, Ø 1/2"	AFM60A-BFEB018x12	1059055
Blind hollow shaft, Ø 14 mm	AFM60A-BGEB018x12	1059054
Blind hollow shaft, Ø 15 mm	AFM60A-BHEB018x12	1059053
Blind hollow shaft, Ø 1/4"	AFM60A-BKEB018x12	1059052



Dimensional drawings

dimensions in mm (inch)

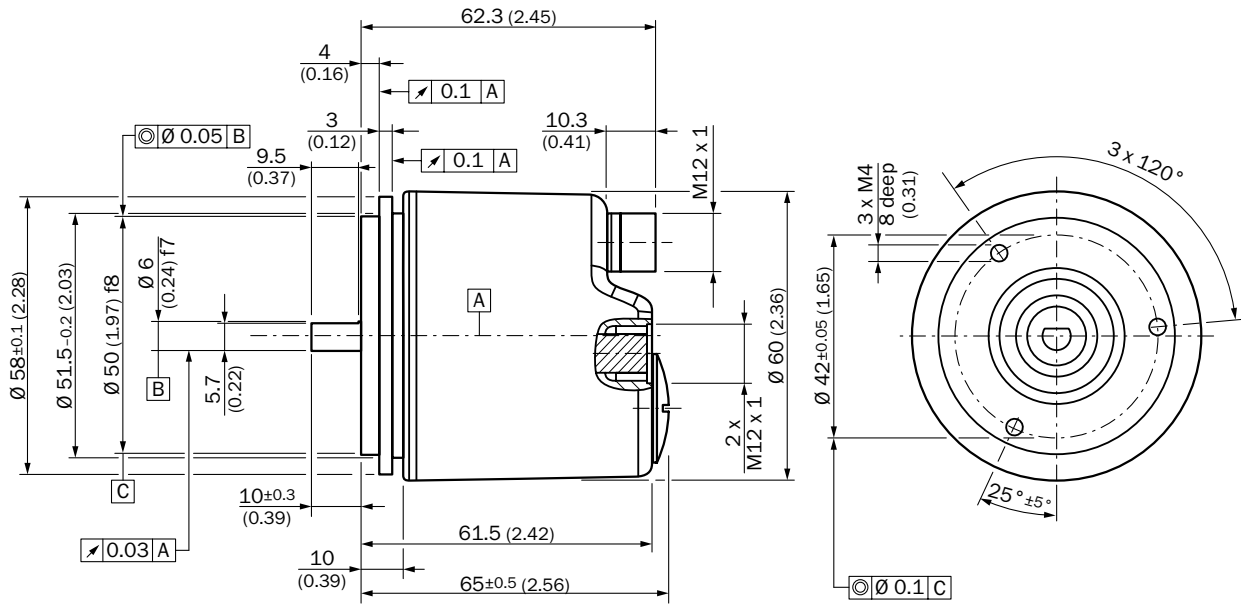
Face mount flange



General tolerances as per DIN ISO 2768-mk



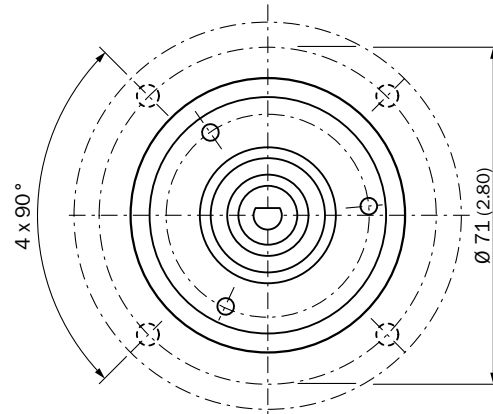
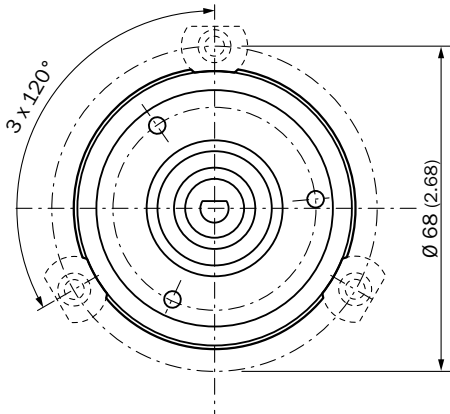
Servo flange



General tolerances as per DIN ISO 2768-mk

Proposed customer fitting for servo clamp small (part no. 2029166)

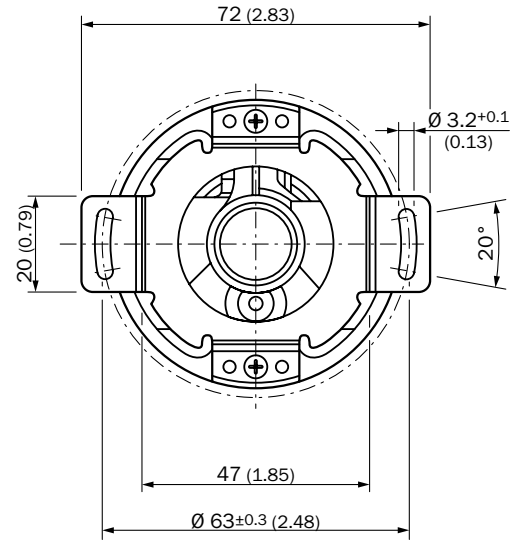
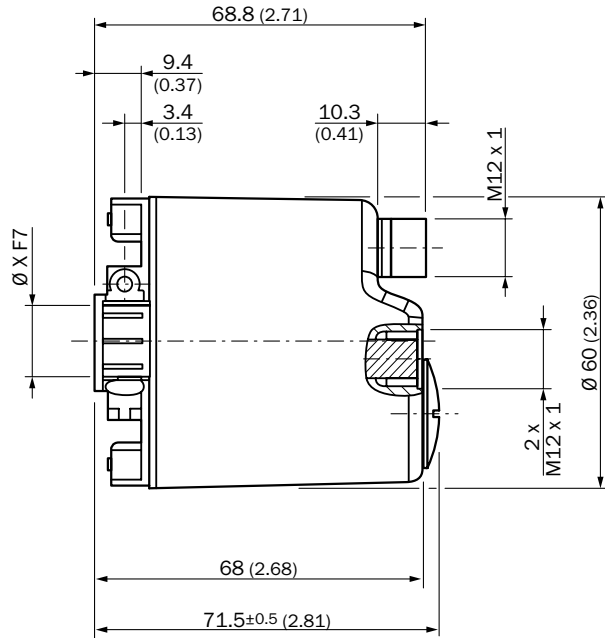
Proposed customer fitting for servo clamp half-shell (part no. 2029165)



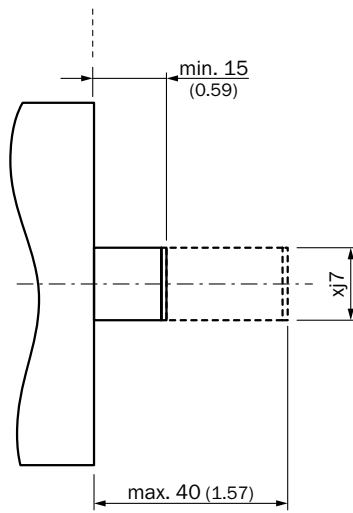
General tolerances as per DIN ISO 2768-mk



Blind hollow shaft



General tolerances as per DIN ISO 2768-mk
Proposed customer fitting



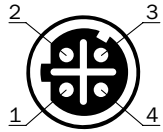
General tolerances as per DIN ISO 2768-mk
 xj7 = shaft diameter, on the customer side

Diameter X F7	
Absolute Encoder singleturn AFS60	Absolute Encoder multiturn AFM60
Blind hollow shaft 1/4"	Blind hollow shaft 1/4"
Blind hollow shaft 8 mm	Blind hollow shaft 8 mm
Blind hollow shaft 3/8"	Blind hollow shaft 3/8"
Blind hollow shaft 10 mm	Blind hollow shaft 10 mm
Blind hollow shaft 12 mm	Blind hollow shaft 12 mm
Blind hollow shaft 1/2"	Blind hollow shaft 1/2"
Blind hollow shaft 14 mm	Blind hollow shaft 14 mm
Blind hollow shaft 15 mm	Blind hollow shaft 15 mm
Blind hollow shaft 5/8"	

E

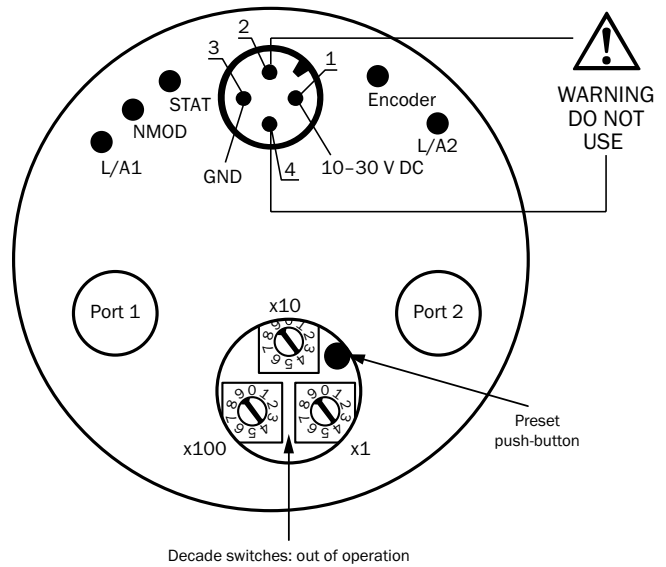
Pin allocation

M12 - 4-pin (D coding)

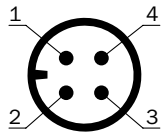


Port 1				
Signal	T x D+	R x D+	T x D-	R x D-
Pin	1	2	3	4
Color wires	Yellow	White	Orange	Blue

Port 2				
Signal	T x D+	R x D+	T x D-	R x D-
Pin	1	2	3	4
Color wires	Yellow	White	Orange	Blue



M12 - 4-pin (A coding)




Power supply				
Signal	U _s 10 ... 30 V	Not connected	GND	Not connected
Pin	1	2	3	4
Color wires	Brown	White	Blue	Black


Sales kits

Sales kit 01

EtherCAT® encoder

- + Female connector power supply angled (DOS-1204-W, part no. 6007303)
- + Male connector EtherCAT®-signal angled (STE-1204-WZ, part no. 6048262)

	Encoder type (singleturn)	Description	Model name	Part no.
	AFS60A-S1EB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1EB Sales Kit 01	1060469
	AFS60A-S4EB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4EB Sales Kit 01	1060470
	AFS60A-BDEB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDEB Sales Kit 01	1060471
	AFS60A-BEEB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEEB Sales Kit 01	1060472
	AFS60A-BHEB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHEB Sales Kit 01	1060473


	Encoder type (multiturn)	Description	Model name	Part no.
	AFM60A-S1EB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1EB Sales Kit 01	1060474
	AFM60A-S4EB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4EB Sales Kit 01	1060475
	AFM60A-BDEB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDEB Sales Kit 01	1060476
	AFM60A-BEEB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEEB Sales Kit 01	1060477
	AFM60A-BHEB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHEB Sales Kit 01	1060478


E

Sales kit 02

EtherCAT® encoder

- + Female connector power supply angled, pre-wired with cable 5 m (DOL-1204-W05MC, part no. 6025904)
- + Male connector EtherCAT®-signal angled, pre-wired with cable 5 m (STL-1204-W05MZ90, part no. 6048257)


	Encoder type (singleturn)	Description	Model name	Part no.
	AFS60A-S1EB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1EB Sales Kit 02	1060479
	AFS60A-S4EB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4EB Sales Kit 02	1060480
	AFS60A-BDEB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDEB Sales Kit 02	1060481
	AFS60A-BEEB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEEB Sales Kit 02	1060482
	AFS60A-BHEB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHEB Sales Kit 02	1060483


	Encoder type (multiturn)	Description	Model name	Part no.
	AFM60A-S1EB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1EB Sales Kit 02	1060484
	AFM60A-S4EB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4EB Sales Kit 02	1060485
	AFM60A-BDEB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDEB Sales Kit 02	1060486
	AFM60A-BEEB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEEB Sales Kit 02	1060487
	AFM60A-BHEB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHEB Sales Kit 02	1060488

Sales kit 03

EtherCAT® encoder

- + Female connector power supply angled (DOS-1204-W, part no. 6007303)
- + 2 male connectors EtherCAT®-signal angled (STE-1204-WZ, part no. 6048262)


	Encoder type (singleturn)	Description	Model name	Part no.
	AFS60A-S1EB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1EB Sales Kit 03	1060489
	AFS60A-S4EB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4EB Sales Kit 03	1060490
	AFS60A-BDEB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDEB Sales Kit 03	1060491
	AFS60A-BEEB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEEB Sales Kit 03	1060492
	AFS60A-BHEB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHEB Sales Kit 03	1060493


	Encoder type (multiturn)	Description	Model name	Part no.
	AFM60A-S1EB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1EB Sales Kit 03	1060495
	AFM60A-S4EB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4EB Sales Kit 03	1060496
	AFM60A-BDEB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDEB Sales Kit 03	1060497
	AFM60A-BEEB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEEB Sales Kit 03	1060498
	AFM60A-BHEB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHEB Sales Kit 03	1060499

Sales kit 04

EtherCAT® encoder

- + Female connector power supply angled, pre-wired with cable 5 m (DOL-1204-W05MC, part no.6025904)
- + 2 male connectors EtherCAT®-signal angled, pre-wired with cable 5 m (STL-1204-W05MZ90, part no. 6048257)

	Encoder type (singleturn)	Description	Model name	Part no.
	AFS60A-S1EB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1EB Sales Kit 04	1060500
	AFS60A-S4EB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4EB Sales Kit 04	1060501
	AFS60A-BDEB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDEB Sales Kit 04	1060502
	AFS60A-BEEB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEEB Sales Kit 04	1060503
	AFS60A-BHEB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHEB Sales Kit 04	1060504

	Encoder type (multiturn)	Description	Model name	Part no.
	AFM60A-S1EB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1EB Sales Kit 04	1060505
	AFM60A-S4EB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4EB Sales Kit 04	1060506
	AFM60A-BDEB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDEB Sales Kit 04	1060507
	AFM60A-BEEB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEEB Sales Kit 04	1060508
	AFM60A-BHEB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHEB Sales Kit 04	1060509

Accessories

Plug connector and cables

	Data line
Mechanical characteristics	
Number of poles	4
Coding	D coding
Cable diameter	6.50 mm
Smallest bending radius, fixed installation	19.5 mm
Smallest bending radius, flexible installation	45.5 mm
Length of cable, between the participants max.	100 m
Material	
External sheath	PVC
Conductor	Tin-coated CU-litz wire
Color external sheath	Green RAL 6018
Electrical characteristics	
Transmission characteristics (category)	CAT5 (IEC 11801:2002), CAT5e (TIA 568B:2001)
Characteristics of cable	
Signal type	EtherCAT®
Cable structure	1x4xAWG22/7; SF/Q
Wire colors	White, yellow, blue, orange
Conductor cross section	0.34 mm ²
Conductor resistance	≤ 120 Ω/km
Shielding	Tinned copper braided shield
Temperature range	
Connector pre-wired with cable	
Fixed installation	-25 °C ... +60 °C
Flexible installation	-5 °C ... +50 °C
M12 connector	
Ambient temperature (operation)	-40 °C ... +85 °C
RJ45 connector	
Ambient temperature (operation)	-10 °C ... +60 °C
Special properties	
Flame resistance	In accordance with IEC 60332-1

Description	Cable length	Model name	Part no.
Cable connector, M12, 4-pin, straight to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-G02MZ90	6048241
	5.0 m	SSL-1204-G05MZ90	6048242
	10.0 m	SSL-1204-G10MZ90	6048243
Cable connector, M12, 4-pin, straight to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-G02MZ60	6048244
	5.0 m	SSL-2J04-G05MZ60	6048245
	10.0 m	SSL-2J04-G10MZ60	6048246
Cable connector, M12, 4-pin, straight, to open end, shielded	2.0 m	STL-1204-G02MZ90	6048247
	5.0 m	STL-1204-G05MZ90	6048248
	10.0 m	STL-1204-G10MZ90	6048249
Cable connector, M12, 4-pin, angled to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-F02MZ90	6048250
	5.0 m	SSL-1204-F05MZ90	6048251
	10.0 m	SSL-1204-F10MZ90	6048252

Description	Cable length	Model name	Part no.
Cable connector, M12, 4-pin, angled to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-F02MZ	6048253
	5.0 m	SSL-2J04-F05MZ	6048254
	10.0 m	SSL-2J04-F10MZ	6048255
Cable connector, M12, 4-pin, angled, to open end, shielded	2.0 m	STL-1204-W02MZ90	6048256
	5.0 m	STL-1204-W05MZ90	6048257
	10.0 m	STL-1204-W10MZ90	6048258
	20.0 m	STL-1204-W25MZ90	6048259

Description	Contacts	Type of connector	Model name	Part no.
Cable connector, M12, 4-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	4	Male connector	STE-1204-GZ	6048261
		Female connector	DOS-1204-GZ	6048263
Cable connector, M12, 4-pin, angled, shielded, suitable for cable diameter 4 - 8 mm	4	Male connector	STE-1204-WZ	6048262
		Female connector	DOS-1204-WZ	6048264

RJ45 connector

Description	Contacts	Type of connector	Model name	Part no.
Cable connector, RJ45, suitable for cable diameter 4.5 - 8 mm	4	Male connector	STE-0J04-GZ	6048260

Power supply

	Power supply (A coding)
Mechanical characteristics	
Number of positions	4
External cable diameter	4.7 mm
Smallest bending radius, fixed installation	47 mm
Smallest bending radius, flexible installation	47 mm
Length of cable, between the participants max.	100 m
Material	
External sheath	PUR
Conductor	Bare Cu litz wires
External sheath, color	Black RAL 9005
Characteristics of cable	
AWG sense cable	22
Conductor cross section	0.34 mm ²
Wire colors	Brown, white, blue, black
Conductor resistance	≤ 58 Ω/km
Temperature range	
Fixed installation	-50 °C ... +80 °C
Flexible installation	-25 °C ... +80 °C
Special properties	
Flame resistance	UL Horizontal Flametest/CSA FT2
Halogen-free	PUR halogen-free
Microbe resistance	Excellent
Hydrolysis resistance	Excellent

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Description	Cable length	Model name	Part no.
Cable socket, M12, 4-pin, straight, pre-wired for voltage supply, 4-core, 4 x 0.34 mm ² , shielded, diam. 4.7 mm	2.0 m	DOL-1204-G02MC	6025900
	5.0 m	DOL-1204-G05MC	6025901
	10.0 m	DOL-1204-G10MC	6025902
	25.0 m	DOL-1204-G25MC	6034751

Description	Cable length	Model name	Part no.
Cable socket, M12, 4-pin, angled, pre-wired for voltage supply, 4-core, 4 x 0.34 mm ² , shielded, diam. 4.7 mm	2.0 m	DOL-1204-W02MC	6025903
	5.0 m	DOL-1204-W05MC	6025904
	10.0 m	DOL-1204-W10MC	6025905
	25.0 m	DOL-1204-W25MC	6034754

Description	Model name	Part no.
Cable socket for voltage supply, M12, 4-pin, angled, suitable for cable diameter 4 - 6 mm	DOS-1204-W	6007303

Connector for wall mounting RJ45 on M12

Description	Model name	Part no.
Switch cabinet feedthrough M12 cable socket, 4-pin, D-coded to RJ45 cable socket, 90 degree bush input	Passage jack Ethernet RJ45	6048180

Mounting technology

Couplings

- Bellows coupling, max. shaft offset radial ± 0.3 mm, axial 0.4 mm, angle ± 4 degrees, torsion spring stiffness 120 Nm/rad, bellows of stainless steel, hubs of aluminium.

Description	Model name	Part no.
Bellows coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad, material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
Bellows coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983
Bellows coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984

- Spring-disc coupling, max. shaft offset radial ± 0.3 mm, axial 0.4 mm, angle ± 2.5 degrees, torsion spring stiffness 50 Nm/rad, flange of aluminium, spring-discs of glass-fibre-reinforced plastic

Description	Model name	Part no.
Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985
Spring washer coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

Mechanical adapters

Adapter flanges

- Adapter flange of aluminium for face mount flange, spigot 36 mm.

Description	Model name	Part no.
Flange adapter, adapts face mount flange with 36 mm centering collar to 50 mm servo flange	BEF-FA-036-050	2029160
Flange adapter, adapts face mount flange with 36 mm centering collar to 60 mm square mounting plate	BEF-FA-036-060REC	2029162
Flange adapter, adapts face mount flange with 36 mm centering collar to 58 mm square mounting plate with shock absorber	BEF-FA-036-060RSA	2029163
Flange adapter, adapts face mount flange with 36 mm centering collar to 63 mm square mounting plate	BEF-FA-036-063REC	2034225

Mounting bells

- Mounting bell incl. fixing set for encoder with servo flange.

Description	Model name	Part no.
Mounting bell for servo flange encoder with 50 mm centering collar incl. mounting kit	BEF-MG-50	5312987

Mounting angles

- Mounting angle incl. fixing set for encoder with face mount flange.

Description	Model name	Part no.
Mounting bracket for encoder with 36 mm centering collar	BEF-WF-36	2029164

Servo clamps

Description	Model name	Part no.
Servo clamp half-shells (set of 2) for 50 mm centering collar	BEF-WG-SF050	2029165
Servo clamps (set of 3), large	BEF-WK-SF	2029166

Bearing blocks

Description	Model name	Part no.
Bearing block for hollow shaft encoder	BEF-FA-B12-010	2042728

Measuring wheels

- Circumference 200 mm, plastic

Description	Model name	Part no.
Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678

- Circumference 500 mm, plastic

Description	Model name	Part no.
Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989

- Circumference 200 mm, O-ring

Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224

- Circumference 300 mm, O-ring

Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278

- Circumference 500 mm, O-ring

Description	Model name	Part no.
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227

Further mounting versions for hollow shaft encoders

Description	Model name	Part no.
Torque support, one-sided, 81 mm long with slot	BEF-DS01DFS/VFS	2047428
Torque support, one-sided, 179 mm long with slots	BEF-DS02DFS/VFS	2047430
Torque support, one-sided, 248 mm long with slots	BEF-DS03DFS/VFS	2047431





Compact, robust, powerful



E

Product description

The A3M60 PROFIBUS is an extremely rugged absolute multiturn encoder with a 60 mm housing. Maximum reliability even in the harshest of environmental conditions is attained by means of magnetic scanning, both with singleturn and multiturn detection. New singleturn technology combines the durability of a magnetic sensor with high resolutions, previously only possible with optical systems. The innovative, gearless multiturn

technology keeps the number of moving components on the A3M60 to a minimum. This results in a longer life with less maintenance and optimum system reliability. The highly compact technology offers a space-saving, cost-efficient solution for users. Together with the integrated PROFIBUS interface, the A3M60 is particularly suited for applications where installation space is tight

At a glance

- Robust absolute multiturn encoder with up to 31 bits (14 bits singleturn and 17 bits multiturn)
- Face mount flange, servo flange or blind hollow shaft
- Compact design (<70 mm)
- Integrated PROFIBUS interface with DP V0, V1 and V2 functionality (dependent on type)
- Connection system: 3x M12 connectors
- Enclosure rating up to IP 67
- Operating temperature: -30 °C to +80 °C (dependent on type)

Your benefits

- High level of system reliability even in extreme environmental conditions
- Lower maintenance costs due to non-contact single and multiturn magnetic scanning
- Space-saving, cost-efficient design ensures easy integration into applications with limited space
- High level of productivity due to quick communication and position calculation
- Immune to contamination and condensation, making it ideal for harsh environmental conditions
- Very good price-performance ratio



Additional information

- Detailed technical data E-209
- Ordering information E-211
- Dimensional drawings E-212
- Sales kits E-214
- Recommended accessories E-216

→ www.mysick.com/en/A3M60_PROFIBUS

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

Performance

	B	A
Max. number of steps per revolution	8,192	16,384
Max. number of revolutions	8,192	131,072
Error limits	± 0.5°	± 0.35°
Repeat accuracy	± 0.25°	± 0.15°

Mechanical data

Shaft diameter		
Face mount flange	10 x 19 mm	
Servo flange	6 x 10 mm	
Blind hollow shaft	8, 10, 12, 14, 15 mm and 3/8", 1/2", 5/8"	
Shaft material	Stainless steel	
Flange material	Aluminium	
Housing material	Aluminium	
Mass		
Face mount flange, servo flange	0.28 kg	
Blind hollow shaft	0.28 kg	
Start up torque at 20 °C		
Face mount flange, servo flange	1 Ncm with shaft seal	
Blind hollow shaft	1 Ncm	2 Ncm
Operating torque at 20 °C		
Face mount flange, servo flange	0.8 Ncm	0.8 Ncm
Blind hollow shaft	0.8 Ncm	1.6 Ncm
Permissible Load capacity of shaft		
Face mount flange, servo flange	80 N radial 40 N axial	
Permissible movement axial static/dynamic		
Blind hollow shaft	± 0.3/ ± 0.1 mm radial ± 0.5/ ± 0.2 mm axial	
Max. angular acceleration	≤ 500,000 rad/s ²	
Operating speed		
Face mount flange, servo flange	6000 min ⁻¹	9000 min ⁻¹
Blind hollow shaft	6000 min ⁻¹	9000 min ⁻¹
Self warming at max. number of revolutions		
Face mount flange	30k	30k
Servo flange	15k	25k
Blind hollow shaft	45k	35k
Moment of inertia of the rotor		
Face mount flange, servo flange	11.4 gcm ²	
Blind hollow shaft	20.8 gcm ²	
Bearing lifetime	3 x 10 ⁹ revolutions	

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Electrical data

	B	A
Bus interface	PROFIBUS (RS485)	
SET (electronic adjustment)	Via PRESET push button or protocol	
Data protocol	DP V0	DP V0 und DP V1 + V2
Address setting (node number)	0 ... 127 Dec-Switches	
Data transmission rate (baud rate)	Max. 12 MBaud	
Status information	Via status LEDs	
Bus termination	Via DIP switches or external resistor	
Initialization time ¹⁾	Ca. 1 s	
Supply voltage	10 ... 32 V	
Max. current consumption	Max. 1.5 W	
Reverse polarity protection	Ja	
MTTFd: mean time to dangerous failure ²⁾	60 years (EN ISO 13849-1)	

¹⁾ Valid positional data can be read once this time has elapsed.

²⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

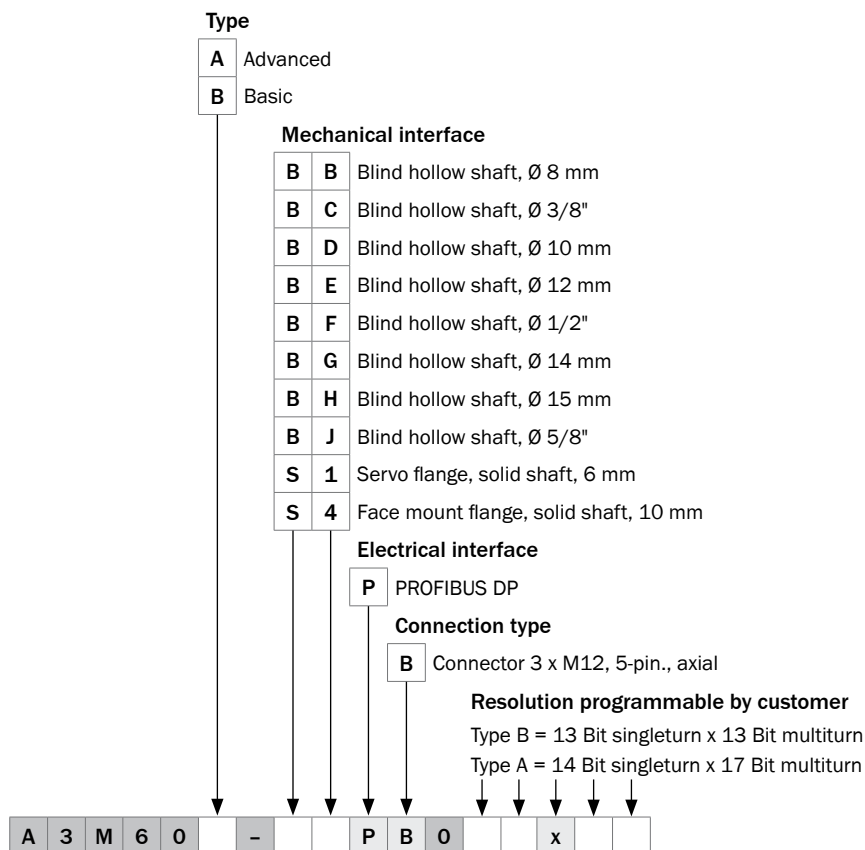
Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3	
Enclosure rating according to IEC 60529 ¹⁾		
Housing	IP 67	
Shaft	IP 65	IP 67
Permissible relative humidity	95 % condensation not permitted	
Working temperature range	-10 ... +70 °C	-30 ... +80 °C
Storage temperature range (without packaging)	-40 ... +100 °C	
Resistance		
To shocks as per EN 60068-2-27	80 g/6 ms	
To vibration as per EN 60068-2-6	30 g/10 ... 2,000 Hz	

¹⁾ With mating connector inserted, or closing cap.

Ordering information

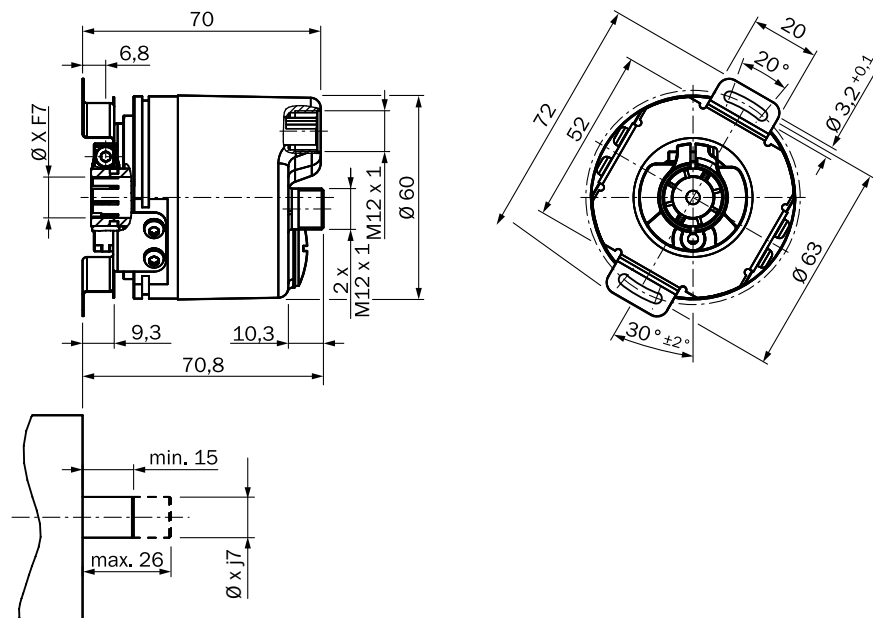
Type code A3M60 PROFIBUS



Ordering information

Mechanical interface / shaft diameter	Resolution	Resolution	Part no.
Solid shaft, face mount flange, Ø 10 mm, length 19 mm	8,192 x 8,192	A3M60B-S4PB013X13	1038826
Solid shaft, servo flange, Ø 6 mm, length 10 mm	8,192 x 8,192	A3M60B-S1PB013X13	1051018
Blind hollow shaft / 8 mm	8,192 x 8,192	A3M60B-BBPB013X13	1051016
Blind hollow shaft / 10 mm	8,192 x 8,192	A3M60B-BDPB013X13	1038824
Blind hollow shaft / 12 mm	8,192 x 8,192	A3M60B-BEPB013X13	1038825
Blind hollow shaft / 15 mm	8,192 x 8,192	A3M60B-BHPB013X13	1051017
Blind hollow shaft / 3/8"	8,192 x 8,192	A3M60B-BCPB013X13	1053327
Blind hollow shaft / 1/2"	8,192 x 8,192	A3M60B-BFPB013X13	1053328
Blind hollow shaft / 14 mm	8,192 x 8,192	A3M60B-BGPB013X13	1051325
Blind hollow shaft / 5/8"	8,192 x 8,192	A3M60B-BJPB013X13	1053329
Solid shaft, face mount flange, Ø 10 mm, length 19 mm	16,384 x 131,072	A3M60A-S4PB014X17	1053341
Solid shaft, servo flange, Ø 6 mm, length 10 mm	16,384 x 131,072	A3M60A-S1PB014X17	1053342
Blind hollow shaft / 8 mm	16,384 x 131,072	A3M60A-BBPB014X17	1053330
Blind hollow shaft / 3/8"	16,384 x 131,072	A3M60A-BCPB014X17	1053334
Blind hollow shaft / 10 mm	16,384 x 131,072	A3M60A-BDPB014X17	1053331
Blind hollow shaft / 12 mm	16,384 x 131,072	A3M60A-BEPB014X17	1053332
Blind hollow shaft / 1/2"	16,384 x 131,072	A3M60A-BFPB014X17	1053335
Blind hollow shaft / 14 mm	16,384 x 131,072	A3M60A-BGPB014X17	1053336
Blind hollow shaft / 15 mm	16,384 x 131,072	A3M60A-BHPB014X17	1053333
Blind hollow shaft / 5/8"	16,384 x 131,072	A3M60A-BJPB014X17	1053337

Blind hollow shaft



General tolerances as per DIN ISO 2768-mk

XF7 = shaft diameter encoder, see type code


xj7 = Shaft diameter, on the customer side

Sales kits

Sales kit 01

A3M60 PROFIBUS


- + Cable socket for voltage supply, M12, 4-pin, angled, suitable for cable diameter 4 – 6 mm (DOS-1204-W, part no. 6007303)
- + PROFIBUS IN: Cable socket, M12, 5-pin, angled, shielded, B-coded, suitable for cable diameter 4 – 8 mm (DOS-1205-WQ, part no. 6041429)

	Encoder type (singleturn)	Description	Model name	Part no.
	A3M60B-S4PB013x13	Solid shaft, face mount flange, 10 x 19 mm	A3M60B-S4P Sales Kit 01	1052488
	A3M60B-S1PB013x13	Solid shaft, servo flange, 6 x 10 mm	A3M60B-S1P Sales Kit 01	1052489
	A3M60B-BBPB013x13	Blind hollow shaft, Ø 8 mm	A3M60B-BBP Sales Kit 01	1052477
	A3M60B-BDPB013x13	Blind hollow shaft, Ø 10 mm	A3M60B-BDP Sales Kit 01	1052478
	A3M60B-BEPB013x13	Blind hollow shaft, Ø 12 mm	A3M60B-BEP Sales Kit 01	1052479
	A3M60B-BHPB013x13	Blind hollow shaft, Ø 15 mm	A3M60B-BHP Sales Kit 01	1052486
	A3M60B-BGPB013x13	Blind hollow shaft Ø 14 mm	A3M60B-BGP Sales Kit 01	1053975

Sales kit 02

A3M60 PROFIBUS

- + Cable socket, M12, 5-pin, angled, pre-wired for voltage supply, 3-core, 3 x 0.34 mm², shielded, diam. 4.2 mm (DOL-1202-W05MC, part no. 6042067)
- + PROFIBUS IN: Cable socket, M12, 5-pin, angled, pre-wired with PROFIBUS cable, 2-core, 2 x 0.64 mm², suitable for drag chain, diam. 7.8 mm (DOL-1205-W05MQ, part no. 6041423)


	Encoder type (singleturn)	Description	Model name	Part no.
	A3M60B-S4PB013x13	Solid shaft, face mount flange, 10 x 19 mm	A3M60B-S4P Sales Kit 02	1052492
	A3M60B-S1PB013x13	Solid shaft, servo flange, 6 x 10 mm	A3M60B-S1P Sales Kit 02	1052506
	A3M60B-BBPB013x13	Blind hollow shaft, Ø 8 mm	A3M60B-BBP Sales Kit 02	1052490
	A3M60B-BDPB013x13	Blind hollow shaft, Ø 10 mm	A3M60B-BDP Sales Kit 02	1052491
	A3M60B-BEPB013x13	Blind hollow shaft, Ø 12 mm	A3M60B-BEP Sales Kit 02	1052493
	A3M60B-BHPB013x13	Blind hollow shaft, Ø 15 mm	A3M60B-BHP Sales Kit 02	1052494
	A3M60B-BGPB013x13	Blind hollow shaft Ø 14 mm	A3M60B-BGP Sales Kit 02	1053976

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Sales kit 03

A3M60 PROFIBUS


- + Cable socket for voltage supply, M12, 4-pin, angled, suitable for cable diameter 4 – 6 mm (DOS-1204-W, part no. 6007303)
- + PROFIBUS IN: Cable socket, M12, 5-pin, angled, shielded, B-coded, suitable for cable diameter 4 – 8 mm (DOS-1205-WQ, part no. 6041429)
- + PROFIBUS OUT: Cable plug, M12, 5-pin, angled, B-coded, suitable for cable diameter 4 – 8 mm (STE-1205-WQ, part no. 6041428)

	Encoder type (singleturn)	Description	Model name	Part no.
	A3M60B-S4PB013x13	Solid shaft, face mount flange, 10 x 19 mm	A3M60B-S4P Sales Kit 03	1052513
	A3M60B-S1PB013x13	Solid shaft, servo flange, 6 x 10 mm	A3M60B-S1P Sales Kit 03	1052514
	A3M60B-BBPB013x13	Blind hollow shaft, Ø 8 mm	A3M60B-BBP Sales Kit 03	1052507
	A3M60B-BDPB013x13	Blind hollow shaft, Ø 10 mm	A3M60B-BDP Sales Kit 03	1052508
	A3M60B-BEPB013x13	Blind hollow shaft, Ø 12 mm	A3M60B-BEP Sales Kit 03	1052509
	A3M60B-BHPB013x13	Blind hollow shaft, Ø 15 mm	A3M60B-BHP Sales Kit 03	1052510
	A3M60B-BGPB013x13	Blind hollow shaft Ø 14 mm	A3M60B-BGP Sales Kit 03	1053977

Sales kit 04

A3M60 PROFIBUS

- + Cable socket, M12, 5-pin, angled, pre-wired for voltage supply, 3-core, 3 x 0.34 mm², shielded, diam. 4.2 mm (DOL-1202-W05MC, part no. 6042067)
- + PROFIBUS IN: Cable socket, M12, 5-pin, angled, pre-wired with PROFIBUS cable, 2-core, 2 x 0.64 mm², suitable for drag chain, diam. 7.8 mm (DOL-1205-W05MQ, part no. 6041423)
- + PROFIBUS OUT: Cable socket, M12, 5-pin, angled, pre-wired with 2-core cable, 2 x 0.64 mm², shielded, B-coded, cable diameter 7.8 mm (STL-1205-W05MQ, part no. 6041426)

	Encoder type (singleturn)	Description	Model name	Part no.
	A3M60B-S4PB013x13	Solid shaft, face mount flange, 10 x 19 mm	A3M60B-S4P Sales Kit 04	1052519
	A3M60B-S1PB013x13	Solid shaft, servo flange, 6 x 10 mm	A3M60B-S1P Sales Kit 04	1052520
	A3M60B-BBPB013x13	Blind hollow shaft, Ø 8 mm	A3M60B-BBP Sales Kit 04	1052515
	A3M60B-BDPB013x13	Blind hollow shaft, Ø 10 mm	A3M60B-BDP Sales Kit 04	1052516
	A3M60B-BEPB013x13	Blind hollow shaft, Ø 12 mm	A3M60B-BEP Sales Kit 04	1052517
	A3M60B-BHPB013x13	Blind hollow shaft, Ø 15 mm	A3M60B-BHP Sales Kit 04	1052518
	A3M60B-BGPB013x13	Blind hollow shaft Ø 14 mm	A3M60B-BGP Sales Kit 04	1053978



Recommended accessories

Mechanical adapters

Short description	Model name	Part no.
Flange adapter, adapts face mount flange with 36 mm centering collar to 50 mm servo flange	BEF-FA-036-050	2029160
Flange adapter, adapts face mount flange with 36 mm centering collar to 60 mm square mounting plate	BEF-FA-036-060REC	2029162
Flange adapter, adapts face mount flange with 36 mm centering collar to 58 mm square mounting plate with shock absorber	BEF-FA-036-060RSA	2029163
Flange adapter, adapts face mount flange with 36 mm centering collar to 63 mm square mounting plate	BEF-FA-036-063REC	2034225
Mounting bell for servo flange encoder with 50 mm centering collar incl. mounting kit	BEF-MG-50	5312987
Mounting bracket for encoder with 36 mm centering collar	BEF-WF-36	2029164
Servo clamp half-shells (set of 2) for 50 mm centering collar	BEF-WG-SF050	2029165
Servo clamps (set of 3), large	BEF-WK-SF	2029166
Bearing block for hollow shaft encoder	BEF-FA-B12-010	2042728
Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR-010030	2049278

Plug connectors and cables

Short description	Cable length	Model name	Part no.
Cable socket for voltage supply, M12, 4-pin, straight, suitable for cable diameter 3 - 6.5 mm	-	DOS-1204-G	6007302
Cable socket, M12, 5-pin, straight, pre-wired for voltage supply, 5-core, 5 x 0.34 mm ² , shielded, suitable for drag chain, diam. 5.9 mm	5.0 m	DOL-1205-G05MAC	6036384
	10.0 m	DOL-1205-G10MAC	6036385
	20.0 m	DOL-1205-G20MAC	6036386
Cable socket for voltage supply, M12, 4-pin, angled, suitable for cable diameter 4 - 6 mm	-	DOS-1204-W	6007303
Cable socket, M12, 5-pin, angled, pre-wired for voltage supply, 3-core, 3 x 0.34 mm ² , shielded, diam. 4.2 mm	5.0 m	DOL-1202-W05MC	6042067
	10.0 m	DOL-1202-W10MC	6042068
PROFIBUS cable by the meter 2 x 0.25 mm ² with shielding, suitable for drag chain, diam. 8.0 mm	-	LTG-2102-MW	6021355
PROFIBUS terminator M12, 5-pin	-	PRE-STE-END	6021156
Cable socket, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	DOS-1205-GQ	6021353
Cable socket, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	5.0 m	DOL-1205-G05MQ	6026006
	10.0 m	DOL-1205-G10MQ	6026008
Cable socket, M12, 5-pin, angled, shielded, B-coded, suitable for cable diameter 4 - 8 mm	-	DOS-1205-WQ	6041429
Cable socket, M12, 5-pin, angled, pre-wired with PROFIBUS cable, 2-core, 2 x 0.64 mm ² , suitable for drag chain, diam. 7.8 mm	5.0 m	DOL-1205-W05MQ	6041423
	10.0 m	DOL-1205-W10MQ	6041425
A3M60 sales set comprising: Cable socket supply voltage M12 angled (6007303) Cable socket M12 angled (6041429) Cable connector M12 angled (6041428)	-	DOS-3XM12-W	2058177
Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	STE-1205-GQ	6021354
Cable connector, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	5.0 m	STL-1205-G05MQ	6026005
	10.0 m	STL-1205-G10MQ	6026007
Cable connector, M12, 5-pin, angled, B-coded, suitable for cable diameter 4 - 8 mm	-	STE-1205-WQ	6041428
Cable socket, M12, 5-pin, angled, pre-wired with 2-core cable, 2 x 0.64 mm ² , shielded, B-coded, cable diameter 7.8 mm	5.0 m	STL-1205-W05MQ	6041426
	10.0 m	STL-1205-W10MQ	6041427

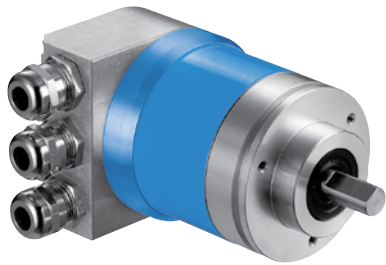
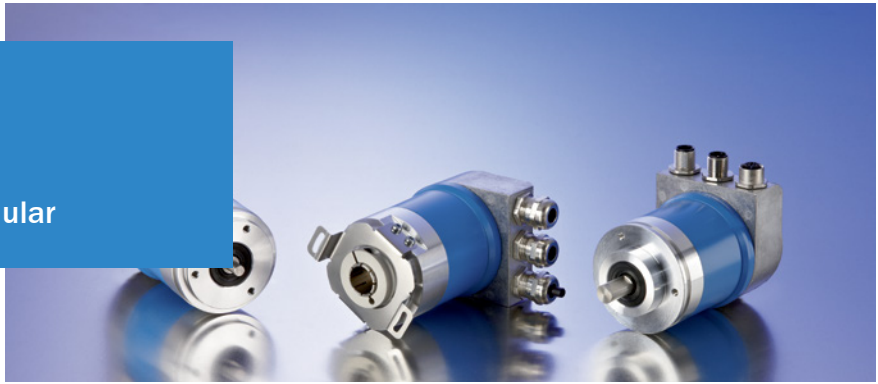


Shaft couplings

Short description	Model name	Part no.
Bellows coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad, material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
Bellows coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983
Bellows coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984
Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985
Spring washer coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

→ For additional accessories, please see page H-399

Reliable, established and modular



Product description

The ATM60 PROFIBUS absolute multiturn encoder from SICK provides reliable positional and speed information even in harsh environmental conditions. With a resolution of up to 26 bits, this product family is based on the principle of magnetic measurement. The 13-bit singleturn range is scanned by a sensor using permanent magnetic elements. The 13-bit multiturn range consists of a magnetic reduction gear. Equipped with

a zero set pushbutton, the encoder can be easily set to zero or to any other user-programmed value on site. The connection adapter, which can be removed from the device enables simple user maintenance and mounting. With its magnetic scanning, rugged IP 67-rated housing and high level of resistance to shock and vibration, the ATM6 PROFIBUS is optimally suited for use in harsh conditions

At a glance

- 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
- Electrical interface: PROFIBUS DP as per IEC61158 / RS 485 , electrically isolated
- Electronically adjustable, configurable resolution
- Magnetic scanning

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to various connectivity options (3 x PG, 3 x M12)
- Less maintenance and a long service life reduce overall costs
- Application flexibility due to easily interchangeable collets for the blind hollow shaft
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service



Additional information

Detailed technical data.....E-219
 Ordering information.....E-221
 Dimensional drawingsE-221
 Mandatory accessories.....E-223
 PIN and wire allocation.....E-224
 Recommended accessories.....E-224

→ www.mysick.com/en/ATM60_PROFIBUS

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.



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Detailed technical data

Performance

Max. number of steps per revolution	≤ 8,192
Max. number of revolutions	≤ 8,192
Error limits	± 0.25°
Repeat accuracy	0.1°

Mechanical data

Shaft diameter	
Face mount flange	10 x 19 mm
Servo flange	6 x 10 mm
Blind hollow shaft ¹⁾	6, 8, 10, 12, 14, 15 mm and 1/4", 3/8", 1/2"
Shaft material	Stainless steel
Flange material	Aluminium
Housing material	Aluminium
Mass ²⁾	
Face mount flange, servo flange	0.59 kg
Blind hollow shaft	0.59 kg
Start up torque at 20 °C	
Face mount flange, servo flange	2.5 Ncm with shaft seal
Face mount flange, servo flange	0.5 Ncm without shaft seal
Blind hollow shaft	1.2 Ncm with shaft seal
Operating torque at 20 °C	
Face mount flange, servo flange	1.8 Ncm with shaft seal
Face mount flange, servo flange	0.3 Ncm without shaft seal
Blind hollow shaft	0.8 Ncm with shaft seal
Max. shaft loading	
Face mount flange, servo flange	300 N radial 50 N axial
Permissible shaft movement of the drive element static/dynamic	
Blind hollow shaft	± 0.3/ ± 0.1 mm radial ± 0.5/ ± 0.2 mm axial
Max. angular acceleration	≤ 500,000 rad/s ²
Operating speed ³⁾	
Face mount flange, servo flange	6000 min ⁻¹
Blind hollow shaft	3000 min ⁻¹
Moment of inertia of the rotor	
Face mount flange, servo flange	35 gcm ²
Blind hollow shaft	55 gcm ²
Bearing lifetime	3.6 x 10 ⁹ revolutions

¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item. For 15 mm shaft diameter collet is not needed.

²⁾ For an encoder with connector outlet.

³⁾ Self warming of 3.3 K per 1000 revolutions/min⁻¹ when applying note working temperature range.

Electrical data

Electrical interface	RS 485 (according to 50170-2 (DIN 19245 part 1–3) DC isolated via opto-couplers)
Bus	PROFIBUS DP (via bus adapter with cable screw system or round screw system) ¹⁾
SET (electronic adjustment)	Via PRESET switch or protocol
Protocol	Profile for Encoders (07hex) – Class2
Address setting (node number)	0 ... 127 (DIP switches or protocol)
Data transmission rate (baud rate)	9.6 kBaud ... 12 Mbaud (automatic detection)
Status information	Operation (green LED), bus activity (red LED)
Bus termination	Via DIP switches (should only be connected in the final device) or external resistance
Initialization time ²⁾	1250 ms
Supply voltage	10 ... 32 V
Power consumption max.	≤ 2 W
Reverse polarity protection	Yes
MTTFd: mean time to dangerous failure ³⁾	150 years (EN ISO 13849-1)

¹⁾ Please order the PROFIBUS adapter separately, see mandatory accessories.

²⁾ From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

³⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

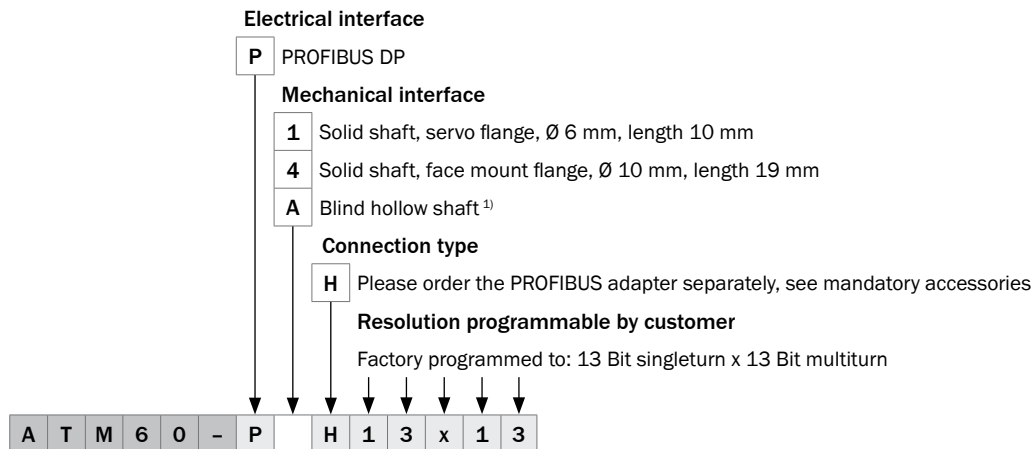
EMC	According to EN 61000-6-2 and EN61000-6-3
Enclosure rating acc. IEC 60529 ¹⁾	
With shaft seal	IP 67
Without shaft seal	IP 43 on encoder flange not sealed
Without shaft seal	IP 66 on encoder flange sealed
Permissible relative humidity	98 %
Working temperature range	–20 ... +80 °C
Storage temperature range (without packaging)	–40 ... +125 °C
Resistance	
To shocks as per EN 60068-2-27	100 g/6 ms
To vibration as per EN 60068-2-6	20 g/10 ... 2,000 Hz

¹⁾ With mating connector fitted.



Ordering information

Type code ATM60 PROFIBUS



¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item (see recommended accessories). For 15 mm shaft diameter collet is not needed.

Ordering information

- **Electrical interface:** 10 V ... 32 V, PROFIBUS
- **Connection type:** Bus adapter with cable screw fixings or connector
- **Max. Resolution:** 8,192 x 8,192

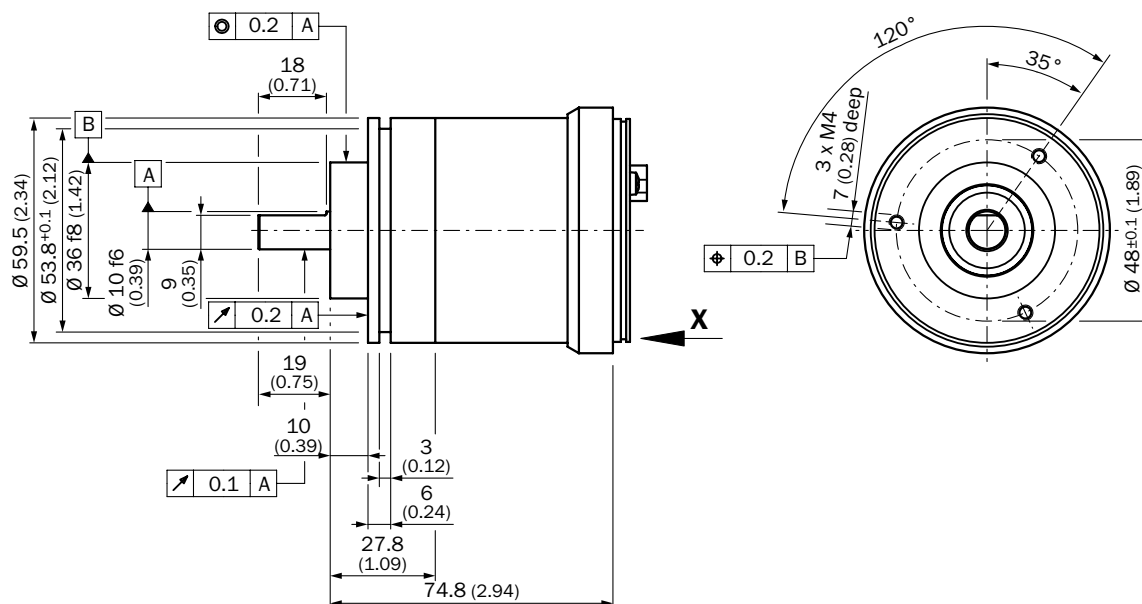
Mechanical interface	Shaft diameter	Type	Part no.
Solid shaft, face mount flange	Ø 10 mm, length 19 mm	ATM60-P4H13X13	1030013
Solid shaft, servo flange	Ø 6 mm, length 10 mm	ATM60-P1H13X13	1030014
Blind hollow shaft	6 mm, 8 mm, 10 mm, 12 mm, 14 mm, 15 mm 1/4", 3/8", 1/2" ¹⁾	ATM60-PAH13X13	1030015

¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item. For 15 mm shaft diameter collet is not needed.

Dimensional drawings

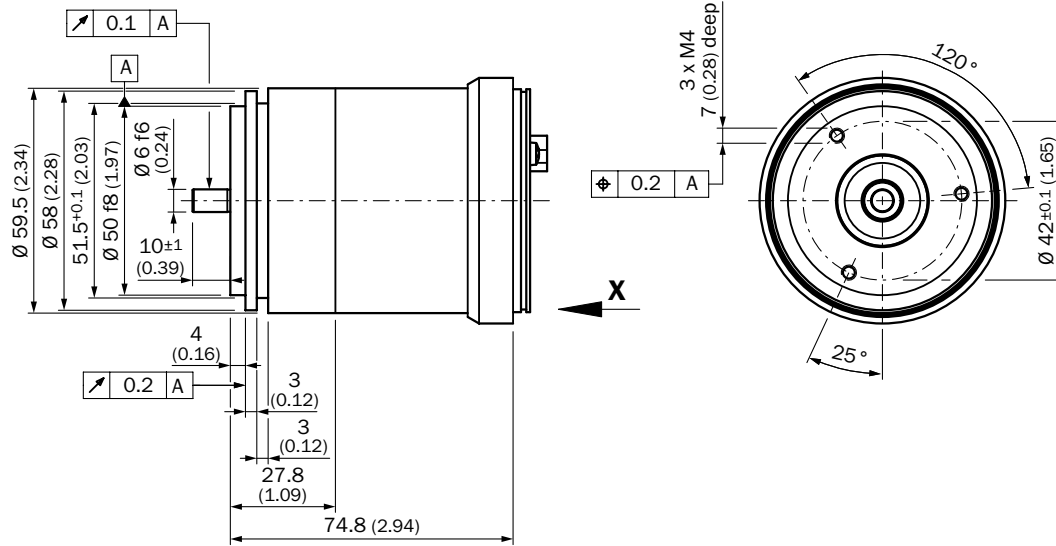
dimensions in mm (inch)

Face mount flange



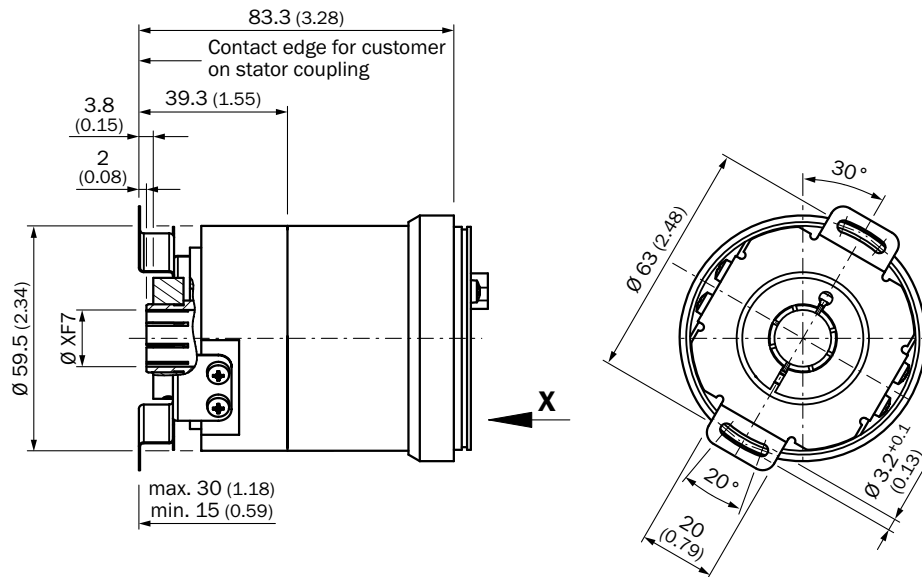
General tolerances as per DIN ISO 2768-mk

Servo flange



General tolerances as per DIN ISO 2768-mk

Blind hollow shaft



General tolerances as per DIN ISO 2768-mk

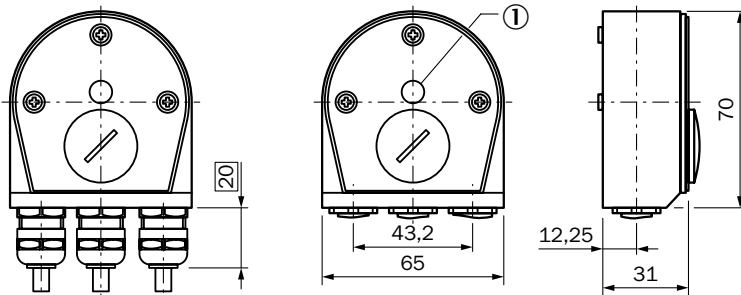
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Mandatory accessories

Adapter

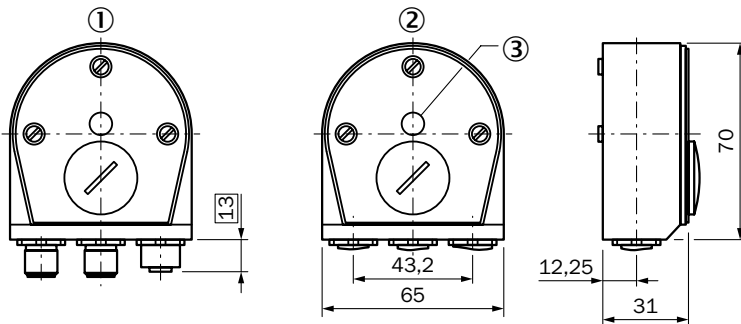
Short description	Model name	Part no.
PROFIBUS connection adapter KA3, 3 x PG	AD-ATM60-KA3PR	2029225
PROFIBUS connection adapter SR3, 1 x M12, 4-pin, 2 x M12, 5-pin	AD-ATM60-SR3PR	2031985

AD-ATM60-KA3PR



General tolerances as per DIN ISO 2768-mk

AD-ATM60-SR3PR



General tolerances as per DIN ISO 2768-mk

Shaft adaptation

Short description	Model name	Part no.
Collet D6 mm for blind hollow shaft	SPZ-006-AD-A	2029174
Collet D8 mm for blind hollow shaft	SPZ-008-AD-A	2029176
Collet D10 mm for blind hollow shaft	SPZ-010-AD-A	2029178
Collet D12 mm for blind hollow shaft	SPZ-012-AD-A	2029179
Collet D14 mm for blind hollow shaft	SPZ-014-AD-A	2048863
Collet D1/2" for blind hollow shaft	SPZ-1E2-AD-A	2029180
Collet D1/4" for blind hollow shaft	SPZ-1E4-AD-A	2029175
Collet D3/8" for blind hollow shaft	SPZ-3E8-AD-A	2029177

PIN and wire allocation for bus adapter ¹⁾

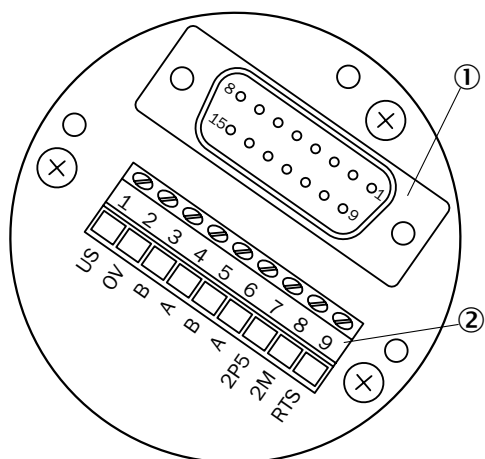
Terminal strip	Connect. 4-pin (male)	Connect. 5-pin (male)	Connect. 5-pin (female)	Signal	Description
1	1	-	-	U _s (24 V)	Supply voltage 10 ... 32 V
2	3	-	-	0 V (GND)	Ground (0 V)
3	-	-	4	B	B line PROFIBUS DP (out)
4	-	-	2	A	A line PROFIBUS DP (out)
5	-	4	-	B	B line PROFIBUS DP (in)
6	-	2	-	A	A line PROFIBUS DP (in)
7	-	-	1	2P5 ²⁾	+ 5 V (potential free)
8	-	-	3	2M ²⁾	0 V (potential free)
9	-	-	-	RTS ³⁾	Request To Send
-	2	1	-	N. C.	-
-	4	3	-	N. C.	-
-	-	5	5	Screen	Housing potential

¹⁾ Encoders with a PROFIBUS adapter have a terminal strip for connecting the bus and supply lines. In order to connect the lines, the PROFIBUS adapter is unscrewed from the complete device. The figure shows the pin allocation within the bus connection.

²⁾ Use for external bus termination or to supply the transmitter/receiver of an optical transmission link.

³⁾ Signal is optional, used to detect the direction of an optical connection.

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① = Internal plug connection to the encoder

② = External connection to the bus

Recommended accessories

Mounting brackets/plates

Short description	Model name	Part no.
Mounting bracket for encoder with 36 mm centering collar	BEF-WF-36	2029164

Flanges

Short description	Model name	Part no.
Flange adapter, adapts face mount flange with 36 mm centering collar to 50 mm servo flange	BEF-FA-036-050	2029160
Flange adapter, adapts face mount flange with 36 mm centering collar to 60 mm square mounting plate	BEF-FA-036-060REC	2029162
Flange adapter, adapts face mount flange with 36 mm centering collar to 58 mm square mounting plate with shock absorber	BEF-FA-036-060RSA	2029163
Flange adapter, adapts face mount flange with 36 mm centering collar to 100 mm servo flange with 60 mm centering collar	BEF-FA-036-100	2029161

Other mounting accessories

Short description	Model name	Part no.
Mounting bell for servo flange encoder with 50 mm centering collar incl. mounting kit	BEF-MG-50	5312987
Servo clamp half-shells (set of 2) for 50 mm centering collar	BEF-WG-SF050	2029165
Servo clamps (set of 3), large	BEF-WK-SF	2029166

Plug connectors and cables

Short description	Cable length	Model name	Part no.
Cable socket, M12, 4-pin, straight, pre-wired with PROFIBUS cable for voltage supply, 4-core, 4 x 0.25 mm ² , suitable for drag chain, diam. 5.0 mm	5.0 m	DOL-1204-G05M	6009866
Cable socket, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	5 m	DOL-1205-G05MQ	6026006
	10 m	DOL-1205-G10MQ	6026008
Cable socket for voltage supply, M12, 4-pin, straight, suitable for cable diameter 3 - 6.5 mm	-	DOS-1204-G	6007302
Cable socket, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	DOS-1205-GQ	6021353
PROFIBUS cable by the meter 2 x 0.25 mm ² with shielding, suitable for drag chain, diam. 8.0 mm	-	LTG-2102-MW	6021355
Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	PR-STE-1205-G	6021354
Cable connector, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	5.0 m	STL-1205-G05MQ	6026005
	10.0 m	STL-1205-G10MQ	6026007

Shaft adaptation

Short description	Model name	Part no.
Bellows coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad, material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985
Bellows coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983
Spring washer coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986
Bellows coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984

→ For additional accessories, please see page H-399

E

Reliable, established and modular



Product description

The ATM60 absolute multiturn encoder with SSI data interface by SICK provides reliable positional and speed information, even in harsh environmental conditions with a resolution of up to 25 bits. This product family, which is proven in its field, is based on the principle of magnetic measurement. The 13-bit single turn range is scanned by a sensor using permanent magnetic elements. The 13-bit multiturn range consists of a

magnetic reduction gear. Equipped with a zero-set pushbutton, the encoder can be simply set to zero or to any other user-programmed value on site. Configuration of the SSI encoder is easy using the RS422 interface. With its magnetic scanning, robust housing in accordance with the IP 67 enclosure rating and high level of resistance to shocks and vibrations, the ATM60 is optimally suited for use in adverse conditions.

At a glance

- Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 25 bits
- Mechanical interface: face mount flange, servo flange and blind hollow shaft
- Zero-set and preset functions via hardware or software
- Electrical interface: SSI with gray or binary code type
- Electronically adjustable, configurable resolution
- Endless operating functionality (optional)
- Magnetic scanning

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to various connectivity options (cable, connector)
- Less maintenance and a long service life reduce overall costs
- Application flexibility due to easily interchangeable collets for the blind hollow shaft
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service



Additional information

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→ www.mysick.com/en/ATM60_SSI

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.



E

Detailed technical data

Performance

Max. number of steps per revolution	≤ 8,192
Max. number of revolutions	≤ 8,192
Error limits	± 0.25°
Repeatability	0.1°

Mechanical data

Shaft diameter	Face mount flange	10 x 19 mm
	Servo flange	6 x 10 mm
	Blind hollow shaft ¹⁾	6, 8, 10, 12, 14, 15 mm and 1/4", 3/8", 1/2"
Shaft material	Stainless steel	
Flange material	Aluminium	
Housing material	Aluminium	
Mass ²⁾	Face mount flange, servo flange	0.5 kg
	Blind hollow shaft	0.4 kg
Start up torque at 20 °C	Face mount flange, servo flange	2.5 Ncm with shaft seal
	Face mount flange, servo flange	0.5 Ncm without shaft seal
	Blind hollow shaft	1.2 Ncm with shaft seal
Operating torque bei 20 °C	Face mount flange, servo flange	1.8 Ncm with shaft seal
	Face mount flange, servo flange	0.3 Ncm without shaft seal
	Blind hollow shaft	0.8 Ncm with shaft seal
Max. shaft loading	Face mount flange, servo flange	300 N radial 50 N axial
	Blind hollow shaft	± 0.3/± 0.1 mm radial ± 0.5/± 0.2 mm axial
Max. angular acceleration	≤ 500,000 rad/s ²	
Operating speed ³⁾	Face mount flange, servo flange	6000 min ⁻¹
	Blind hollow shaft	3000 min ⁻¹
Moment of inertia of the rotor	Face mount flange, servo flange	35 gcm ²
	Blind hollow shaft	55 gcm ²
Bearing lifetime	3.6 x 10 ⁹ revolutions	

¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item. For 15 mm shaft diameter collet is not needed.

²⁾ For an encoder with connector outlet.

³⁾ Self warming of 3.3 K per 1000 revolutions/min⁻¹ when applying note working temperature range.

Electrical data

Electrical interface	SSI
Signal line	Carried by 12-pin connector, potential-free with respect to housing, or 12 core cable
Interface signals	
Clock+, Clock-, Data+, Data- SSI resp. LOW-level (Clock+): 500 ns	Clock frequency 1 Mhz ¹⁾
TxD+, txD-, RxD+, RxD-	RS422
SET (electronic adjustment)	H-active (L e 0 – 4,7 V; H e 10 – U _S V)
CW/CCW (steps sequence in direction of rotation)	L-active (L e 0 – 1,5 V; H e 2,0 – U _S V)
Initialization time ²⁾	1050 ms
Supply voltage	10 ... 32 V
Power consumption max.	0.8 W
Reverse polarity protection	Yes
MTTFd: mean time to dangerous failure ³⁾	150 years (EN ISO 13849-1)

¹⁾ For higher clock frequencies, choose synchronous SSI.

²⁾ From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

³⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

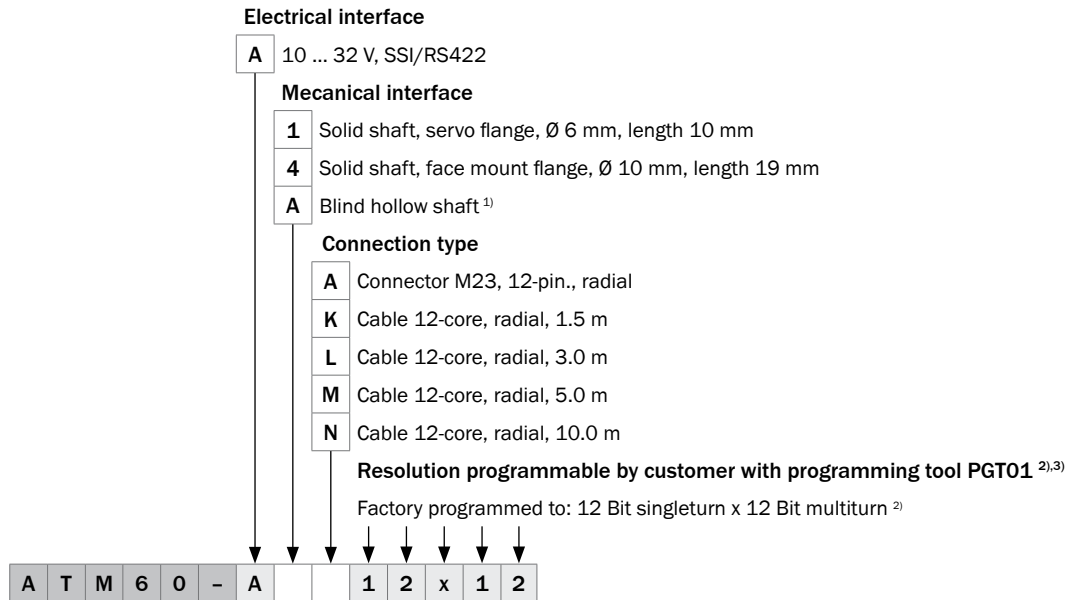
EMC	According to 61000-6-2 and EN 61000-6-3
Enclosure rating acc. IEC 60529 ¹⁾	
With shaft seal	IP 67
Without shaft seal	IP 43 on encoder flange not sealed
Without shaft seal	IP 65 on encoder flange sealed
Permissible relative humidity	98 %
Working temperature range	-20 ... +85 °C
Storage temperature range (without packaging)	-40 ... +100 °C
Resistance	
To shocks as per EN 60068-2-27	100 g/6 ms
To vibration as per EN 60068-2-6	20 g/10 ... 2.000 Hz

¹⁾ With mating connector fitted.



Ordering information

Type code ATM60 SSI



¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item. For 15 mm shaft diameter collet is not needed.

²⁾ Configuration ex works: 4,096 steps x 4,096 revolutions, Gray code, SET=0. Other configuration on request.

³⁾ Max. permissible resolution 25 bit (12 bit singleturn x 13 bit multiturn or 13 bit singleturn x 12 bit multiturn).

Ordering information

- **Electrical interface:** 10 V ... 32 V, SSI
- **Resolution:** 4,096 x 4,096

Mechanical interface	Shaft diameter	Connection type	Type	Part no.
Solid shaft, face mount flange	Ø 10 mm, length 19 mm	Connector M23, 12-pin, radial	ATM60-A4A12X12	1030001
		Cable, 12-pin, radial, 1.5 m	ATM60-A4K12X12	1030002
		Cable, 12-pin, radial, 3 m	ATM60-A4L12X12	1030003
		Cable, 12-pin, radial, 5 m	ATM60-A4M12X12	1030004
		Cable, 12-pin, radial, 10 m	ATM60-A4N12X12	1032915
Solid shaft, servo flange	Ø 6 mm, length 10 mm	Connector M23, 12-pin, radial	ATM60-A1A12X12	1030005
		Cable, 12-pin, radial, 1.5 m	ATM60-A1K12X12	1030006
		Cable, 12-pin, radial, 3 m	ATM60-A1L12X12	1030007
		Cable, 12-pin, radial, 5 m	ATM60-A1M12X12	1030008
		Cable, 12-pin, radial, 10 m	ATM60-A1N12X12	1032925
Blind hollow shaft	6 mm, 8 mm, 10 mm, 12 mm, 14 mm, 15 mm 1/4", 3/8", 1/2" ¹⁾	Connector M23, 12-pin, radial	ATM60-AAA12X12	1030009
		Cable, 12-pin, radial, 1.5 m	ATM60-AAK12X12	1030010
		Cable, 12-pin, radial, 3 m	ATM60-AAL12X12	1030011
		Cable, 12-pin, radial, 5 m	ATM60-AAM12X12	1030012
		Cable, 12-pin, radial, 10 m	ATM60-AAN12X12	1033169

¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item. For 15 mm shaft diameter collet is not needed.

Mandatory accessories

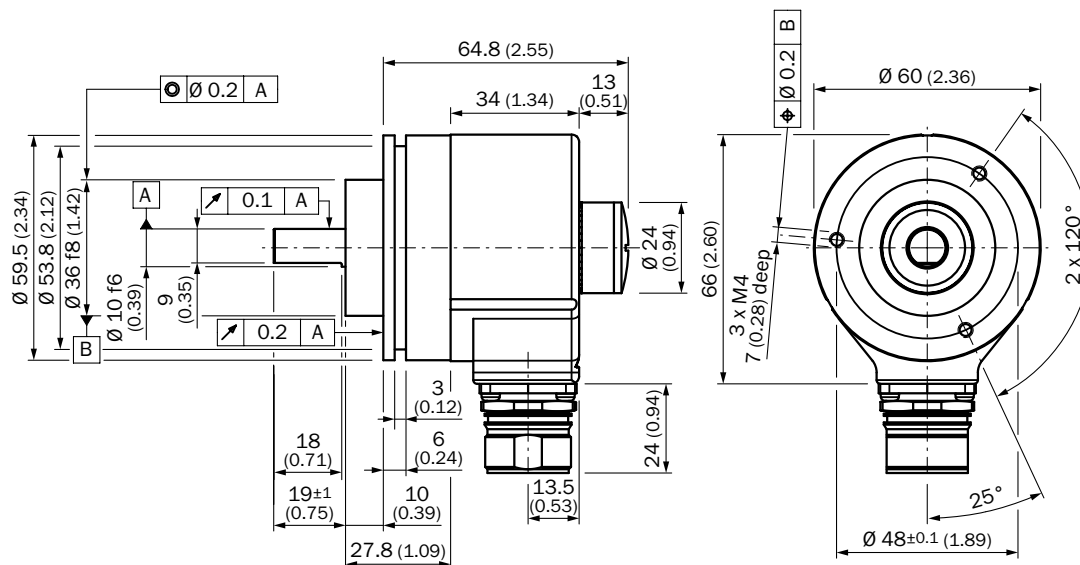
Shaft adaptation

Short description	Model name	Part no.
Collet D6 mm for blind hollow shaft	SPZ-006-AD-A	2029174
Collet D8 mm for blind hollow shaft	SPZ-008-AD-A	2029176
Collet D10 mm for blind hollow shaft	SPZ-010-AD-A	2029178
Collet D12 mm for blind hollow shaft	SPZ-012-AD-A	2029179
Collet D14 mm for blind hollow shaft	SPZ-014-AD-A	2048863
Collet D1/2" for blind hollow shaft	SPZ-1E2-AD-A	2029180
Collet D1/4" for blind hollow shaft	SPZ-1E4-AD-A	2029175
Collet D3/8" for blind hollow shaft	SPZ-3E8-AD-A	2029177

Dimensional drawings

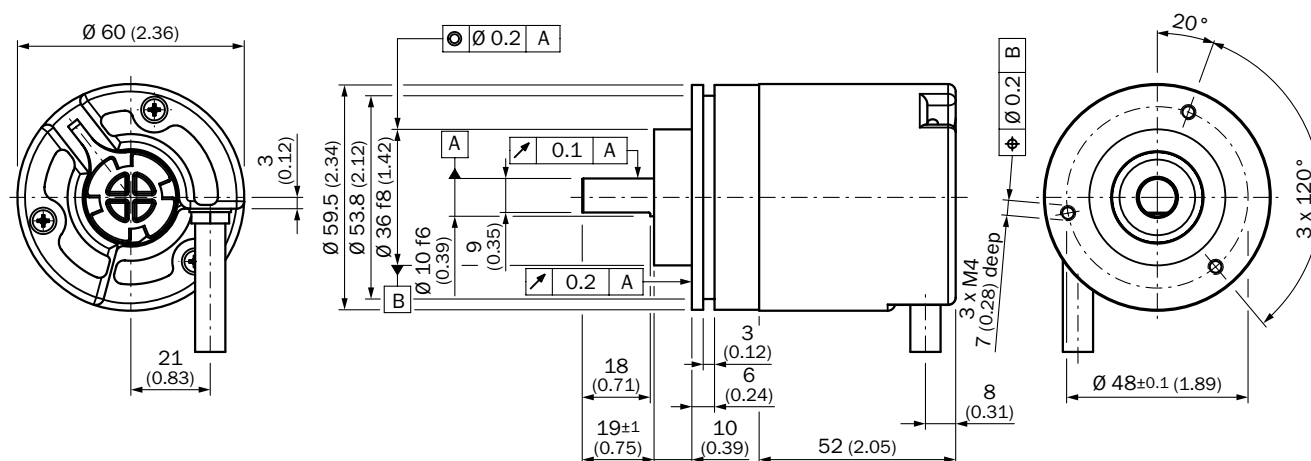
dimensions in mm (inch)

Face mount flange, connector



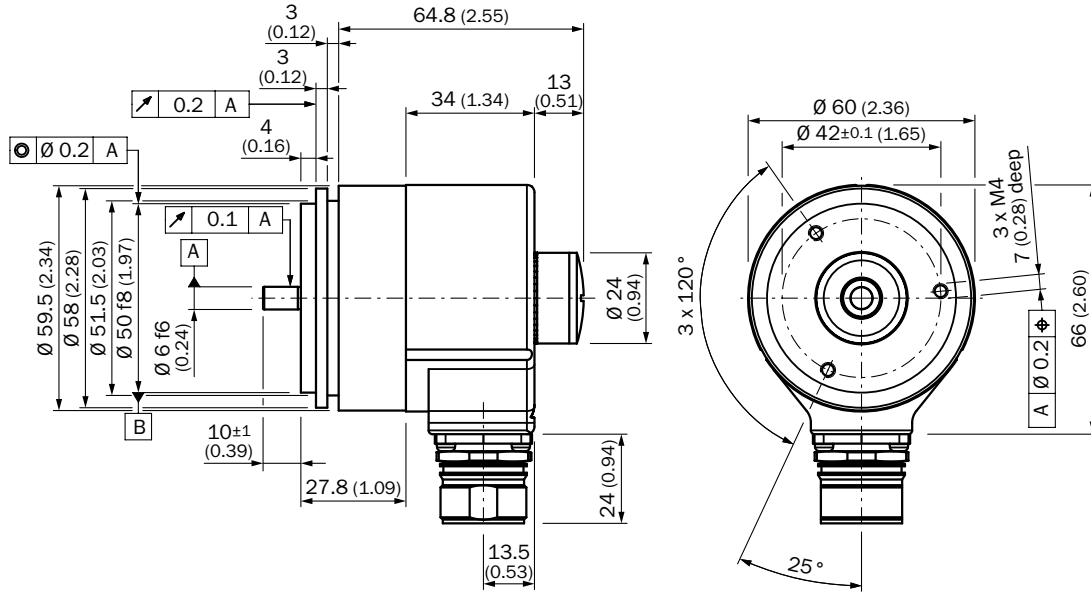
General tolerances as per DIN ISO 2768-mk

Face mount flange, cable



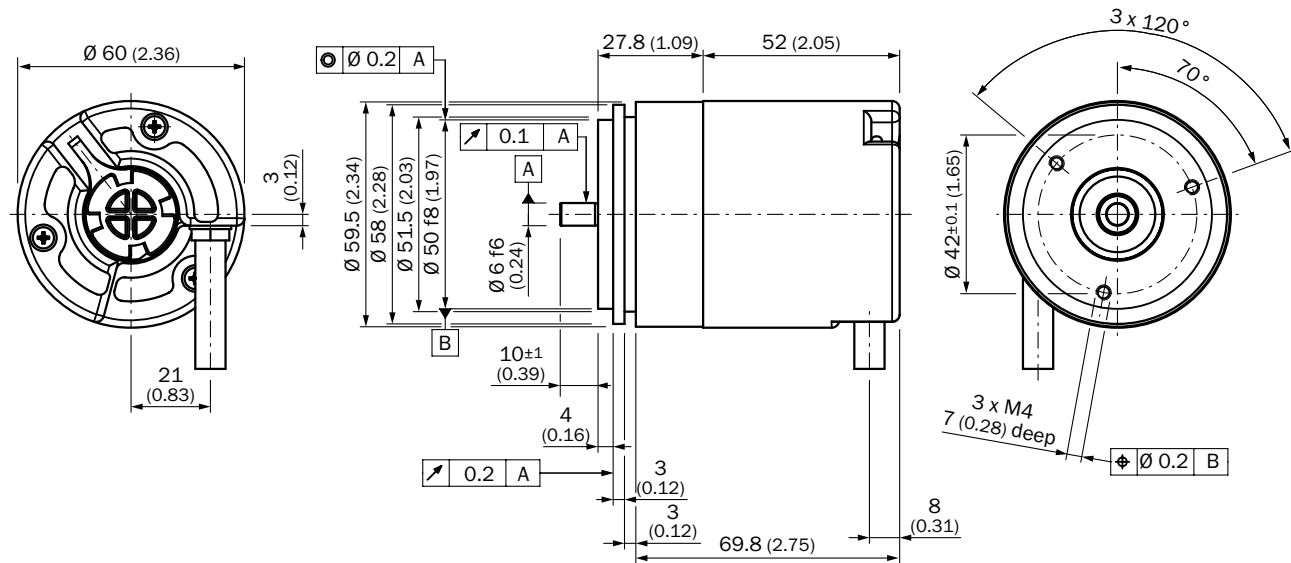
General tolerances as per DIN ISO 2768-mk

Servo flange, connector



General tolerances as per DIN ISO 2768-mk

Servo flange, cable



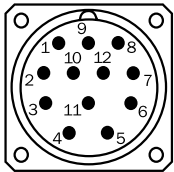
General tolerances as per DIN ISO 2768-mk

PIN and wire allocation

PIN	Signal	Color of wires (cable outlet)	Description
1	GND	Blue	Earth connection
2	Data +	White	Signal line
3	Clock +	Yellow	Signal line
4	R x D +	Gray	RS 422 programming line
5	R x D -	Green	RS 422 programming line
6	T x D +	Pink	RS 422 programming line
7	T x D -	Black	RS 422 programming line
8	U_s	Red	Supply voltage
9	SET ¹⁾	Orange	Electrical adjustment
10	Data -	Brown	Signal line
11	Clock -	Lilac	Signal line
12	CW/CCW ²⁾	Orange/black	Counting sequence when turning
-	Screen	-	Housing potential

¹⁾ SET = This input activates the electronic zero set. When the SET line is connected to U_s for more than 100 ms, the current mechanical position is assigned the value 0 or the pre-programmed SET-value.

²⁾ CW/CCW = Forward/reverse: This input programs the counting direction of the encoder. If not connected, this input is "HIGH". If the encoder shaft, as viewed on the drive shaft, rotates in the clockwise direction, it counts in an increasing sequence. If it should count upwards when the shaft rotates in the anti-clockwise direction, this connection must be connected permanently to "LOW" level (zero volts).



View of the connector M23 fitted to the encoder body



Recommended accessories

Mounting brackets/plates

Short description	Model name	Part no.
Mounting bracket for encoder with 36 mm centering collar	BEF-WF-36	2029164

Flanges

Short description	Model name	Part no.
Flange adapter, adapts face mount flange with 36 mm centering collar to 50 mm servo flange	BEF-FA-036-050	2029160
Flange adapter, adapts face mount flange with 36 mm centering collar to 60 mm square mounting plate	BEF-FA-036-060REC	2029162
Flange adapter, adapts face mount flange with 36 mm centering collar to 58 mm square mounting plate with shock absorber	BEF-FA-036-060RSA	2029163
Flange adapter, adapts face mount flange with 36 mm centering collar to 100 mm servo flange with 60 mm centering collar	BEF-FA-036-100	2029161

Programming and configuration tools

Short description	Model name	Part no.
Programming tool for ATM60, ATM90 and KH53 SSI	PGT-01-S	1030111

Other mounting accessories

Short description	Model name	Part no.
Mounting bell for servo flange encoder with 50 mm centering collar incl. mounting kit	BEF-MG-50	5312987
Servo clamp half-shells (set of 2) for 50 mm centering collar	BEF-WG-SF050	2029165
Servo clamps (set of 3), large	BEF-WK-SF	2029166

Plug connectors and cables

Short description	Cable length	Model name	Part no.
Cable socket, M23, 12-pin, straight, pre-wired with 12-core SSI cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , shielded, suitable for drag chain, cable diameter 7.8 mm	1.5 m	DOL-2312-G1M5MA1	2029200
	3.0 m	DOL-2312-G03MMA1	2029201
	5.0 m	DOL-2312-G05MMA1	2029202
	10.0 m	DOL-2312-G10MMA1	2029203
	20.0 m	DOL-2312-G20MMA1	2029204
	30.0 m	DOL-2312-G30MMA1	2029205
Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	DOS-2312-G	6027538
Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	STE-2312-G	6027537

E

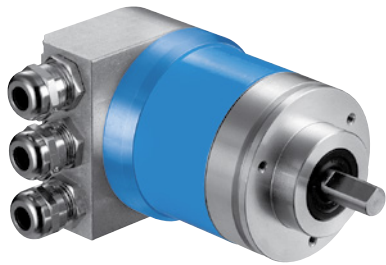
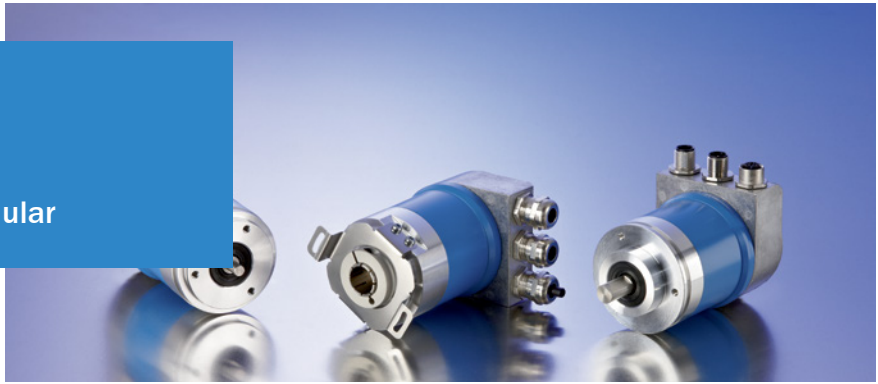
Shaft adaptation

Short description	Model name	Part no.
Bellows coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad, material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985
Bellows coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983
Spring washer coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986
Bellows coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984

→ For additional accessories, please see page H-399



Reliable, established and modular



Product description

The ATM60 CANopen absolute multiturn encoder from SICK provides reliable positional and speed information even in harsh environmental conditions. With a resolution of up to 26 bits, this product family is based on the principle of magnetic measurement. The 13-bit singleturn range is scanned by a sensor using permanent magnetic elements. The 13-bit multiturn range consists of a magnetic reduction gear. Equipped with

a zero set pushbutton, the encoder can be easily set to zero or to any other user-programmed value on site. The connection adapter, which can be removed from the device, enables simple user maintenance and mounting. With its magnetic scanning, rugged IP 67-rated housing and high level of resistance to shocks and vibrations, the ATM60 CANopen is optimally suited for use in harsh conditions

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, adapter accessories
- Zero-set and preset functions via hardware/software
- 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

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to electrical connection adapters (1 to 3 x PG, 2 x connector M12)
- Less maintenance and a long service life reduce overall costs
- Application flexibility due to easily interchangeable collets for the blind hollow shaft
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service

CANopen®



Additional information

Detailed technical data.....E-237
 Ordering information.....E-239
 Dimensional drawings.....E-239
 Mandatory accessories.....E-241
 PIN and wire allocation.....E-242
 Recommended accessories.....E-243

→ www.mysick.com/en/ATM60_CANopen

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.



E

Detailed technical data

Performance

Max. number of steps per revolution	≤ 8,192
Max. number of revolutions	≤ 8,192
Error limits	± 0.25°
Repeatability	0.1°
Measuring step	0.043°

Mechanical data

Shaft diameter	Face mount flange	10 x 19 mm
	Servo flange	6 x 10 mm
	Blind hollow shaft ¹⁾	6, 8, 10, 12, 14, 15 mm and 1/4", 3/8", 1/2"
Shaft material	Stainless steel	
Flange material	Aluminium	
Housing material	Aluminium	
Mass ²⁾	Face mount flange, servo flange	0.59 kg
	Blind hollow shaft	0.59 kg
Start up torque at 20 °C	Face mount flange, servo flange	2.5 Ncm with shaft seal
	Face mount flange, servo flange	0.5 Ncm without shaft seal
	Blind hollow shaft	1.2 Ncm with shaft seal
Operating torque at 20 °C	Face mount flange, servo flange	1.8 Ncm with shaft seal
	Face mount flange, servo flange	0.3 Ncm without shaft seal
	Blind hollow shaft	0.8 Ncm with shaft seal
Max. shaft loading	Face mount flange, servo flange	
	300 N radial	50 N axial
Permissible shaft movement of the drive element static/dynamic	Blind hollow shaft	
	± 0.3/± 0.1 mm radial	± 0.5/± 0.2 mm axial
Max. angular acceleration	≤ 500,000 rad/s ²	
Operating speed ³⁾	Face mount flange, servo flange	
	6000 min ⁻¹	3000 min ⁻¹
Moment of inertia of the rotor	Face mount flange, servo flange	
	35 gcm ²	55 gcm ²
Bearing lifetime	3.6 x 10 ⁹ revolutions	

¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item. For 15 mm shaft diameter collet is not needed.

²⁾ For an encoder with connector outlet.

³⁾ Self warming of 3.3 K per 1000 revolutions/min⁻¹ when applying note working temperature range.

Electrical data

Electrical interface	ISO-DIS 11898 (CANHigh Speed) and CAN specification 2.0 B, DC isolated
Bus	CANopen (via bus adapter with cable screw system or round screw system) ^{1,)}
SET (electronic adjustment)	Via PRESET switch or protocol
Protocol	Communication Profile DS 301 V4.0, Device Profile DSP 406 V2.0
Address setting (node number)	0 ... 63 (DIP switches or protocol)
Data transmission rate (baud rate)	(10, 20, 50, 125, 250, 500) kb, 1 MB (DIP switches or protocol)
Status information	2-color LED for CAN Controller status
Bus termination	Via DIP switches (should only be connected in the final device)
Initialization time ²⁾	1250 ms
Supply voltage	10 ... 32 V
Power consumption max.	2.0 W
Reverse polarity protection	Yes
MTTFd: mean time to dangerous failure ³⁾	150 years (EN ISO 13849-1)

¹⁾ Please order the CANopen adapter separately, see mandatory accessories.

²⁾ From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

³⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

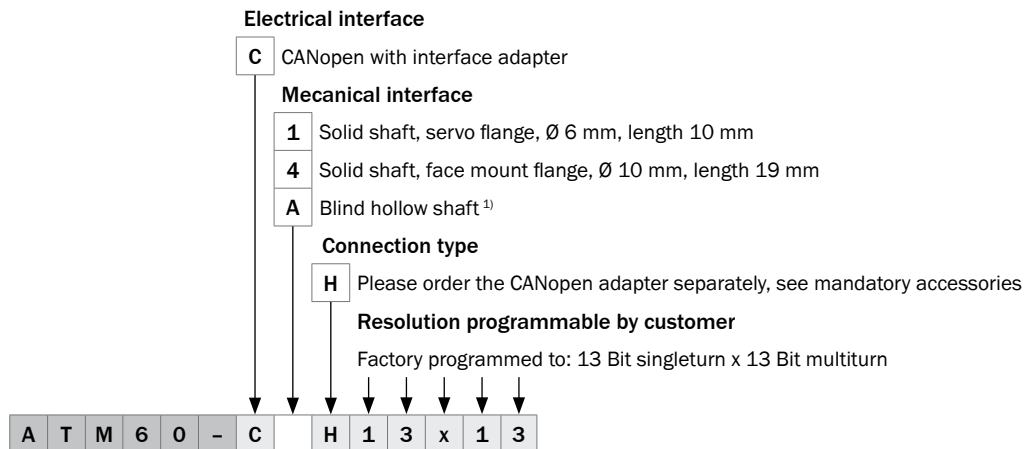
Ambient data

EMC	According to 61000-6-2 and EN 61000-6-3
Enclosure rating acc. IEC 60529 ¹⁾	
With shaft seal	IP 67
Without shaft seal	IP 43 on encoder flange not sealed
Without shaft seal	IP 66 on encoder flange sealed
Permissible relative humidity	98 %
Working temperature range	-20 ... +80 °C
Storage temperature range (without packaging)	-40 ... +125 °C
Resistance	
To shocks as per EN 60068-2-27	100 g/6 ms
To vibration as per EN 60068-2-6	20 g/10 ... 2,000 Hz

¹⁾ With mating connector fitted.

Ordering information

Type code ATM60 CANopen



¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item. For 15 mm shaft diameter collet is not needed.

Ordering information

- **Electrical interface:** 10 V ... 32 V, CANopen
- **Connection type:** Bus adapter with cable screw fixings or connector
- **Max. Resolution:** 8,192 x 8,192

Mechanical interface	Shaft diameter	Type	Part no.
Solid shaft, Face mount flange	Ø 10 mm, length 19 mm	ATM60-C4H13X13	1030024
Solid shaft, Servo flange	Ø 6 mm, length 10 mm	ATM60-C1H13X13	1030025
Blind hollow shaft	6 mm, 8 mm, 10 mm, 12 mm, 14 mm, 15 mm 1/4", 3/8", 1/2" ¹⁾	ATM60-CAH13X13	1030026

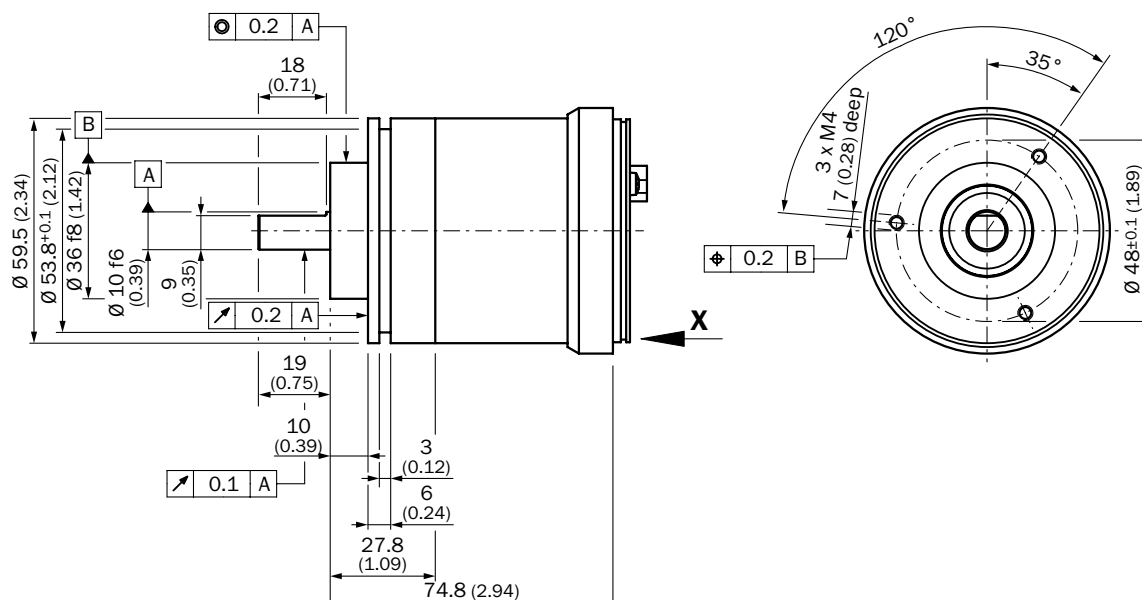
¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item. For 15 mm shaft diameter collet is not needed.



Dimensional drawings

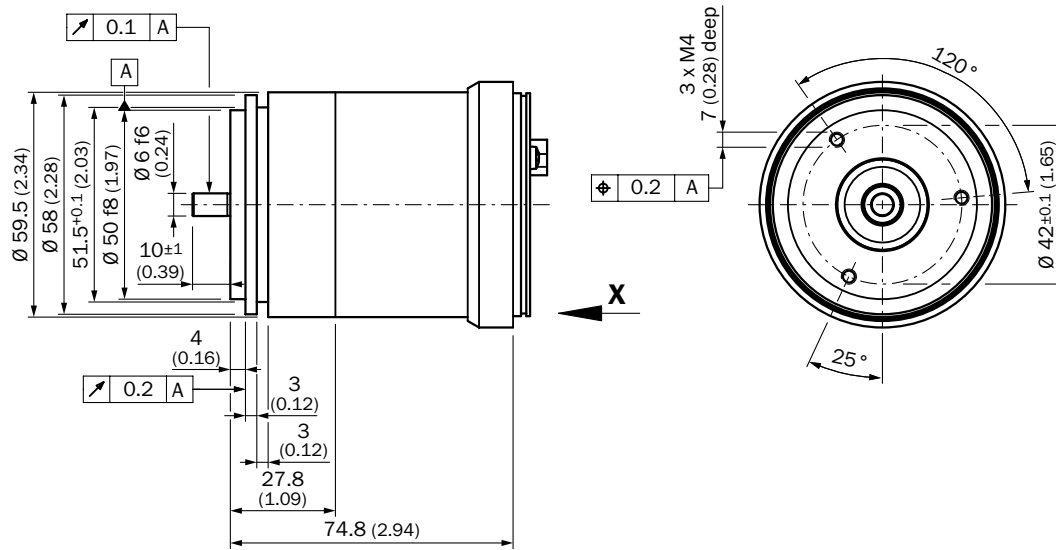
dimensions in mm (inch)

Face mount flange



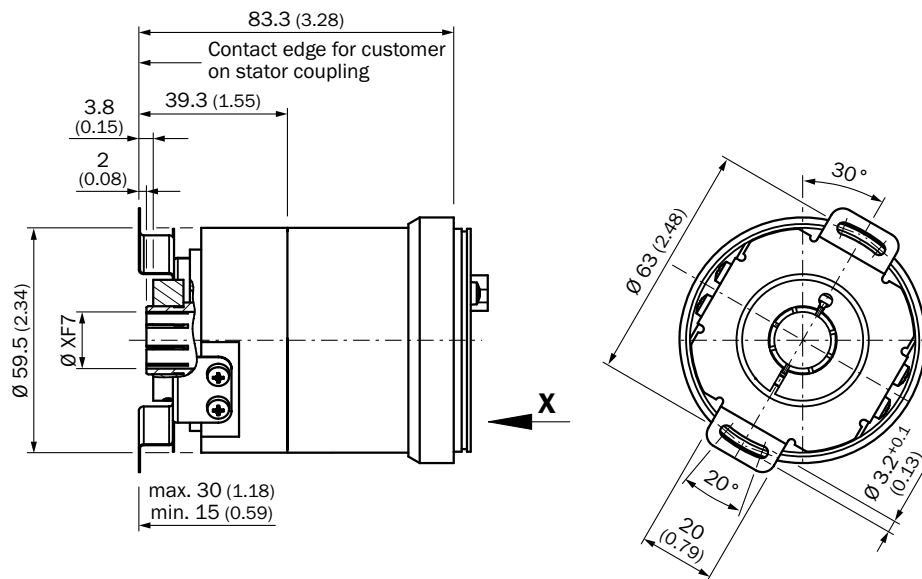
General tolerances as per DIN ISO 2768-mk

Servo flange



General tolerances as per DIN ISO 2768-mk

Blind hollow shaft



General tolerances as per DIN ISO 2768-mk

E

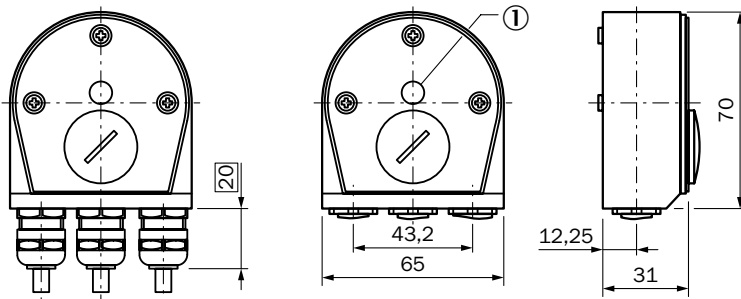
Mandatory accessories

Adapter

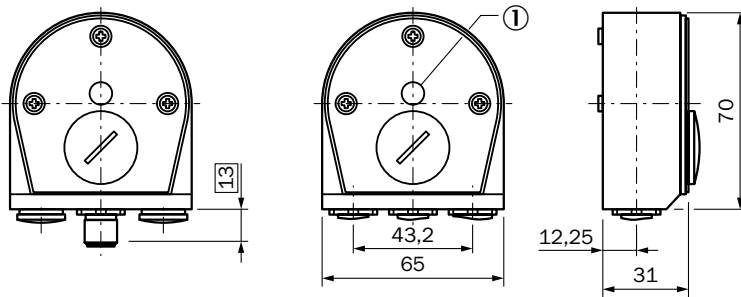
- Short description bus adapter CANopen

Short description	Model name	Part no.
CANopen connection adapter KR1, 1 x PG	AD-ATM60-KR1CO	2029230
CANopen connection adapter KR2, 2 x PG	AD-ATM60-KR2CO	2029231
CANopen connection adapter KR3, 3 x PG	AD-ATM60-KR3CO	2029232
CANopen connection adapter SR1, 1 x M12, 5-pin	AD-ATM60-SR1CO	2031686
CANopen connection adapter SR2, 2 x M12, 5-pin	AD-ATM60-SR2CO	2020935

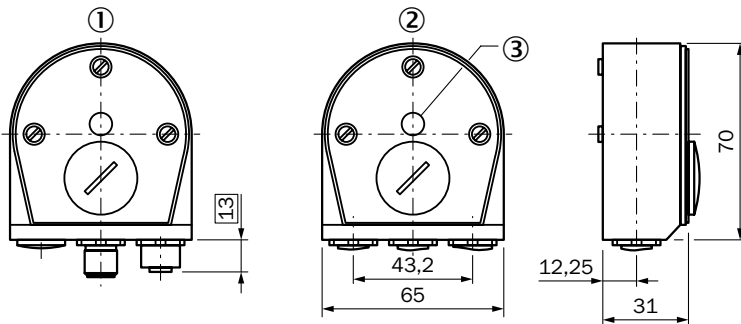
AD-ATM60-KRxCO



AD-ATM60-SR1CO



AD-ATM60-SR2CO



Shaft adaptation

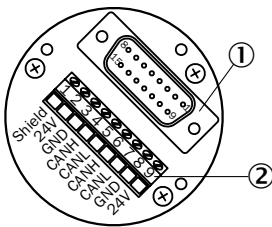
Short description	Model name	Part no.
Collet D6 mm for blind hollow shaft	SPZ-006-AD-A	2029174
Collet D8 mm for blind hollow shaft	SPZ-008-AD-A	2029176
Collet D10 mm for blind hollow shaft	SPZ-010-AD-A	2029178
Collet D12 mm for blind hollow shaft	SPZ-012-AD-A	2029179
Collet D14 mm for blind hollow shaft	SPZ-014-AD-A	2048863
Collet D1/2" for blind hollow shaft	SPZ-1E2-AD-A	2029180
Collet D1/4" for blind hollow shaft	SPZ-1E4-AD-A	2029175
Collet D3/8" for blind hollow shaft	SPZ-3E8-AD-A	2029177

PIN and wire allocation

Terminal strip	Connector	Signal	Description
1	1	Shield	Screen
2	2	U _s (24 V)	Supply voltage 10 ... 32 V
3	3	GND (COM)	0 V (Gnd)
4	4	CAN _H	CAN Bus Signal high
5	5	CAN _L	CAN Bus Signal low
6	-	CAN _H	CAN Bus Signal high
7	-	CAN _L	CAN Bus Signal low
8	-	GND (COM)	0 V (Gnd)
9	-	U _s (24 V)	Supply voltage 10 ... 32 V

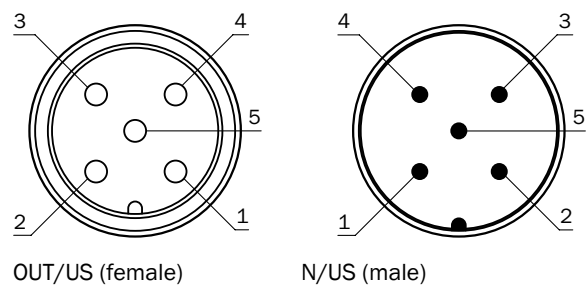
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Bus adapter



A = Internal plug connection to the encoder
 B = External connection to the bus

Connector M12 (bus adapter)



Recommended accessories

Mounting brackets/plates

Short description	Model name	Part no.
Mounting bracket for encoder with 36 mm centering collar	BEF-WF-36	2029164

Flanges

Short description	Model name	Part no.
Flange adapter, adapts face mount flange with 36 mm centering collar to 50 mm servo flange	BEF-FA-036-050	2029160
Flange adapter, adapts face mount flange with 36 mm centering collar to 60 mm square mounting plate	BEF-FA-036-060REC	2029162
Flange adapter, adapts face mount flange with 36 mm centering collar to 58 mm square mounting plate with shock absorber	BEF-FA-036-060RSA	2029163
Flange adapter, adapts face mount flange with 36 mm centering collar to 100 mm servo flange with 60 mm centering collar	BEF-FA-036-100	2029161

Other mounting accessories

Short description	Model name	Part no.
Mounting bell for servo flange encoder with 50 mm centering collar incl. mounting kit	BEF-MG-50	5312987
Servo clamp half-shells (set of 2) for 50 mm centering collar	BEF-WG-SF050	2029165
Servo clamps (set of 3), large	BEF-WK-SF	2029166

Plug connectors and cables

Short description	Cable length	Model name	Part no.
Cable socket for DeviceNet, M12, 5-pin, straight, shielded, suitable for cable diameter 6 - 8 mm	-	DOS-1205-GA	6027534
Cable M12, 5-pin, connector straight, socket straight, CAN/CANopen shielded	6.0 m	DSL-1205-G06MK	6028327
Cable per meter, DeviceNet/CANopen 2 x 0,34 mm ² + 2 x 0,25 mm ² , twisted pair	-	LTG-2804-MW	6028328
Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1205-GA	6027533

Shaft adaptation

Short description	Model name	Part no.
Bellows coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad, material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985
Bellows coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983
Spring washer coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986
Bellows coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984

→ For additional accessories, please see page H-399

Reliable, established and modular



Product description

The ATM60 DeviceNet absolute multiturn encoder from SICK provides reliable positional and speed information even in harsh environmental conditions. With a resolution of up to 26 bits, this product family is based on the principle of magnetic measurement. The 13-bit singleturn range is scanned by a sensor using permanent magnetic elements. The 13-bit multiturn range consists of a magnetic reduction gear. Equipped with

a zero set pushbutton, the encoder can be easily set to zero or to any other user-programmed value on site. The connection adapter, which can be removed from the device, enables simple user maintenance and mounting. With its magnetic scanning, rugged IP 67- rated housing and high level of resistance to shock and vibration, the ATM60 DeviceNet is optimally suited for use in harsh conditions

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
- 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

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to electrical connection adapters (1 to 2 x PG, 1 to 2 x M12)
- Less maintenance and a long service life reduce overall costs
- Application flexibility due to easily interchangeable collets for the blind hollow shaft
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service



Additional information

Detailed technical data.....E-245
 Ordering information.....E-247
 Dimensional drawings.....E-249
 Mandatory accessories.....E-249
 PIN and wire allocation.....E-250
 Recommended accessories.....E-250

→ www.mysick.com/en/ATM60_DeviceNet

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.



E

Detailed technical data

Performance

Max. number of steps per revolution	≤ 8,192
Max. number of revolutions	≤ 8,192
Error limits	± 0.25°
Repeatability	0.1°
Measuring step	0.043°

Mechanical data

Shaft diameter	Face mount flange	10 x 19 mm
	Servo flange	6 x 10 mm
	Blind hollow shaft ¹⁾	6, 8, 10, 12, 14, 15 mm and 1/4", 3/8", 1/2"
Shaft material	Stainless steel	
Flange material	Aluminium	
Housing material	Aluminium	
Mass ²⁾	Face mount flange, servo flange	0.59 kg
	Blind hollow shaft	0.59 kg
Start up torque at 20 °C	Face mount flange, servo flange	2.5 Ncm with shaft seal
	Face mount flange, servo flange	0.5 Ncm without shaft seal
	Blind hollow shaft	1.2 Ncm with shaft seal
Operating torque at 20 °C	Face mount flange, servo flange	1.8 Ncm with shaft seal
	Face mount flange, servo flange	0.3 Ncm without shaft seal
	Blind hollow shaft	0.8 Ncm with shaft seal
Max. shaft loading	Face mount flange, servo flange	
	300 N radial	50 N axial
Permissible shaft movement of the drive element static/dynamic	Blind hollow shaft	
	± 0.3/± 0.1 mm radial	± 0.5/± 0.2 mm axial
Max. angular acceleration	≤ 500,000 rad/s ²	
Operating speed ³⁾	Face mount flange, servo flange	
	6000 min ⁻¹	3000 min ⁻¹
Moment of inertia of the rotor	Face mount flange, servo flange	
	35 gcm ²	55 gcm ²
Bearing lifetime	3.6 x 10 ⁹ revolutions	

¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item. For 15 mm shaft diameter collet is not needed.

²⁾ For an encoder with connector outlet.

³⁾ Self warming of 3.3 K per 1000 revolutions/min⁻¹ when applying note working temperature range.

Electrical data

Electrical interface	ISO-DIS 11898 (CANHigh Speed) and CAN Specification 2.0 B, D.C. isolated
Bus	DeviceNet (via bus adapter with cable screw system or round screw system) ¹⁾
SET (electronic adjustment)	Via PRESET push button or protocol
Protocol	DeviceNet Specification, Release 2.0
Address setting (node number)	0 ... 63 (DIP switches or protocol)
Data transmission rate (baud rate)	(125, 250, 500) kb, (DIP switches or protocol)
Status information	Network Status LED (NS), 2-colors
Bus termination	Via DIP switches (should only be connected in the final device)
Initialization time ²⁾	1250 ms
Supply voltage	10 ... 32 V
Power consumption max.	2.0 W
Reverse polarity protection	Yes
MTTFd: mean time to dangerous failure ³⁾	150 years (EN ISO 13849-1)

¹⁾ Please order the DeviceNet adapter separately, see mandatory accessories.

²⁾ From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

³⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

EMC	According to 61000-6-2 and EN 61000-6-3
Enclosure rating acc. IEC 60529 ¹⁾	
With shaft seal	IP 67
Without shaft seal	IP 43 on encoder flange not sealed
Without shaft seal	IP 66 on encoder flange sealed
Permissible relative humidity	98 %
Working temperature range	-20 ... +80 °C
Storage temperature range (without packaging)	-40 ... +125 °C
Resistance	
To shocks as per EN 60068-2-27	100 g/6 ms
To vibration as per EN 60068-2-6	20 g/10 ... 2,000 Hz

¹⁾ With mating connector fitted.



Ordering information

Type code ATM60 DeviceNet

Electrical interface

D DeviceNet Specification, Release 2.0

Mechanical interface

1 Solid shaft, servo flange, Ø 6 mm, length 10 mm

4 Solid shaft, face mount flange, Ø 10 mm, length 19 mm

A Blind hollow shaft ¹⁾

Connection type

H Please order the DeviceNet adapter separately, see mandatory accessories

Resolution programmable by customer

Factory programmed to: 13 Bit singleturn x 13 Bit multiturn

A T M 6 0 - D H 1 3 x 1 3

¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item (see recommended accessories). For 15 mm shaft diameter collet is not needed.

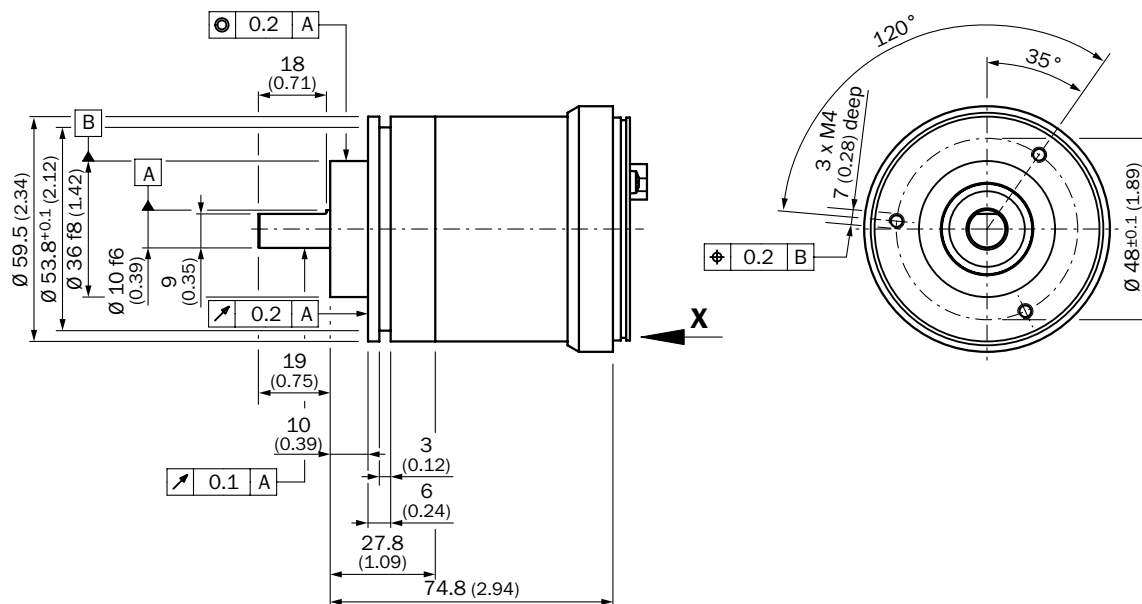
Ordering information

Mechanical interface	Description	Model name	Part no.
Solid shaft, face mount flange	Ø 10 mm, length 19 mm	ATM60-D4H13X13	1030017
Solid shaft, servo flange	Ø 6 mm, length 10 mm	ATM60-D1H13X13	1030018
Blind hollow shaft	Blind hollow shaft	ATM60-DAH13X13	1030019

Dimensional drawings

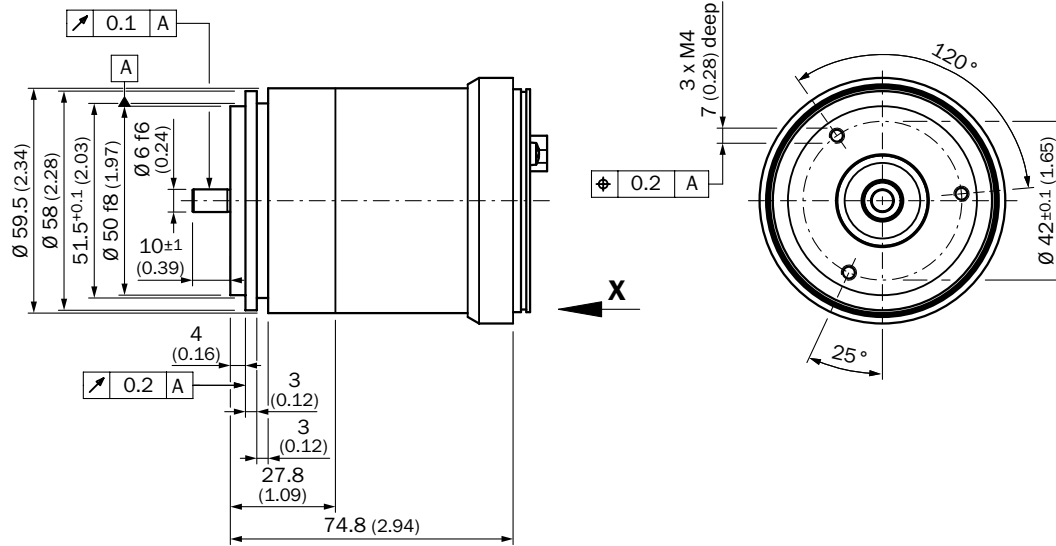
dimensions in mm (inch)

Face mount flange



General tolerances as per DIN ISO 2768-mk

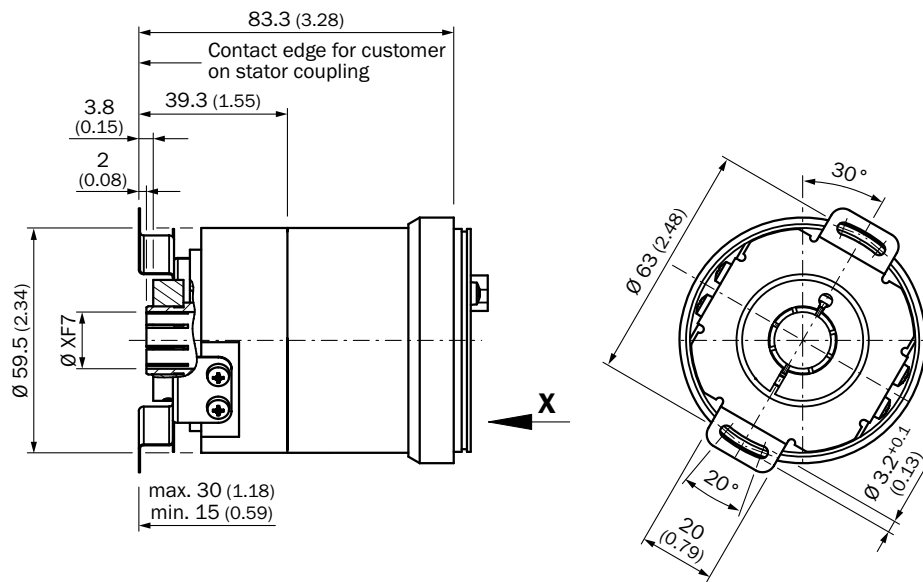
Servo flange



General tolerances as per DIN ISO 2768-mk

Blind hollow shaft

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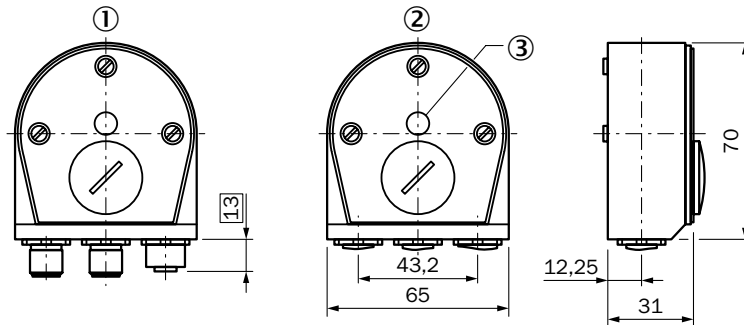
General tolerances as per DIN ISO 2768-mk

Mandatory accessories

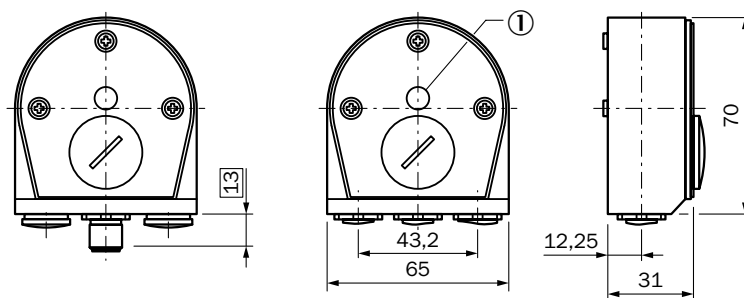
Adapter

Description	Model name	Part no.
DeviceNet connection adapter KR1, 1 x PG	AD-ATM60-KR1DN	2029228
DeviceNet connection adapter KR2, 2 x PG	AD-ATM60-KR2DN	2029229
DeviceNet connection adapter SR1, 1 x M12, 5-pin	AD-ATM60-SR1DN	2029226
DeviceNet connection adapter SR2, 2 x M12, 5-pin	AD-ATM60-SR2DN	2029227

AD-ATM60-KRxDN



AD-ATM60-SRxDN



Shaft adaptation

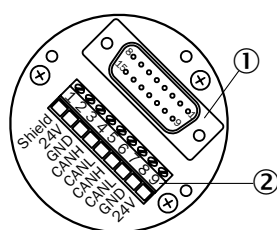
Short description	Model name	Part no.
Collet D6 mm for blind hollow shaft	SPZ-006-AD-A	2029174
Collet D8 mm for blind hollow shaft	SPZ-008-AD-A	2029176
Collet D10 mm for blind hollow shaft	SPZ-010-AD-A	2029178
Collet D12 mm for blind hollow shaft	SPZ-012-AD-A	2029179
Collet D14 mm for blind hollow shaft	SPZ-014-AD-A	2048863
Collet D1/2" for blind hollow shaft	SPZ-1E2-AD-A	2029180
Collet D1/4" for blind hollow shaft	SPZ-1E4-AD-A	2029175
Collet D3/8" for blind hollow shaft	SPZ-3E8-AD-A	2029177

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PIN and wire allocation

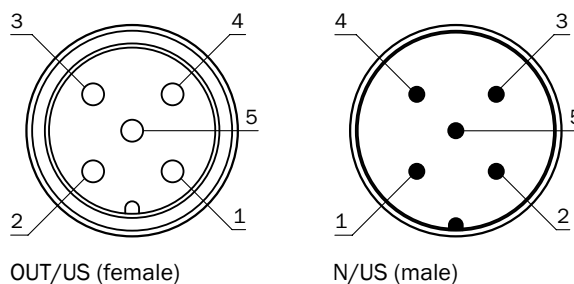
Terminal strip	Connector	Signal	Description
1	1	Shield	Screen
2	2	U _S (24 V)	Supply voltage 10 ... 32 V
3	3	GND (COM)	0 V (Gnd)
4	4	CAN _H	CAN Bus Signal high
5	5	CAN _L	CAN Bus Signal low
6	-	CAN _H	CAN Bus Signal high
7	-	CAN _L	CAN Bus Signal low
8	-	GND (COM)	0 V (Gnd)
9	-	U _S (24 V)	Supply voltage 10 ... 32 V

Bus adapter



- ① = Internal plug connection to the encoder
- ② = External connection to the bus

Connector M12 (bus adapter)



Recommended accessories

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Mounting brackets/plates

Short description	Model name	Part no.
Mounting bracket for encoder with 36 mm centering collar	BEF-WF-36	2029164

Flanges

Short description	Model name	Part no.
Flange adapter, adapts face mount flange with 36 mm centering collar to 50 mm servo flange	BEF-FA-036-050	2029160
Flange adapter, adapts face mount flange with 36 mm centering collar to 60 mm square mounting plate	BEF-FA-036-060REC	2029162
Flange adapter, adapts face mount flange with 36 mm centering collar to 58 mm square mounting plate with shock absorber	BEF-FA-036-060RSA	2029163
Flange adapter, adapts face mount flange with 36 mm centering collar to 100 mm servo flange with 60 mm centering collar	BEF-FA-036-100	2029161

Other mounting accessories

Short description	Model name	Part no.
Mounting bell for servo flange encoder with 50 mm centering collar incl. mounting kit	BEF-MG-50	5312987
Servo clamp half-shells (set of 2) for 50 mm centering collar	BEF-WG-SF050	2029165
Servo clamps (set of 3), large	BEF-WK-SF	2029166

Plug connectors and cables

Short description	Cable length	Model name	Part no.
Cable socket for DeviceNet, M12, 5-pin, straight, shielded, suitable for cable diameter 6 - 8 mm	-	DOS-1205-GA	6027534
Cable M12, 5-pin, connector straight, socket straight, CAN/CANopen shielded	6.0 m	DSL-1205-G06MK	6028327
Cable per meter, DeviceNet/CANopen 2 x 0,34 mm ² + 2 x 0,25 mm ² , twisted pair	-	LTG-2804-MW	6028328
Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1205-GA	6027533

Shaft adaptation

Short description	Model name	Part no.
Bellows coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad, material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985
Bellows coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983
Spring washer coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986
Bellows coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984

→ For additional accessories, please see page H-399



Reliable, established and modular



Product description

The ATM90 with SSI data interface complements the through hollow shaft variants in the ATM60 product family. The ATM90 operates reliably even under harsh environmental conditions. Its rugged mechanical design ensures maximum reliability and a long service life. Magnetic singleturn scanning allows a maximum resolution of up to 13 bits within one revolution. Output and detec-

tion of the number of revolutions is determined via a mechanical drive with almost wear-free gearbox. This means that the ATM90 can be operated without a battery. A shallow installation depth of 60 mm combined with high shock and vibration resistance enable the ATM90 SSI to be used in applications with high mechanical stress and distinct climate fluctuations

At a glance

- Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 25 bits
- Mechanical interface: through hollow shaft with shallow installation depth
- Zero-set and preset functions via hardware or software
- Electrical interface: SSI with gray or binary code type
- Electronically adjustable, configurable resolution
- Magnetic scanning

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to various electrical connection adapters (cable, connector)
- Application flexibility due to easily interchangeable collets for the blind hollow shaft
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service



Additional information

Detailed technical data E-253
 Ordering information E-254
 Dimensional drawing E-255
 PIN and wire allocation E-256
 Recommended accessories E-256

→ www.mysick.com/en/ATM90_SSI

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.



E

Detailed technical data

Performance

Max. number of steps per revolution	≤ 8,192
Max. number of revolutions	≤ 8,192
Error limits	± 0.25°
Repeatability	0.1°

Mechanical data

Shaft diameter	
Through hollow shaft	12, 16 mm und 1/2"
Shaft material	Stainless steel
Flange material	Aluminium
Housing material	Aluminium
Mass ¹⁾	0.8 kg
Start up torque at 20 °C	0.5 Ncm
Operating torque at 20 °C	0.4 Ncm
Max. angular acceleration	≤ 600,000 rad/s ²
Betriebsdrehzahl ²⁾	2000 min ⁻¹
Moment of inertia of the rotor	152.77 gcm ²
Bearing lifetime	3.6 x 10 ⁹ revolutions

¹⁾ For an encoder with connector outlet.

²⁾ Self warming of 3.3 K per 1000 revolutions/min⁻¹ when applying note working temperature range.

Electrical data

Electrical interface	SSI
Signal line	Carried by 12-pin connector ,potential-free with respect to housing, or 12 core cable
Interface signals	
Clock+, Clock-, Data+, Data-	
SSI bzw. LOW-Pegel (Clock+): 500 ns	Max. clock frequency 1 Mhz ¹⁾
TxD+, txD-, RxD+, RxD-	RS422
SET (electronic adjustment)	H-active (Le 0 - 4,7 V; H e 10 - U _s V)
CW/CCW (step sequence in direction of rotation)	L-active (L e 0 - 1,5 V; H e 2,0 - U _s V)
Initialization time ²⁾	1050 ms
Supply voltage	10 ... 32 V
Max. power consumption	0.8 W
Reverse polarity protection	Yes
MTTFd: mean time to dangerous failure ³⁾	150 years (EN ISO 13849-1)

¹⁾ For higher clock frequencies, choose synchronous SSI.

²⁾ From the moment the supply voltage is applied, this is the time which elapses before the dataword can be correctly read in.

³⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

EMC	According to 61000-6-2 and EN 61000-6-3
Enclosure rating acc. IEC 60529 ¹⁾	
With shaft seal	IP 65
Permissible relative humidity	98 %
Working temperature range	-20 ... +70 °C
Storage temperature range (without packaging)	-40 ... +100 °C
Resistance	
To shocks as per EN 60068-2-27	100 g/6 ms
To vibration as per EN 60068-2-6	20 g/10 ... 2,000 Hz

¹⁾ For an encoder with mating connector fitted.

Ordering information

Type code ATM90 SSI

E

Electrical interface

A 10 ... 32 V, SSI/RS422

Mechanical interface

T Through hollow shaft, Ø 12 mm

U Through hollow shaft, Ø 1/2"

X Through hollow shaft, Ø 16 mm

Connection type

A Connector M23, 12-pin, radial

K Cable 12-core, radial, 1.5 m

L Cable 12-core, radial, 3.0 m

M Cable 12-core, radial, 5.0 m

Resolution programmable by customer with programming tool PGT01 ^{1),2)}

Factory programmed to: 12 Bit singleturn x 12 Bit multiturn



¹⁾ Configuration ex works: 4,096 steps x 4,096 revolutions, Gray code, SET=0. Other configuration on request.
²⁾ Max. permissible resolution 25 bit (12 bit singleturn x 13 bit multiturn or 13 bit singleturn x 12 bit multiturn).

Ordering information

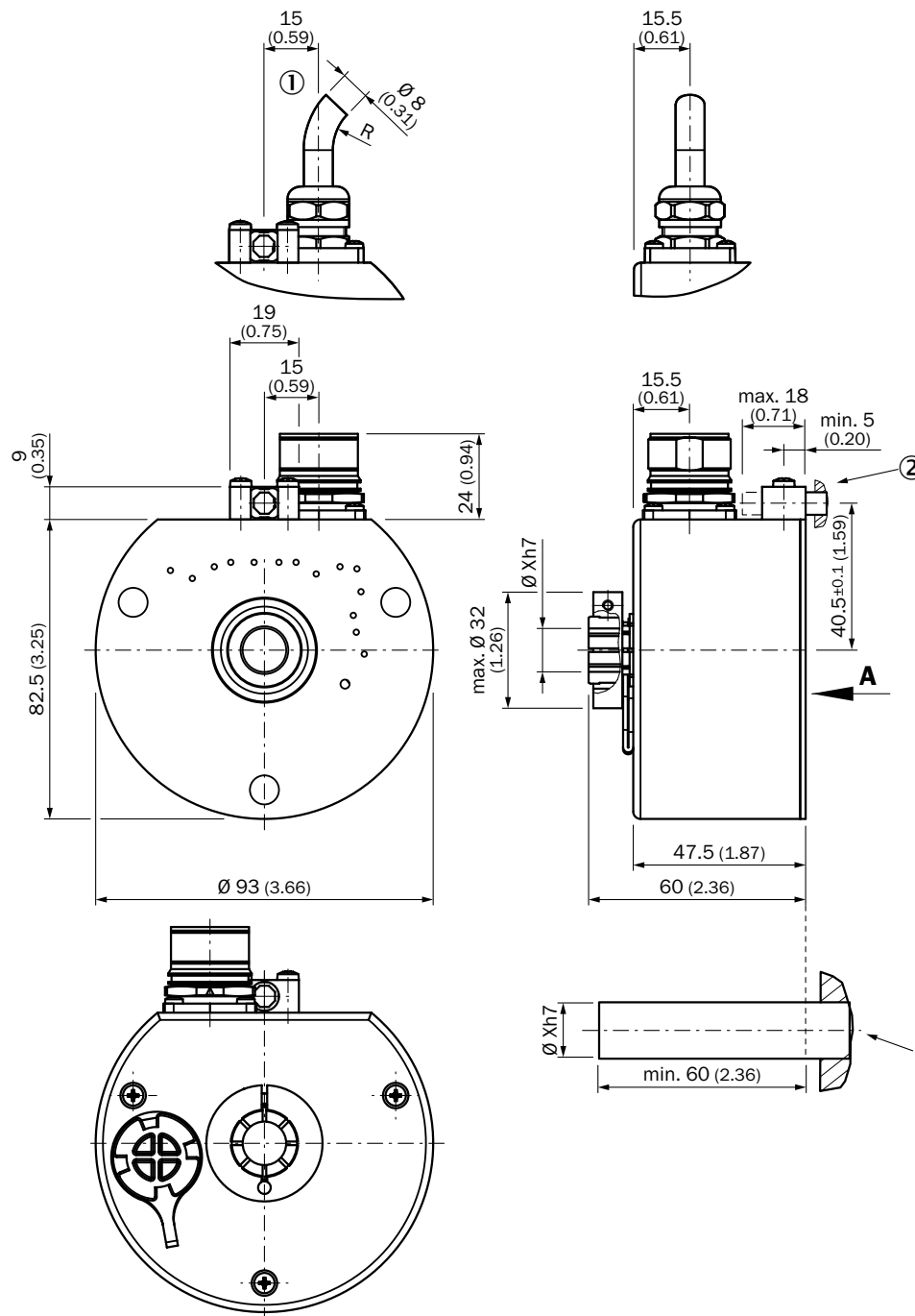
- **Mechanical interface:** Through hollow shaft
- **Electrical interface:** 10 V ... 32 V, SSI
- **Resolution:** 4,096 x 4,096

Shaft diameter	Connection type	Type	Part no.
12 mm	Connector M23, 12-pin, radial	ATM90-ATA12X12	1030030
	Cable, 12-pin, radial, 1.5 m	ATM90-ATK12X12	1030031
	Cable, 12-pin, radial, 3 m	ATM90-ATL12X12	1030032
	Cable, 12-pin, radial, 5 m	ATM90-ATM12X12	1030033
1/2"	Connector M23, 12-pin, radial	ATM90-AUA12X12	1030034
	Cable, 12-pin, radial, 1.5 m	ATM90-AUK12X12	1030035
	Cable, 12-pin, radial, 3 m	ATM90-AUL12X12	1030036
	Cable, 12-pin, radial, 5 m	ATM90-AUM12X12	1030037

Shaft diameter	Connection type	Type	Part no.
16 mm	Connector M23, 12-pin, radial	ATM90-AXA12X12	1030038
	Cable, 12-pin, radial, 1.5 m	ATM90-AXK12X12	1030039
	Cable, 12-pin, radial, 3 m	ATM90-AXL12X12	1030040
	Cable, 12-pin, radial, 5 m	ATM90-AXM12X12	1030041

Dimensional drawing

dimensions in mm (inch)

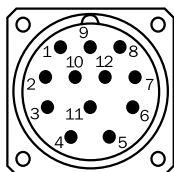


General tolerances as per DIN ISO 2768-mk

- ① Bending radius min. 40 mm
- ② Torque support for the encoder via customers cylindrical pin $\varnothing 6$ mm DIN EN 28734

PIN and wire allocation

PIN	Signal	Color of wires (cable outlet)	Description
1	GND	Blue	Earth connection
2	Data +	White	Signal line
3	Clock +	Yellow	Signal line
4	R x D +	Gray	RS 422 programming line
5	R x D -	Green	RS 422 programming line
6	T x D +	Pink	RS 422 programming line
7	T x D -	Black	RS 422 programming line
8	U _s	Red	Supply voltage
9	SET	Orange	Electronical adjustment
10	Data -	Brown	Signal line
11	Clock -	Lilac	Signal line
12	V/ \bar{R}	Orange/black	Counting sequence when turning
	Screen		Housing potential



View of the connector M23 fitted to the encoder body

V/ \bar{R} Forward/reverse: This input programs the counting direction of the encoder. If not connected, this input is “HIGH”. If the encoder shaft, as viewed on the drive shaft, rotates in the clockwise direction, it counts in an increasing sequence. If it should count upwards when the shaft rotates in the anti-clockwise direction, this connection must be connected permanently to “LOW” level (zero volts).

SET This input activates the electronic zero set. When the SET line is connected to U_s for more than 100 ms, the current mechanical position is assigned the value 0 or the pre-programmed SET-value.

Recommended accessories

Programming and configuration tools

Short description	Model name	Part no.
Programming tool for ATM60, ATM90 and KH53 SSI	PGT-01-S	1030111

Plug connectors and cables

Short description	Cable length	Model name	Part no.
Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	–	DOS-2312-G	6027538
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, diam. 7.8 mm		LTG-2512-MW	6027531
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, UV and salt water resistant, diam. 7.8 mm		LTG-2612-MW	6028516
Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm		STE-2312-G	6027537

→ For additional accessories, please see page H-399



Reliable, established and modular



E

Product description

The ATM90 PROFIBUS complements the through hollow shaft variants in the ATM60 product family. The ATM90 operates reliably even under harsh environmental conditions. Its rugged mechanical design ensures maximum reliability and a long service life. Magnetic singleturn scanning allows a maximum resolution of up to 13 bits within one revolution. Output and detection of the number of

revolutions is determined via a mechanical drive with almost no waste. This means that the ATM90 can be operated without a battery. A shallow installation depth of 60 mm combined with high shock and vibration resistance enable the ATM90 PROFIBUS to be used in applications with high mechanical stress and distinct climate fluctuations

At a glance

- 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
- Electrical interface: PROFIBUS DP as per IEC61158 / RS-485, electrically isolated
- Electronically adjustable, configurable resolution
- Magnetic scanning

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to various electrical connection adapters (cable, connector 3 x M14)
- Application flexibility due to easily interchangeable collets for the blind hollow shaft
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service



Additional information

- Detailed technical data E-259
- Ordering information E-260
- Dimensional drawings E-261
- PIN and wire allocation E-263
- Recommended accessories E-264

→ www.mysick.com/en/ATM90_PROFIBUS

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

Performance

Max. number of steps per revolution	≤ 8,192
Max. number of revolutions	≤ 8,192
Error limits	± 0.25°
Repeatability	0.1°

Mechanical data

Shaft diameter		
	Through hollow shaft	12, 16 mm and 1/2"
Shaft material		Stainless steel
Flange material		Aluminium
Housing material		Aluminium
Mass ¹⁾		
	Connector outlet	0.6 kg
	Cable outlet	0.8 kg
Start up torque at 20 °C		0.5 Ncm
Operating torque at 20 °C		0.4 Ncm
Max. angular acceleration		≤ 600,000 rad/s ²
Operating speed ²⁾		3000 min ⁻¹
Moment of inertia of the rotor		153 gcm ²
Bearing lifetime		3.6 x 10 ⁹ revolutions

¹⁾ For an encoder with connector outlet.

²⁾ Self warming of 3.3 K per 1000 revolutions/min⁻¹ when applying note working temperature range.

Electrical data

Electrical interface	RS 485 (according to 50170-2 (DIN 19245 part 1–3) DC isolated via opto-couplers)
Bus	PROFIBUS DP (via M14 screw system 7-pin or 3 x screw fixings for cable connection)
SET (electronic adjustment)	Via PRESET push button or protocol
Protocol	Profile for Encoders (07hex) – Class2
Address setting (node number)	0 ... 127 (DIP switches or protocol)
Data transmission rate (baud rate)	9.6 kBaud ... 12 Mbaud (automatic detection)
Status information	Operation (LED green), bus activity (LED red)
Bus termination	Via DIP switches (should only be connected in the final device)
Initialization time ¹⁾	1250 ms
Supply voltage	10 ... 32 V
Power consumption max.	≤ 2 W
Reverse polarity protection	Yes
MTTFd: mean time to dangerous failure ²⁾	150 years (EN ISO 13849-1)

¹⁾ From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

²⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.



Ambient data

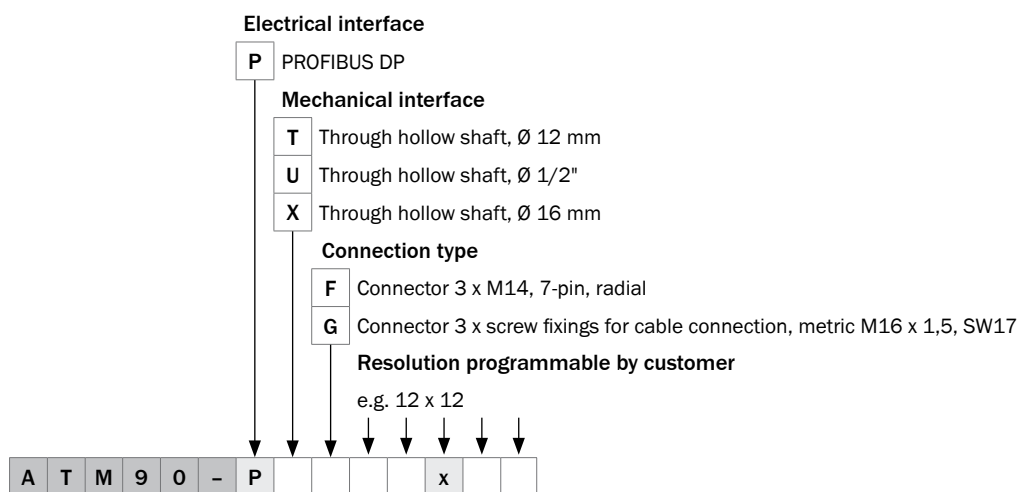
EMC	According to 61000-6-2 and EN 61000-6-3
Enclosure rating acc. IEC 60529 ¹⁾	
With shaft seal	IP 65
Permissible relative humidity	98 %
Working temperature range	-20 ... +80 °C
Storage temperature range (without packaging)	-40 ... +125 °C
Resistance	
To shocks as per EN 60068-2-27	100 g/6 ms
To vibration as per EN 60068-2-6	20 g/10 ... 2,000 Hz

¹⁾ With mating connector fitted.

Ordering information

Type code ATM90 PROFIBUS

E



Ordering information

- **Mechanical interface:** Through hollow shaft
- **Electrical interface:** PROFIBUS

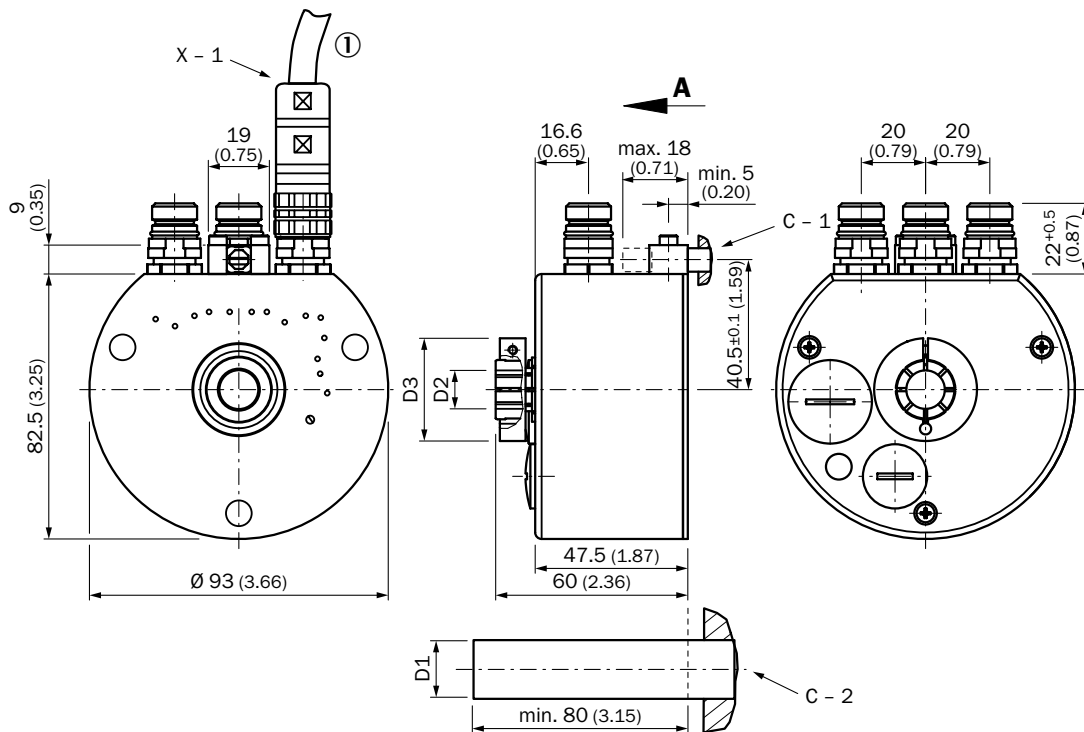
Shaft diameter	Connection type	Number of steps	Resolution	Type	Part no.
12 mm	Bus adapter with 3 x M14 screw fixings	≤ 8,192	8,192 x 8,192	ATM90-PTF13X13	1030042
			8,192 x 2,048	ATM90-PTF13X11	1032654
		≤ 4,096	4,096 x 4,096	ATM90-PTF12X12	1032660
			2,048 x 8,192	ATM90-PTF11X13	1032896
	Bus adapter with 3 cable screw fixings	≤ 8,192	8,192 x 8,192	ATM90-PTG13X13	1030045
			8,192 x 2,048	ATM90-PTG13X11	1032657
		≤ 4,096	4,096 x 4,096	ATM90-PTG12X12	1032663
			2,048 x 8,192	ATM90-PTG11X13	1032899

Shaft diameter	Connection type	Number of steps	Resolution	Type	Part no.
1/2"	Bus adapter with 3 x M14 screw fixings	≤ 8,192	8,192 x 8,192	ATM90-PUF13X13	1030043
			8,192 x 2,048	ATM90-PUF13X11	1032655
		≤ 4,096	4,096 x 4,096	ATM90-PUF12X12	1032661
			≤ 2,048	2,048 x 8,192	ATM90-PUF11X13
	Bus adapter with 3 cable screw fixings	≤ 8,192	8,192 x 8,192	ATM90-PUG13X13	1030046
			8,192 x 2,048	ATM90-PUG13X11	1032658
		≤ 4,096	4,096 x 4,096	ATM90-PUG12X12	1032664
			≤ 2,048	2,048 x 8,192	ATM90-PUG11X13
16 mm	Bus adapter with 3 x M14 screw fixings	≤ 8,192	8,192 x 8,192	ATM90-PXF13X13	1030044
			8,192 x 2,048	ATM90-PXF13X11	1032656
		≤ 4,096	4,096 x 4,096	ATM90-PXF12X12	1032662
			≤ 2,048	2,048 x 8,192	ATM90-PXF11X13
	Bus adapter with 3 cable screw fixings	≤ 8,192	8,192 x 8,192	ATM90-PXG13X13	1030047
			8,192 x 2,048	ATM90-PXG13X11	1032659
		≤ 4,096	4,096 x 4,096	ATM90-PXG12X12	1032665
			≤ 2,048	2,048 x 8,192	ATM90-PXG11X13

Dimensional drawings

dimensions in mm (inch)

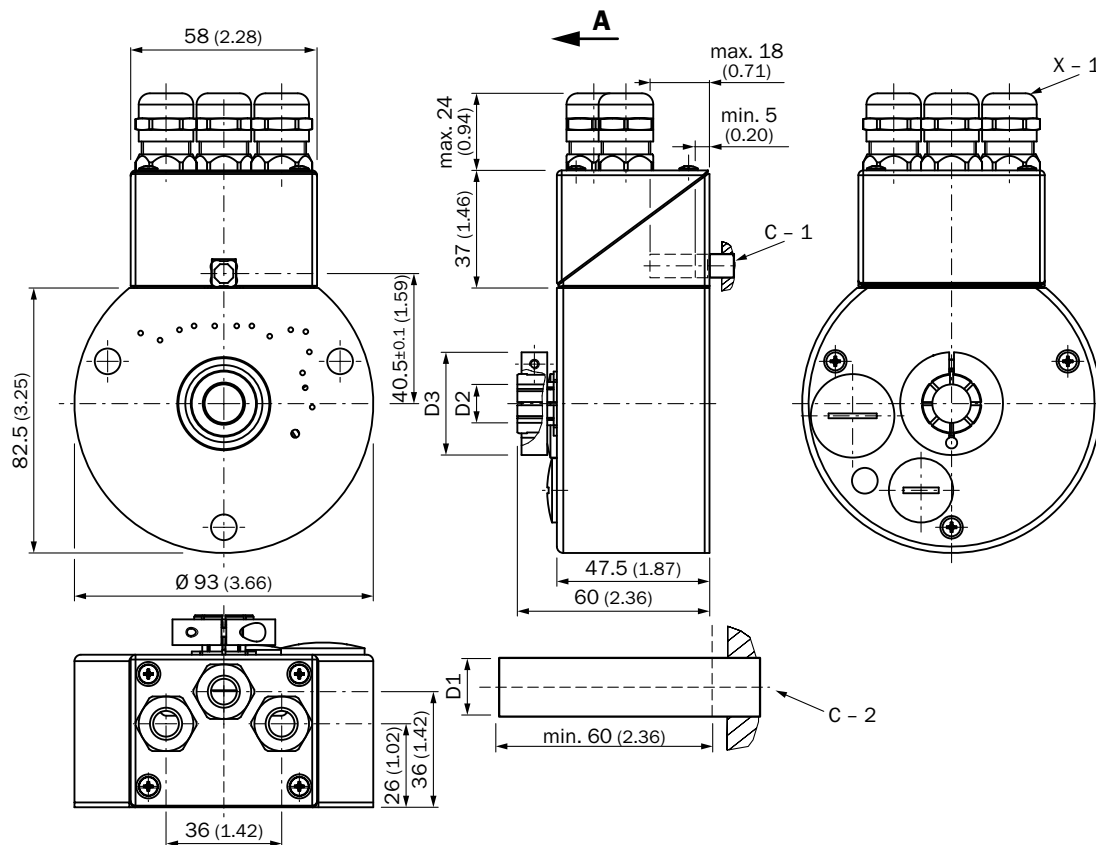
Connector outlet



General tolerances as per DIN ISO 2768-mk

① Bending radius min. 40 mm

Cable outlet



General tolerances as per DIN ISO 2768-mk

E

Hollow shaft	D1	D2	D3
12 mm	12.0 ^{h7}	12.0 ^{F7}	29.5
1/2"	12.7 ^{h7}	12.7 ^{F7}	29.5
16 mm	16.0 ^{h7}	16.0 ^{F7}	32.0
C - 1	Torque support via cylindrical pin (customer) Ø 6 _{m6} to DIN EN ISO 8734		
C - 2	Drive shaft (customer)		
X - 1	7-pin plug connector MINITEC, (3 x)		
A	Direction of view on encoder (used to define the direction of rotation)		

PIN and wire allocation

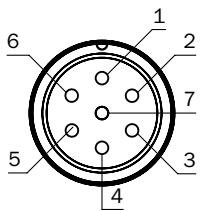
- PROFIBUS DP (In/Out)

PIN	Signal	Description
1	RTS	Request To Send ¹⁾
2	A	A line PROFIBUS DP
3	N. C.	Not connected
4	B	B line PROFIBUS DP
5	2M	0 V (potential free) ²⁾
6	2P5	+ 5 V (potential free) ²⁾
7	N. C.	Not connected

¹⁾ Use for external bus termination or to supply the transmitter/receiver of an optical fibre transmission link.

²⁾ Signal is optional, is used to detect the direction of an optical fibre connection.

N. C. = Not connected.

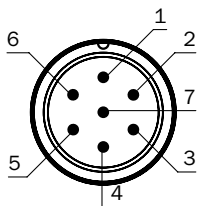


- U_s

PIN	Signal	Description
1	U _s (24 V)	Supply voltage
2	N. C.	Not connected
3	GND (0 V)	0 V (Gnd)
4	N. C.	Not connected
5	RTS	Request To Send ¹⁾
6	N. C.	Not connected
7	N. C.	Not connected

¹⁾ Signal is optional, is used to detect the direction of an optical fibre connection.

N. C. = Not connected



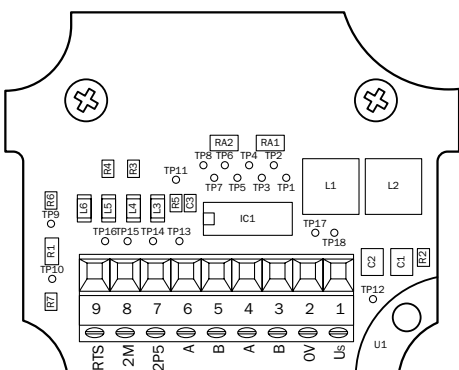
E

- Bus adapter

PIN	Signal	Description
1	U _s (24 V)	Supply voltage
2	GND (0 V)	0 V (Gnd)
3	B	B line PROFIBUS DP (out)
4	A	A line PROFIBUS DP (out)
5	B	B line PROFIBUS DP (in)
6	A	A line PROFIBUS DP (in)
7	2P5	+ 5 V (potential free) ¹⁾
8	2M	0 V (potential free) ¹⁾
9	RTS	Request To Send ²⁾

¹⁾ Use for external bus termination or to supply the transmitter/receiver of an optical fibre transmission link.

²⁾ Signal is optional, used to detect the direction of an optical connection.



E

Recommended accessories

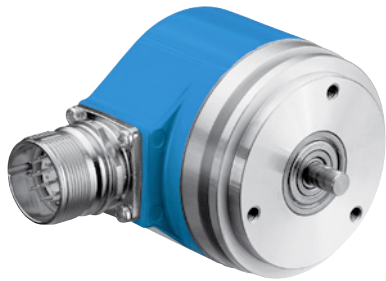
Plug connectors and cables

Short description	Model name	Part no.
Cable socket, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	DOL-1205-G05MQ	6026006
	DOL-1205-G10MQ	6026008
Cable socket, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	DOS-1205-GQ	6021353
Cable socket, M14, 7-pin, straight, shielded	DOS-1507-G	6027536
Sales set comprising: 2 x cable connector M14, 7-pin (6027535) 1 x cable socket M14, 7-pin (6027536)	DSC-1507-G	2029199
PROFIBUS cable by the meter 2 x 0.25 mm ² with shielding, suitable for drag chain, diam. 8.0 mm	LTG-2102-MW	6021355
Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	PR-STE-1205-G	6021354
Cable connector, M14, 7-pin, straight, shielded	STE-1507-G	6027535
Cable connector, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	STL-1205-G05MQ	6026005
	STL-1205-G10MQ	6026007

→ For additional accessories, please see page H-399



Reliable and established



Product description

The modular setup of its CoreTech technology enables the compact ARS60 absolute singleturn encoder to provide a customized solution for all applications. All common mechanical variants are

available with any number of increments between 2 and 32,768 and are either equipped with an SSI or parallel output, making the ARS60 a universal solution for nearly any application requirements

At a glance

- Absolute singleturn encoder
- Resolution: up to 15 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 IP 66

Your benefits

- Freely programmable resolution (up to 15 bits)
- Simple zero set adjustment with the press of a button on the encoder or via signal line (cable version)
- Individual mechanical interfaces ensure quick and easy mounting
- Application flexibility due to simple interchangeable collets for blind hollow shaft and through hollow shaft
- Versions with cable and M23 connector outlets available in axial and radial designs



Additional information

Detailed technical data E-267
 Ordering information E-269
 Dimensional drawings E-273
 PIN and wire allocation E-277
 Signal outputs E-279
 Recommended accessories E-280

→ www.mysick.com/en/ARS60_SSI_Parallel

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.



E

Detailed technical data

Performance

Number of steps per revolution	00002 ... 32,768 see ordering information
Measuring range	1 revolution
Error limits	
Binary number of steps	$\pm 0.035^\circ$
Non-binary number of steps	$\pm 0.046^\circ$
Repeatability	0.005°
Measuring step	360°/number of steps
Measuring step deviation	
Binary number of steps	0.005°
Non-binary number of steps	0.016°

Mechanical data

Shaft diameter	
Face mount flange	10 x 19 mm
Servo flange	6 x 10 mm
Blind hollow shaft ¹⁾	6, 8, 10, 12, 14, 15 mm and 1/4", 3/8", 1/2"
Through hollow shaft ¹⁾	6, 8, 10, 12 mm and 1/4", 3/8", 1/2"
Shaft material	Stainless steel
Flange material	Aluminium
Housing material	Aluminium
Mass ²⁾	0.3 kg
Start up torque at 20 °C	
Face mount flange,	0.4 Ncm typ.
Servo flange	0.25 Ncm typ.
Blind hollow shaft	0.6 Ncm typ.
Through hollow shaft	2.2 Ncm typ.
Operating torque at 20 °C	
Face mount flange,	0.3 Ncm typ.
Servo flange	0.2 Ncm typ.
Blind hollow shaft	0.4 Ncm typ.
Through hollow shaft	1.6 Ncm typ.
Max. shaft loading	
Face mount flange, servo flange	10 N radial 50 N axial
Permissible shaft movement of the drive element static/dynamic	
Blind hollow shaft, through hollow shaft	$\pm 0.3/ \pm 0.1$ mm radial $\pm 0.5/ \pm 0.2$ mm axial
Max. angular acceleration	$\leq 500,000$ rad/s ²
Operating speed ³⁾	
Face mount flange, servo flange	6,000 min ⁻¹ with shaft seal 10,000 min ⁻¹ without shaft seal if the shaft seal has been removed by the customer
Blind hollow shaft, through hollow shaft	3000 min ⁻¹

¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item. For 15 mm shaft diameter collet is not needed.

²⁾ For an encoder with connector outlet.

³⁾ Self warming of 3.3 K per 1000 revolutions/min⁻¹ when applying note working temperature range.

Moment of inertia of the rotor	
Face mount flange	54 gcm ²
Servo flange	48 gcm ²
Blind hollow shaft, through hollow shaft	See fig. 1 below
Bearing lifetime	3.6 x 10 ⁹ revolutions

¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item. For 15 mm shaft diameter collet is not needed.

²⁾ For an encoder with connector outlet.

³⁾ Self warming of 3.3 K per 1000 revolutions/min⁻¹ when applying note working temperature range.

Electrical data

Electrical interface	SSI or Parallel
Switching level of the control inputs	Logic H = 0.7 x U _S Logic L = 0 V... 0.3 V x U _S
Operation of zero-set ¹⁾	100 ms
Initialization time ²⁾	80 ms
Supply voltage	10 ... 32 V
Operating power consumption	
SSI	Typ. 60 mA
Parallel	Typ. 90 mA
Reverse polarity protection	Yes
MTTFd: mean time to dangerous failure ³⁾	300 years (EN ISO 13849-1)

¹⁾ Only with shaft stationary (note initialization time).

²⁾ From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

³⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

EMC	According to 61000-6-2 and EN 61000-6-3
Enclosure rating acc. IEC 60529 ¹⁾	
Face mount flange, servo flange, blind hollow shaft: connector outlet	IP 65
Face mount flange, servo flange, blind hollow shaft: cable outlet	IP 66
Through hollow shaft: connector outlet	IP 64
Through hollow shaft: cable outlet	IP 64
Permissible relative humidity	90 % condensation of the optical scanning not permitted
Working temperature range	-20 ... +85 °C
Storage temperature range (without packaging)	-40 ... +100 °C
Resistance	
To shocks as per EN 60068-2-27	50 g/11 ms
To vibration as per EN 60068-2-6	20 g/10 ... 2.000 Hz

¹⁾ With mating connector fitted.

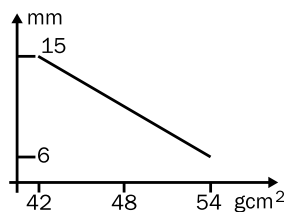
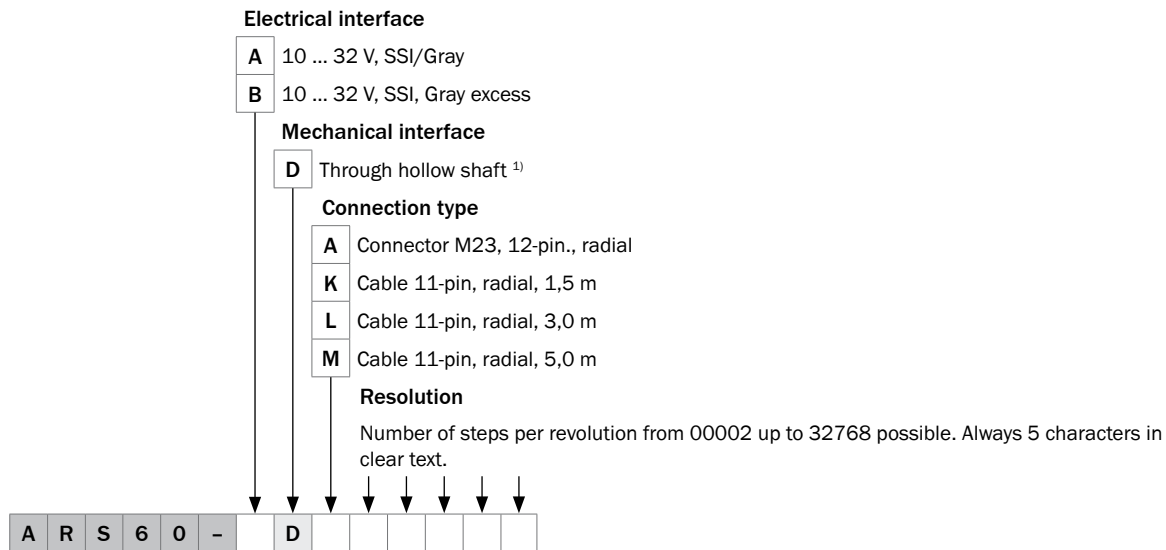


Figure 1

Ordering information

Type code ARS60 SSI, through hollow shaft



¹⁾ Collets for 6, 8, 10, 12 mm and 1/4", 3/8" and 1/2" as accessories, separate order item (see recommended accessories).

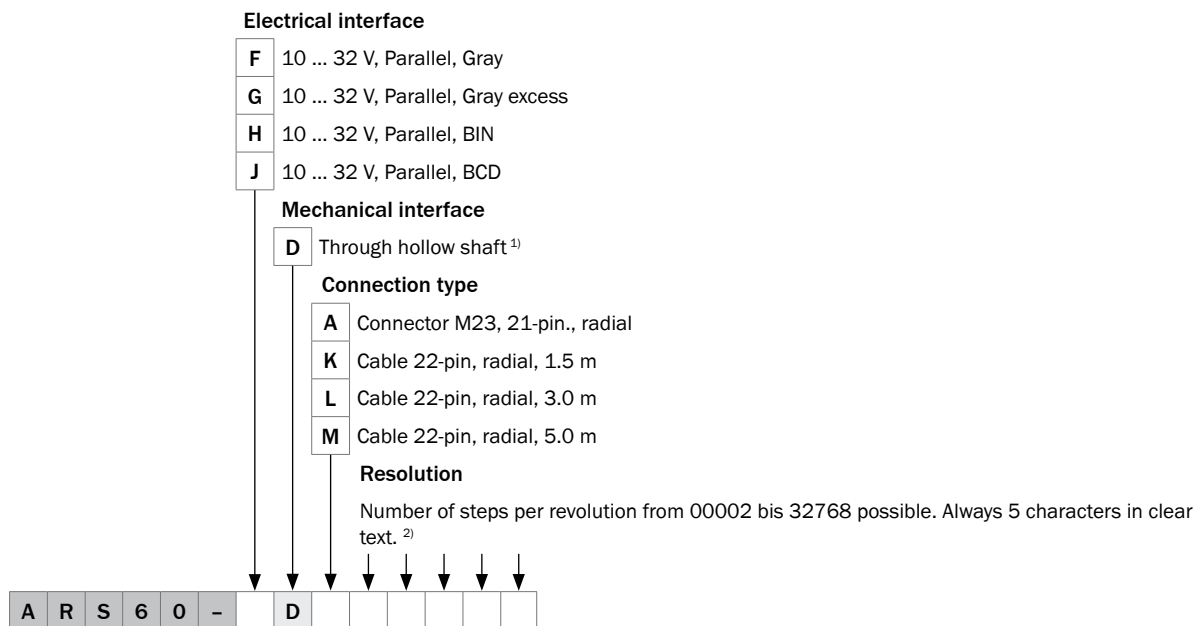
Ordering examples

- Through hollow shaft

Mechanical interface through hollow shaft	Model name
10 ... 32 Volt, SSI, Gray, connector M23, 12-pin, radial, number of steps per revolution 8,192	ARS60-ADA08192



Type code ARS60 Parallel, through hollow shaft



¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item (see recommended accessories). For 15 mm shaft diameter collet is not needed.

²⁾ For the electrical interfaces 10 ... 32 V Parallel Gray; 10 ... 32 V Parallel Gray excess; 10 ... 32 V Parallel BIN. Number of steps from 00002 up to 07999 possible with the electrical interface 10 ... 32 V Parallel BCD. Always 5 characters in clear text.

Ordering examples

- Through hollow shaft



Mechanical interface through hollow shaft	Model name
10 ... 32 Volt, Parallel, Gray, connector M23, 21-pin, radial, number of steps per revolution 8,192	ARS60-FDA08192

Type code ARS60 SSI

Electrical interface

- A** 10 ... 32 V, SSI/Gray
- B** 10 ... 32 V, SSI, Gray excess

Mechanical interface

- 4** Solid shaft, face mount flange, Ø 10 mm, length 19 mm
- 1** Solid shaft, servo flange Ø 6 mm, length 10 mm
- A** Blind hollow shaft ¹⁾

Connection type

- A** Connector M23, 12-pin., radial
- B** Connector M23, 12-pin., axial
- K** Cable 11-pin, radial, 1.5 m
- L** Cable 11-pin, radial, 3.0 m
- M** Cable 11-pin, radial, 5.0 m
- R** Cable 11-pin, axial, 1.5 m
- S** Cable 11-pin, axial, 3.0 m
- T** Cable 11-pin, axial, 5.0 m

Resolution

Number of steps per revolution from 00002 bis 32768 possible. Always 5 characters in clear text.



¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item (see recommended accessories). For 15 mm shaft diameter collet is not needed.

Ordering examples

- Servo flange

Mechanical interface servo flange	Model name
10 ... 32 Volt, SSI, Gray, connector M23, 12-pin, radial, number of steps per revolution 8,192	ARS60-A1A08192

- Face mount flange

Mechanical interface face mount flange	Model name
10 ... 32 Volt, SSI, Gray, connector M23, 12-pin, radial, number of steps per revolution 8,192	ARS60-A4A08192

- Blind hollow shaft

Mechanical interface blind hollow shaft	Model name
10 ... 32 Volt, SSI, Gray, connector M23, 12-pin, radial, number of steps per revolution 8,192	ARS60-AAA08192



Type code ARS60 Parallel

Electrical interface

- F** 10 ... 32 V, Parallel, Gray
- G** 10 ... 32 V, Parallel, Gray excess
- H** 10 ... 32 V, Parallel, BIN
- J** 10 ... 32 V, Parallel, BCD

Mechanical interface

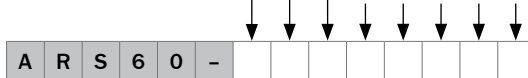
- 4** Solid shaft, face mount flange, Ø 10 mm, length 19 mm
- 1** Solid shaft, servo flange Ø 6 mm, length 10 mm
- A** Blind hollow shaft ¹⁾

Connection type

- A** Connector M23, 21-pin., radial
- B** Connector M23, 21-pin., axial
- K** Cable 22-pin, radial, 1.5 m
- L** Cable 22-pin, radial, 3.0 m
- M** Cable 22-pin, radial, 5.0 m
- R** Cable 22-pin, axial, 1.5 m
- S** Cable 22-pin, axial, 3.0 m
- T** Cable 22-pin, axial, 5.0 m

Resolution

Number of steps per revolution from 00002 bis 32768 possible. Always 5 characters in clear text. ²⁾



¹⁾ Collets for 6, 8, 10, 12, 14 mm and 1/4", 3/8" and 1/2" as accessories, separate order item (see recommended accessories). For 15 mm shaft diameter collet is not needed.

²⁾ For the electrical interfaces 10 ... 32 V Parallel Gray; 10 ... 32 V Parallel Gray excess; 10 ... 32 V Parallel BIN. Number of steps from 00002 up to 07999 possible with the electrical interface 10 ... 32 V Parallel BCD. Always 5 characters in clear text.

Ordering examples

- Servo flange

Mechanical interface servo flange	Model name
10 ... 32 Volt, Parallel, Gray, connector M23, 21-pin, radial, number of steps per revolution 8,192	ARS60-F1A08192

- Face mount flange

Mechanical interface face mount flange	Model name
10 ... 32 Volt, Parallel, Gray, connector M23, 21-pin, radial, number of steps per revolution 8,192	ARS60-F4A08192

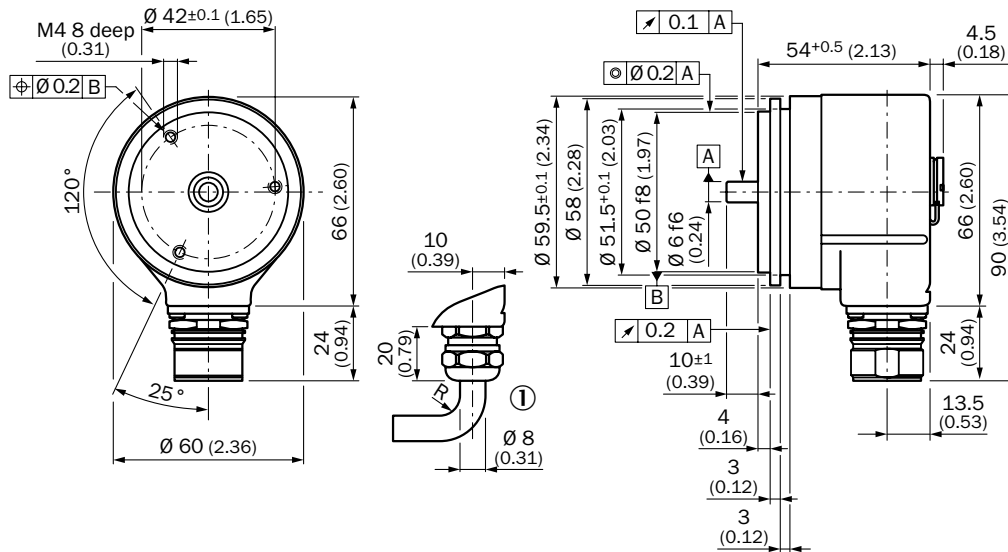
- Blind hollow shaft

Mechanical interface Blind hollow shaft	Model name
10 ... 32 Volt, Parallel, Gray, connector M23, 21-pin, radial, number of steps per revolution 8,192	ARS60-FAA08192

Dimensional drawings

dimensions in mm (inch)

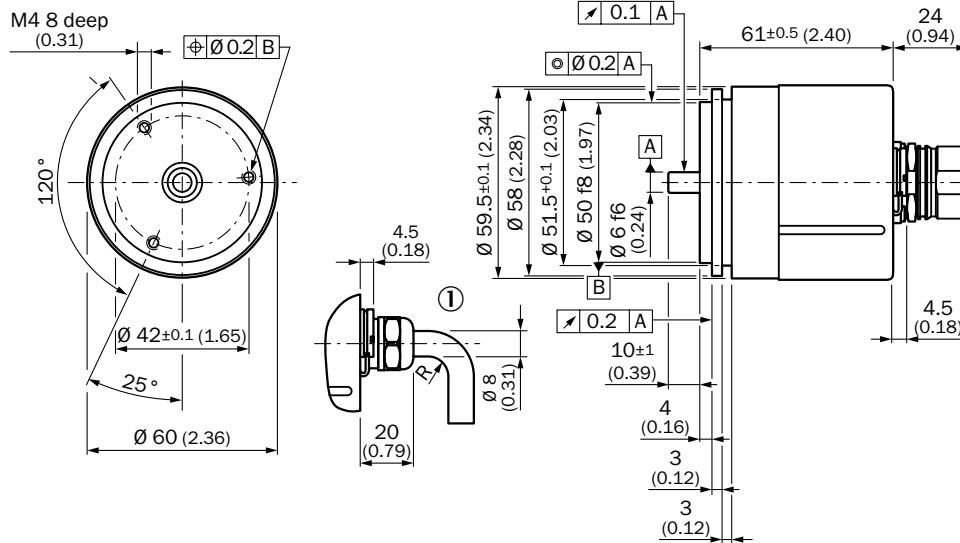
Servo flange radial



General tolerances as per DIN ISO 2768-mk

① R = bending radius min. 40 mm

Servo flange axial

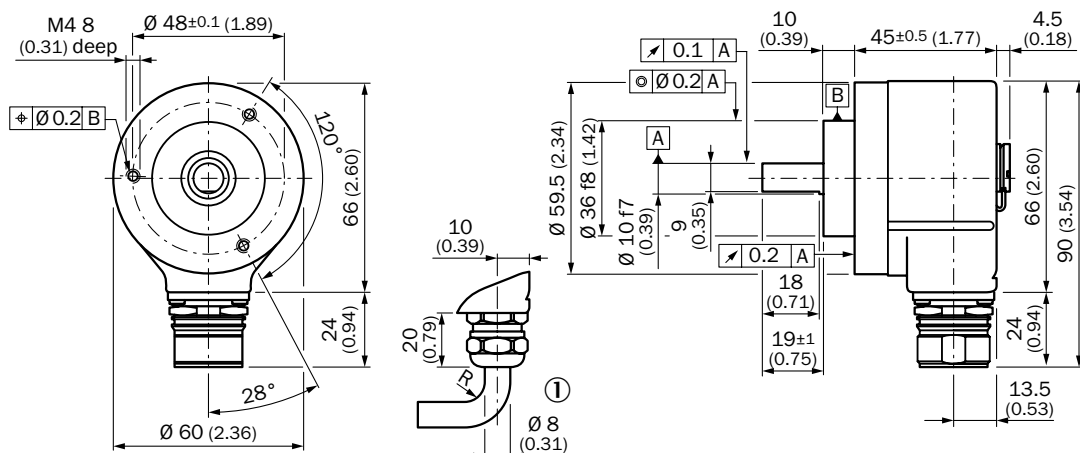


General tolerances as per DIN ISO 2768-mk

① R = bending radius min. 40 mm



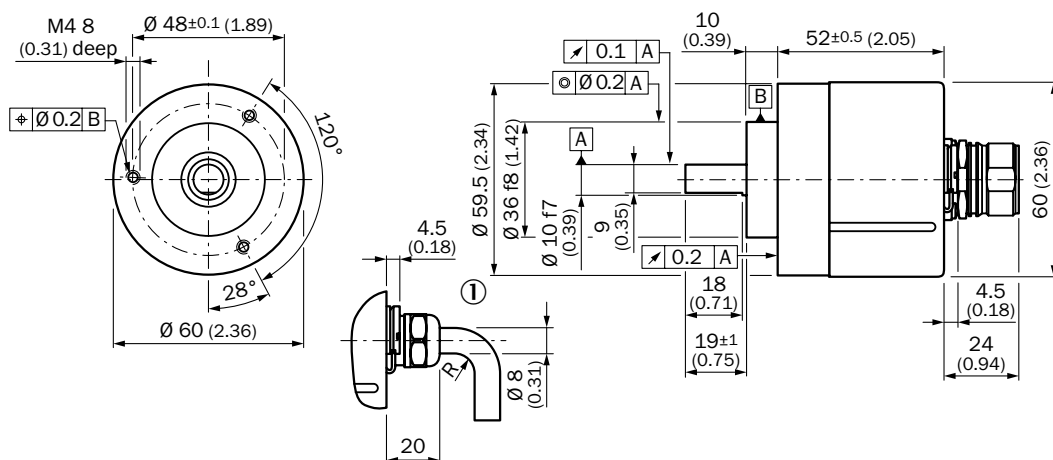
Face mount flange radial



General tolerances as per DIN ISO 2768-mk

① R = bending radius min. 40 mm

Face mount flange axial

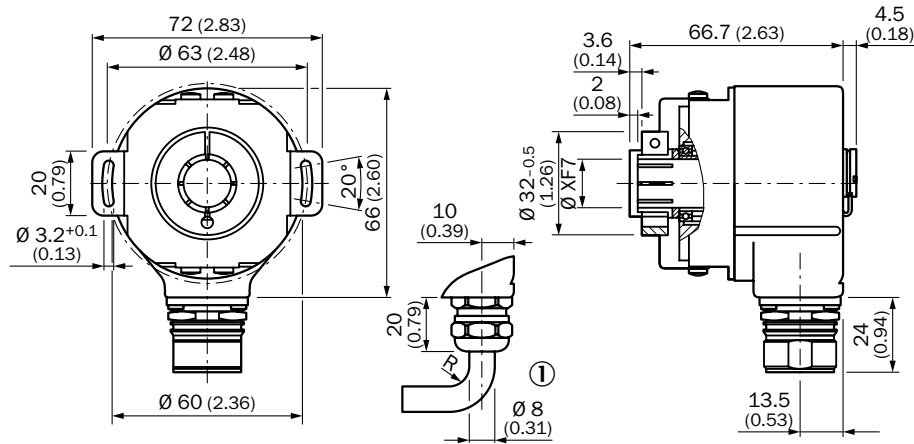


General tolerances as per DIN ISO 2768-mk

① R = bending radius min. 40 mm

E

Blind hollow shaft radial

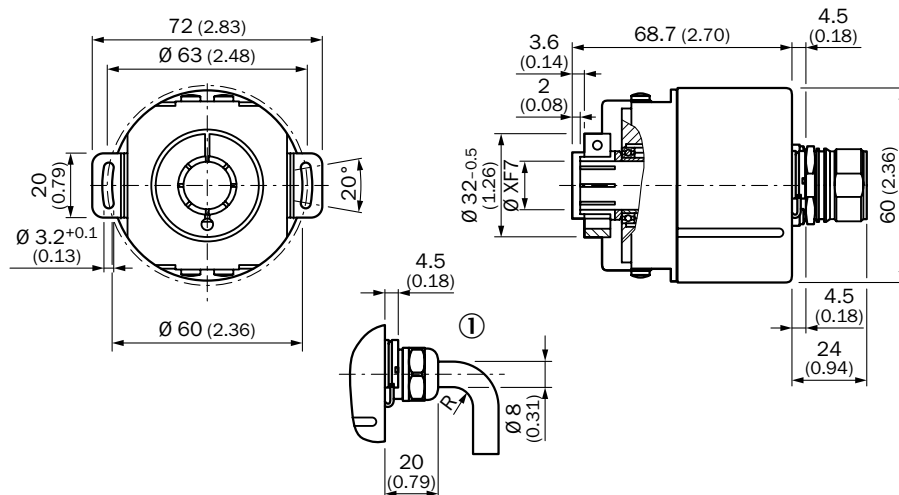


General tolerances as per DIN ISO 2768-mk

① R = bending radius min. 40 mm

Insertion depth of mounting shaft min. 15 mm, max. 30 mm

Blind hollow shaft axial



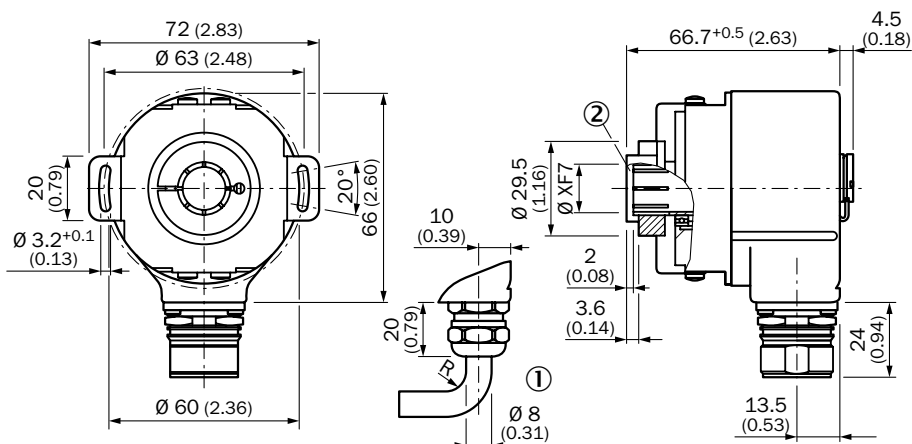
General tolerances as per DIN ISO 2768-mk

① R = bending radius min. 40 mm

Insertion depth of mounting shaft min. 15 mm, max. 30 mm



Through hollow shaft radial



General tolerances as per DIN ISO 2768-mk

① R = bending radius min. 40 mm

② Insertion depth of mounting shaft min. 15 mm

Mandatory accessories

M23 screw-in system

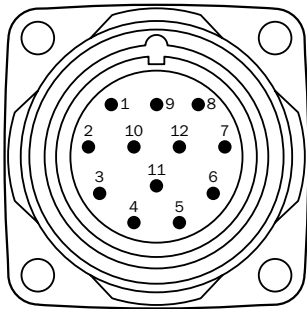
Short description	Model name	Part no.
Collet D6 mm for blind hollow shaft	SPZ-006-AD-A	2029174
Collet D1/4" for blind hollow shaft	SPZ-1E4-AD-A	2029175
Collet D8 mm for blind hollow shaft	SPZ-008-AD-A	2029176
Collet D3/8" for blind hollow shaft	SPZ-3E8-AD-A	2029177
Collet D10 mm for blind hollow shaft	SPZ-010-AD-A	2029178
Collet D12 mm for blind hollow shaft	SPZ-012-AD-A	2029179
Collet D1/2" for blind hollow shaft	SPZ-1E2-AD-A	2029180
Collet D14 mm for blind hollow shaft	SPZ-014-AD-A	2048863

E

PIN and wire allocation

- Allocation for encoder with 12-pin connector; SSI interface

Signal	12-pin connector	11-core cable outlet
GND	1	Blue
Data (+)	2	White
Clock (+)	3	Yellow
N. C.	4	-
V/ \bar{R}	5	Pink
N. C.	6	-
N. C.	7	-
U _s	8	Red
SET	9	Orange
Data (-)	10	Brown
Clock (-)	11	Lilac
N. C.	12	-



View of the connector M23 fitted to the encoder body SSI

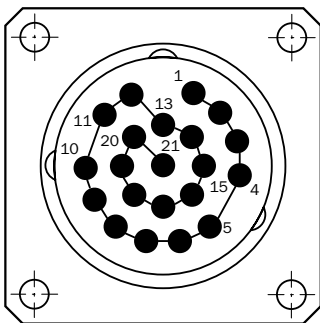
- Allocation for encoder with 21-pin connector Single; Parallel Interface

PIN	Wire color by cable outlet	Binary	Gray	BCD	Description
1	Lilac	2 ⁰	G ₀	2 ⁰ v.10 ⁰	Data lines, outputs
2	White/brown	2 ¹	G ₁	2 ¹ v.10 ⁰	
3	White/green	2 ²	G ₂	2 ² v.10 ⁰	
4	White/yellow	2 ³	G ₃	2 ³ v.10 ⁰	
5	White/gray	2 ⁴	G ₄	2 ⁰ v.10 ¹	
6	White/pink	2 ⁵	G ₅	2 ¹ v.10 ¹	
7	White/blue	2 ⁶	G ₆	2 ² v.10 ¹	
8	White/red	2 ⁷	G ₇	2 ³ v.10 ¹	
9	White/black	2 ⁸	G ₈	2 ⁰ v.10 ²	
10	Brown/green	2 ⁹	G ₉	2 ¹ v.10 ²	
11	Brown/yellow	2 ¹⁰	G ₁₀	2 ² v.10 ²	
12	Brown/gray	2 ¹¹	G ₁₁	2 ³ v.10 ²	
13	Brown/pink	2 ¹²	G ₁₂	2 ⁰ v.10 ³	
14	Brown/blue	2 ¹³	G ₁₃	2 ¹ v.10 ³	
15	Brown/red	2 ¹⁴	G ₁₄	2 ² v.10 ³	
16	Green	Parity	Parity	Parity	
17	Pink	Store_	Store_	Store_	
18	Yellow	Enable_	Enable_	Enable_	
19	Brown	V/R_	V/R_	V/R_	
1)	Gray	SET	SET	SET	
20	Blue	GND	GND	GND	
21	Red	U _s	U _s	U _s	
Housing		Screen	Screen	Screen	



¹⁾ Set line only possible with a cable outlet.

- U_s Supply voltage to the encoder (before commissioning, note must be taken of the type label of the encoder).
- GND Zero volt connection to the encoder: electrically isolated from the housing. The voltage referred to GND is U_s.
- V/R_ Forward/reverse: this input programs the counting direction of the encoder. If not connected, this input is »high«. If the encoder shaft, as viewed on the drive shaft, rotates in the clockwise direction, it counts in an increasing sequence. If it should count upwards when the shaft rotates in the anti-clockwise direction, this connection must be connected permanently to »low« level (zero volts).
- Enable_ This input activates the data output driver when a »low« level is applied. If not connected, this input is »low«. In the case of a »high« level, the outputs are in the tristate mode.
- Store_ This input stores the encoder data in Gray code when a »low« level is applied. This avoids a read error if the output data is requested in binary code. If this input is »low«, the data at the encoder output is stable, irrespective of whether the input shaft rotates. If not switched, this input is »high«.
- Parity This output supplies a »high« level when the binary checksum of the data bits is even.
- SET This input serves to set the zero electronically. If the SET line is connected to U_s for more than 100 ms, the mechanical position corresponds to the value 0.

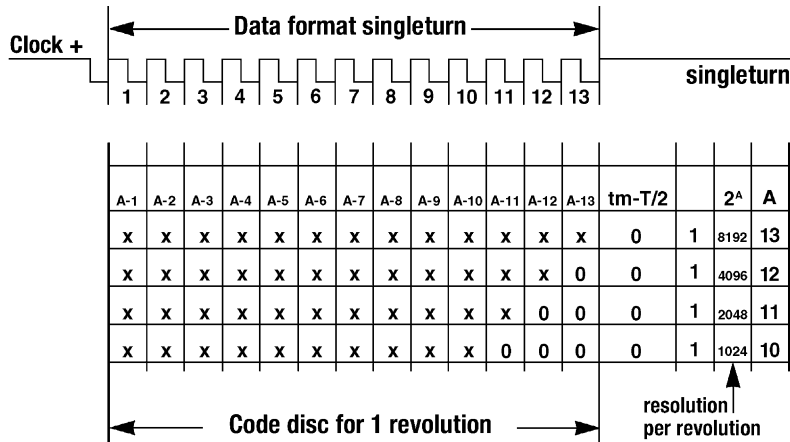


View of the connector M23 fitted to the encoder body Single, Parallel

Signal outputs

SSI data format for resolutions $\leq 8,192$ (1-13 bits)

In order to be compatible with the data formats on the market, a distinction is made in the ARS60 between two data formats. The first data format applies to the encoder designs with-resolutions up to 13 bits. This is the standard data format for the singleturn absolute encoder.



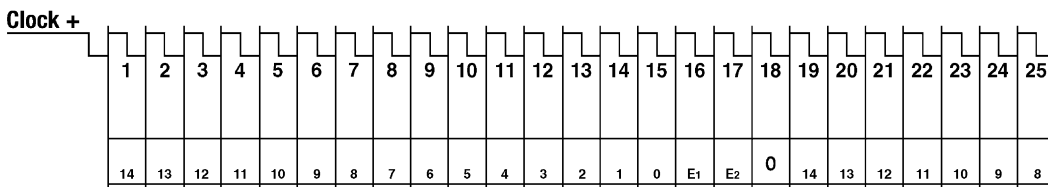
SSI data format for resolutions $> 8,192$ (14 and 15 bits)

The data transmitted is left-justified. The 15 data bits are followed by two error bits.

Error 1 (E1) = Position error

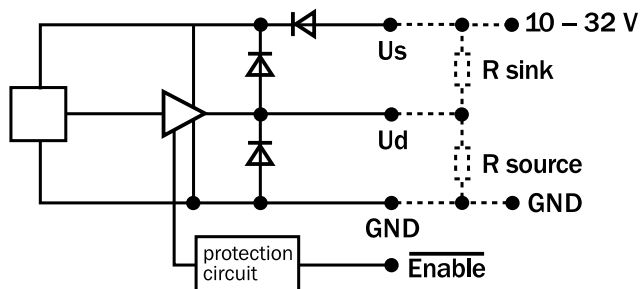
During the determination of the position, an error has occurred since the last SSI transmission. This error bit will be deleted during the next SSI transmission.

Error 2 (E2) = light source monitoring



Parallel interface (output driver 7272 push-pull)

- Tristate capability
- Short-circuit protected
- Protected against reverse polarity
- Integrated transient protection diodes



Technical data: Parallel interface

I_{dH} max. at +85° C 8 nF load 6000 min ⁻¹	30 mA
I_{dL} max. at +85° C 8 nF load 6000 min ⁻¹	30 mA
Output saturation voltage (H-level)	
to I_{dH}	10 mA 2.8 V
U_S-U_{dH}	30 mA 3.0 V
Output saturation voltage (L-level)	
t I_{dL}	10 mA 0.4 V
U_{dL}	30 mA 2.0 V
Position refresh time (dependent upon the encoder resolution and output code)	
Parallel Gray-Code	60 µs
Parallel BIN-Code	60 µs
Parallel BCD-Code	200 µs

Recommended accessories

M23 screw-in system

Short description	Cable length	Model name	Part no.
Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	DOS-2312-G	6027538
Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	STE-2312-G	6027537
Cable socket, M23, 12-pin, straight, pre-wired with 12-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , shielded, suitable for drag chain, cable diameter 7.8 mm, suitable for ARS60 SSI	1.5 m	DOL-2312-G1M5MA2	2029206
	3.0 m	DOL-2312-G03MMA2	2029207
	5.0 m	DOL-2312-G05MMA2	2029208
	10.0 m	DOL-2312-G10MMA2	2029209
	20.0 m	DOL-2312-G20MMA2	2029210
	30.0 m	DOL-2312-G30MMA2	2029211
Cable socket, M23, 21-pin, straight, shielded, suitable for cable diameter 5.5 - 12 mm	-	DOS-2321-G	6027539
Cable socket, M23, 21-pin, straight, pre-wired with 22-core cable, 20 x 0.14 mm ² + 2 x 0.25 mm ² , shielded, cable diameter 7.8 mm, suitable for ARS60 parallel	1.5 m	DOL-2321-G1M5PA4	2029218
	3.0 m	DOL-2321-G03MPA4	2029219
	5.0 m	DOL-2321-G05MPA4	2029220
	10.0 m	DOL-2321-G10MPA4	2029221
	20.0 m	DOL-2321-G20MPA4	2029222

Cable by the meter

Short description	Model name	Part no.
Data cable by the meter 4 x 2 x 0.15 mm ² with shielding, diam. 5.6 mm	LTG-2308-MWENC	6027529
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² with shielding, diam. 7.5 mm	LTG-2411-MW	6027530
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, diam. 7.8 mm	LTG-2512-MW	6027531
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, UV and salt water resistant, diam. 7.8 mm	LTG-2612-MW	6028516
Parallel cable by the meter 20 x 0.14 mm ² + 2 x 0.25 mm ² with shielding, diam. 7.8 mm	LTG-2622-MW	6027532

Shaft couplings

Short description	Model name	Part no.
Bellows coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
Bellows coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983
Bellows coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984
Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985
Spring washer coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

Mechanical adapters

Short description	Model name	Part no.
Flange adapter, adapts face mount flange with 36 mm centering collar to 58 mm square mounting plate with shock absorber	BEF-FA-036-060RSA	2029163

Plug connectors and cables

Short description	Model name	Part no.
Cable connector, SUB-D, 15-pin, straight (shielded)	STE-0D15-G	2029223
Cable socket, SUB-D, 37-pin, straight (shielded)	DOS-0D37-G	2029224

→ For additional accessories, please see page H-399





Wire draw encoders – made-to-measure solutions for your applications

Wire draw encoders consist of a wire draw mechanism and an encoder. The rotation of the drum is proportional to the length being measured. This movement is counted by an encoder, converted to a measuring signal, and provides high-resolution position or distance information for linear measurement paths. SICK's wire draw encoders provide a large selection of interfaces and absolute or incremental encoders, which enable made-to-measure solutions for almost any application.

Your benefits

- From standard to heavy-duty, SICK's wide range of wire draw encoders are suitable for almost any application
- Due to their modular design, SICK wire draw encoders offer the appropriate interface for every application
- A large selection of measuring lengths – from 1.25 m to 50 m
- 3 different product families – EcoLine, Compact, HighLine – suitable for any application
- Unlike other linear measuring systems, wire draw encoders do not require precise linear guidance
- Resolutions of up to 0.001 mm enable very precise measurements
- Easy installation



Wire draw encoders

Applications	F-284
Product family overview	F-288
Selection aid	F-289



EcoLine	F-290
Modular wire draw encoder in miniature design	



Compact	F-322
Compact design – with integrated encoder	



HighLine	F-334
Measuring lengths up to 50 m, rugged design – the heavy-duty wire draw encoder	

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Typical wire draw encoders applications

Automated guided systems – positioning of lift height and measurement of fork width

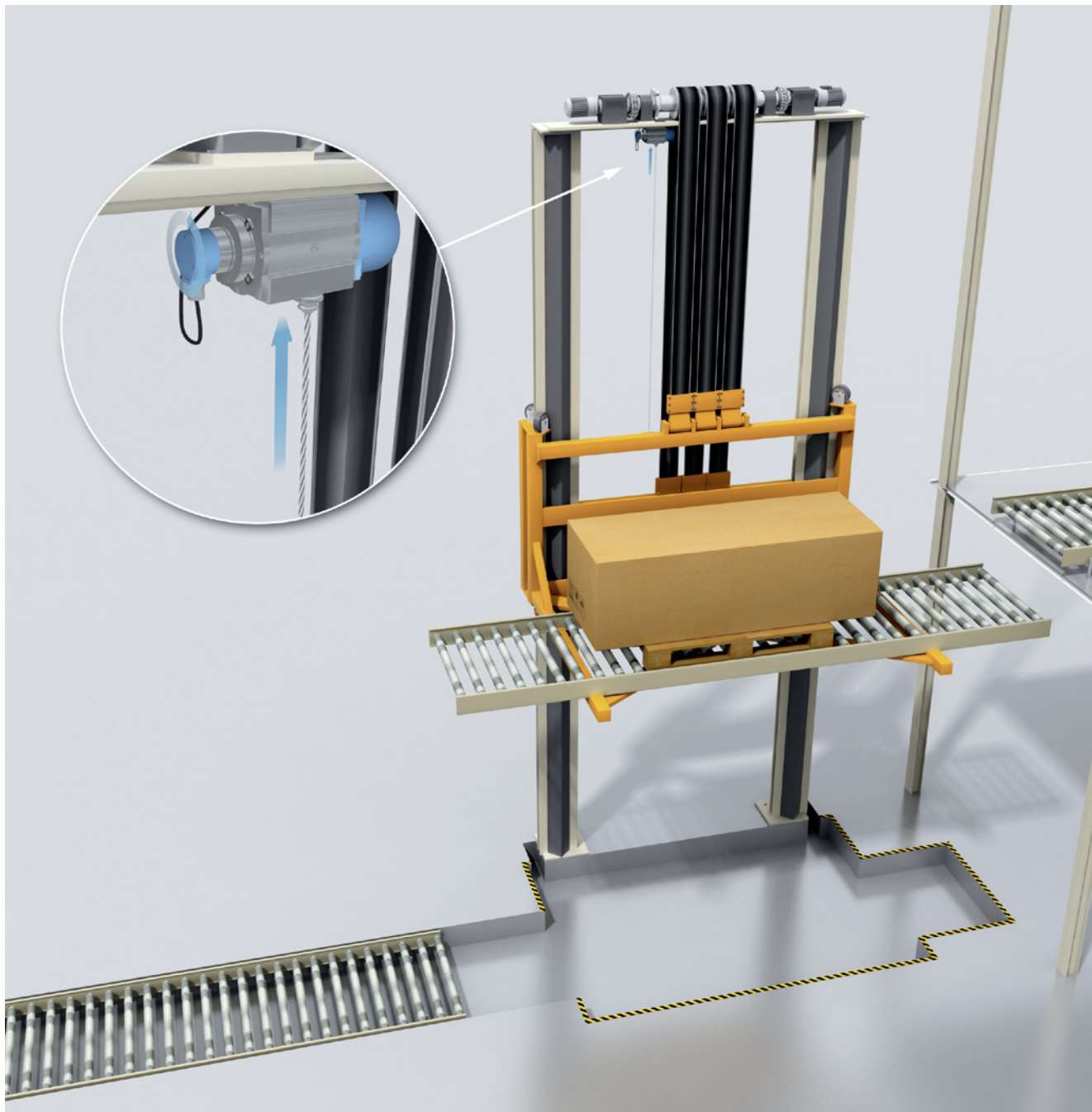


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Automated guided systems are fully automated vehicles that are primarily used for transporting goods. SICK sensors give the vehicles guidance and safeguard them against danger. Height positioning of the lifting surface and measurement of the fork width can also be automated. Wire draw encoders are particularly reliable at these tasks.

BCG wire draw encoders from the EcoLine product family can be used to calculate lift height with a measured length of up to 10 m. They are specifically designed for this purpose and their slim design, light weight and flexible mounting options facilitate vehicle loading. A special rope outlet nozzle also prevents damage from shock and vibration. The BCG EcoLine product family can pick up the smallest variants of fork width measurements up to 1.25 m.

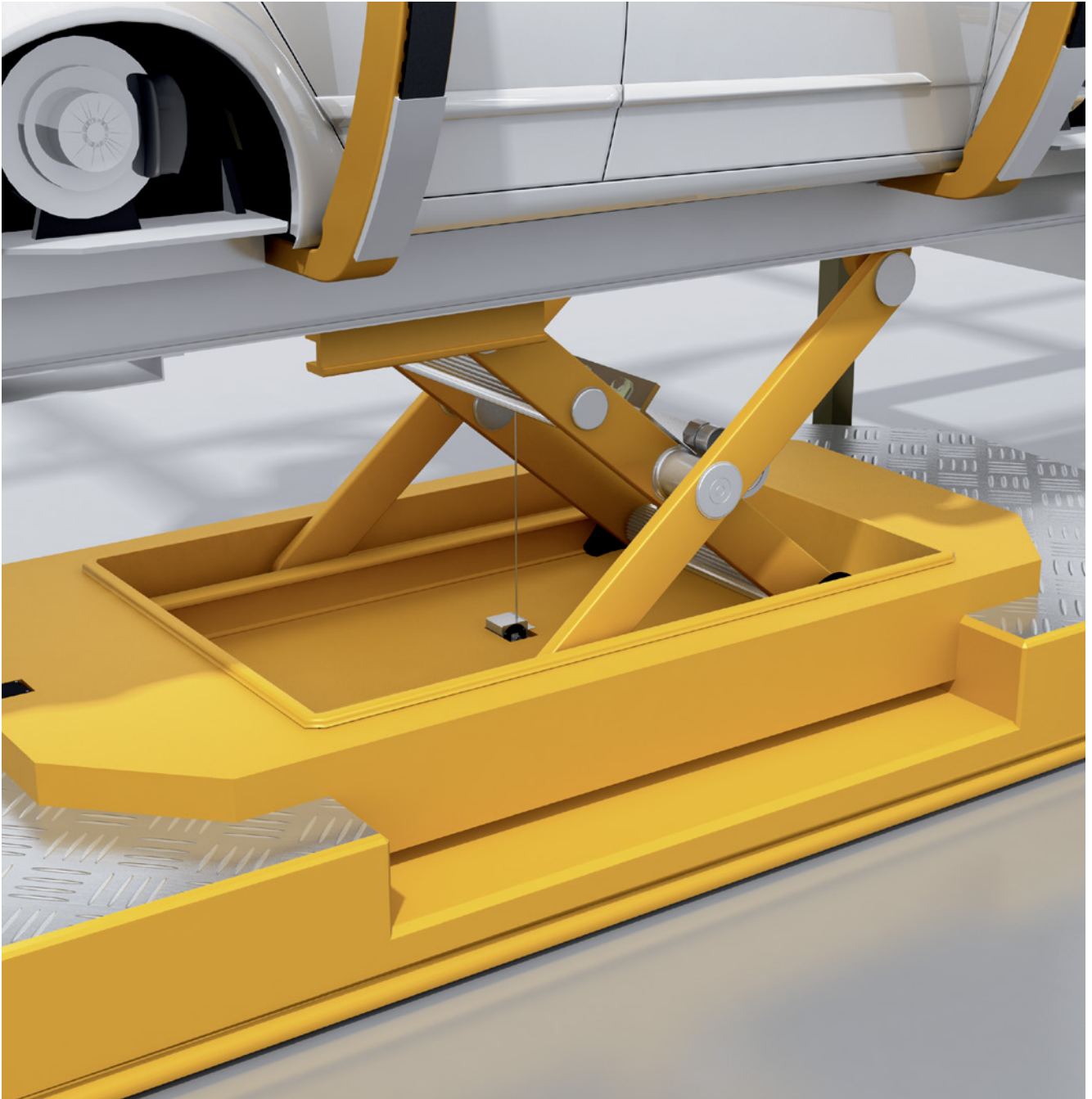
Lifts – flush placement of platform and target level



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 robust design and high reproducibility, particularly accurate positioning is possible. Like the EcoLine product family, it is suited for measuring lengths over 10 m.

Overhead conveyors – positioning vehicle bodies

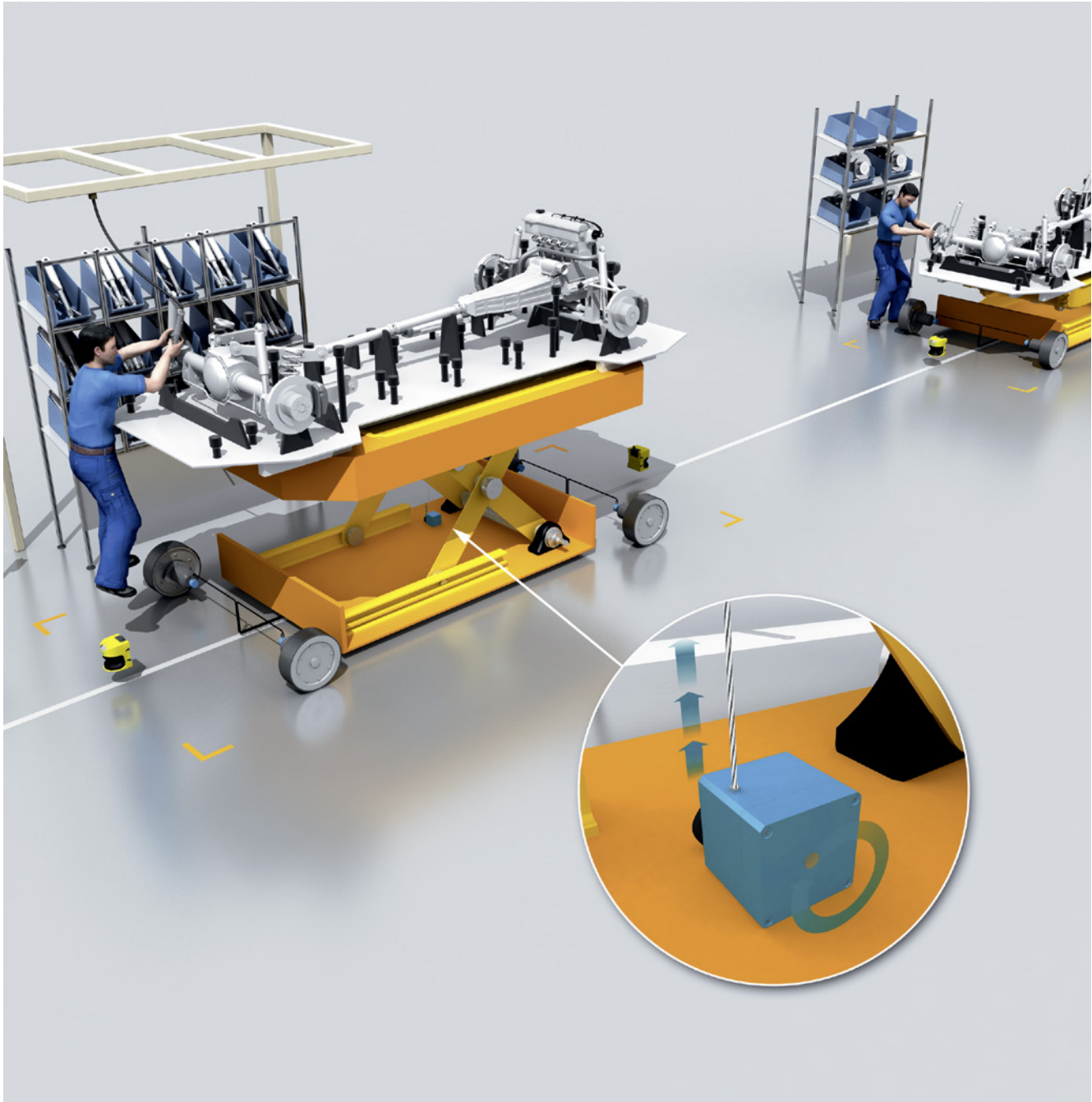


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Overhead conveyors are used in the automotive industry to position vehicle bodies. The exact height of the bodies must be calculated to ensure a smooth assembly process.

The BCG wire draw encoders from the EcoLine product family, with their 3 m measured length are perfect for this type of application. They are characterized by slim design, numerous interfaces, and flexible mounting options.

Scissor lifts – positioning platforms at working height

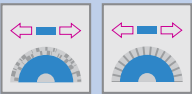
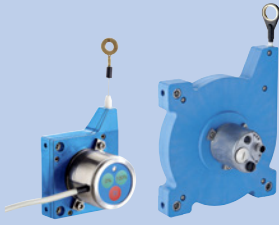

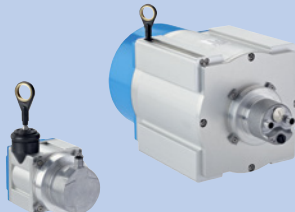


Scissor lifts are used, for example, in the automotive industry for vehicle assembly. It is important that the scissor lifts are at the ideal working height for the operators.

Wire draw encoders from the EcoLine or Compact product families are used for positioning platforms. Both are characterized by their compact designs and high precision. The EcoLine product family has a high degree of modularity in terms of measuring lengths, interfaces and mounting options.


















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Product family overview

	 <p style="text-align: center;">EcoLine</p>	 <p style="text-align: center;">Compact</p>	 <p style="text-align: center;">HighLine</p>
	<p>Modular wire draw encoder in miniature design</p>	<p>Compact design – with integrated encoder</p>	<p>Measuring lengths up to 50 m, rugged design – the heavy-duty wire draw encoder</p>
<p>Technical data overview</p>			
<p>Sub product family</p>	<p>BCG, PFG</p>	<p>BKS, XKS, PKS</p>	<p>BTF, PRF</p>
<p>Measuring length</p>	<p>Up to 10 m</p>	<p>Up to 5 m</p>	<p>Up to 50 m</p>
<p>Resolution</p>	<p>Up to 0.001 mm</p>	<p>Up to 0.295 µm</p>	<p>Up to 0.001 mm</p>
<p>Repeatability</p>	<p>Up to ±0.005 %</p>	<p>0.15 °</p>	<p>± 0.1 %</p>
<p>Electrical interface</p>	<p>4 mA ... 20 mA, analog 0 V ... 10 V, analog SSI CANopen DeviceNet PROFIBUS EtherNet/IP PROFINET EtherCAT® TTL/RS422 HTL/push pull</p>	<p>SSI HIPERFACE® TTL/RS422</p>	<p>4 mA ... 20 mA, analog 0 V ... 10 V, analog SSI CANopen DeviceNet PROFIBUS EtherNet/IP PROFINET EtherCAT® TTL/RS422 HTL/push pull</p>
<p>Modularity (wire draw mechanism and encoder)</p>	<p style="text-align: center;">✓</p>	<p style="text-align: center;">—</p>	<p style="text-align: center;">✓</p>
<p>At a glance</p>			
	<ul style="list-style-type: none"> • Measuring lengths: 1.25 m ... 10 m • Modular measuring system with a wide selection of interfaces/measuring lengths • Very small housing (55 ... 190 mm) • Very small, slim housing with spring integrated in the measurement drum • Light yet shock-proof and temperature-resistant plastic housing • Analog interface with push-button teach 	<ul style="list-style-type: none"> • Measuring lengths: 2 m ... 5 m • Integrated measuring system • Compact housing (90 x 90 x 90 mm) • Incremental and absolute versions • High resolution 	<ul style="list-style-type: none"> • 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 • Highly resistant to shock and vibrations • High resolution possible • Expandable using external accessories
<p>Detailed information</p>	<p style="text-align: center;">→ F-290</p>	<p style="text-align: center;">→ F-322</p>	<p style="text-align: center;">→ F-334</p>

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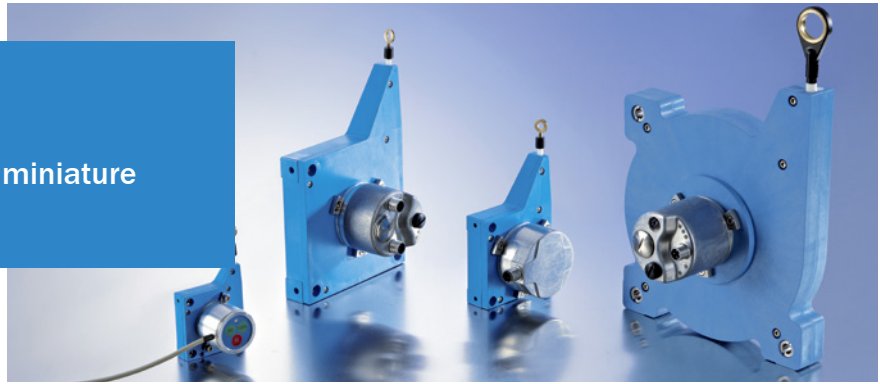
Selection aid

		Measuring length (m)								Interfaces											
										Analog		Absolute						Incremental			
		1,25	2	3	5	10	20	30	50	0 V ... 10 V	4 mA ... 20 mA	SSI	PROFIBUS	DeviceNet	CANopen	EtherNet/IP	EtherCAT®	PROFINET	HIPERFACE®	HTL	TTL
EcoLine																					
	BCG05	■								■	■										
	BCG08			■						■	■	■	■	■	■	■	■	■ ¹⁾			
	BCG13				■					■	■	■	■	■	■	■	■	■ ¹⁾			
	BCG19					■				■	■	■	■	■	■	■	■	■ ¹⁾			
	PFG05	■																	■	■	
	PFG08			■																■	■
	PFG13				■															■	■
	PFG19					■														■	■
Compact																					
	BKS		■		■						■										
	XKS		■		■							■ ¹⁾	■ ¹⁾	■ ¹⁾				■			
	PKS		■		■																■
HighLine																					
	BTF08		■	■						■	■	■	■	■	■	■	■	■ ¹⁾			
	BTF13				■	■	■	■		■ ²⁾	■ ²⁾	■	■	■	■	■	■	■ ¹⁾			
	BTF19							■				■	■	■	■	■	■	■ ¹⁾			
	PRF08		■	■															■	■	
	PRF13				■	■	■	■												■	■
	PRF19							■												■	■

¹⁾ Optional, on request.

²⁾ Up to 20 m measuring length analog interface available on request.

Modular wire draw encoder in miniature design



EtherCAT

ETHERNET/IP

PROFINET

CE SSI

CANopen

PROFIBUS

DeviceNet

EtherCAT® is registered trademark and patent technology, licensed by Beckhoff Automation GmbH, Germany.

Product description

The slim design of the EcoLine family is ideal for applications with limited space. Its modularity makes it suitable for a large selection of measuring lengths, interfaces and encoders. Due to the integrated drum spring as well as the adaption without coupling, it is possible

to achieve high precision and stability. The special nozzle serves to protect the measuring wire from damage caused by vibration. The intuitive teach-in function provided in analog options also enables easy system integration.

At a glance

- Measuring lengths: 1.25 m ... 10 m
- Modular measuring system with a wide selection of interfaces/measuring lengths
- Very small housing (55 ... 190 mm)
- Slim housing with spring integrated in the measuring drum
- Light yet shock-proof and temperature-resistant plastic housing
- Analog interface with push-button teach

Your benefits

- Space- and cost-saving design thanks to slim mechanics
- The absolute analog output allows for the use of a cost-effective interface card
- Easy to install
- Numerous combinations of interfaces and measuring lengths
- Advanced programming options lead to a reduction in the amount of variants, save costs, and reduce storage

Additional information

- Detailed technical data F-291
- Ordering information F-299
- Dimensional drawings F-304
- Recommended accessories F-321

→ www.mysick.com/en/EcoLine

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.



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Analog encoders and absolute encoders detailed technical data

Performance

	BCG05	BCG08	BCG13	BCG19
Measuring range	0 ... 1.25 m	0 ... 3 m	0 ... 5 m	0 ... 10 m
Repeatability ¹⁾	±0.005 %			±0.03 %
Linearity ¹⁾	±0.01 %			±0.05 %
Hysteresis ¹⁾	±0.1 %			±0.04 %
Resolution				
4 mA ... 20 mA Analog	0.04 mm	0.06 mm	0.1 mm	0.03 mm
0 V ... 10 V Analog	0.04 mm	0.06 mm	0.1 mm	0.03 mm
SSI	–	0.03 mm ... 0.06 mm	0.05 mm ... 0.1 mm	0.07 mm ... 0.14 mm
CANopen	–	0.03 mm	0.05 mm	0.07 mm
DeviceNet	–	0.03 mm	0.05 mm	0.07 mm
PROFIBUS	–	0.03 mm	0.05 mm	0.07 mm
EtherNet/IP	–	0.001 mm	0.001 mm	0.002 mm
PROFINET	–	0.001 mm	0.001 mm	0.002 mm
EtherCAT®	–	0.001 mm	0.001 mm	0.002 mm

¹⁾ Value refers to wire draw mechanic.

Interfaces

	BCG05	BCG08	BCG13	BCG19
Electrical interface	See type code			
Encoder connection type	See type code			
Clock frequency				
4 mA ... 20 mA Analog	32 kHz			
0 V ... 10 V Analog	32 kHz			
SSI	–	1 MHz 2 MHz		
Address setting				
CANopen	–	0 ... 63 (DIP-switches or protocol)		
DeviceNet	–	0 ... 63 (DIP-switches or protocol)		
PROFIBUS	–	0 ... 127 (DIP-switches)		
EtherNet/IP	–	Via DHCP / DEC-switches		
PROFINET	–	Via DCP		
EtherCAT®	–			
Protocol				
CANopen	–	Communication Profile DS 301 V4.0		
DeviceNet	–	DeviceNet Specification, Release 2.0		
PROFIBUS	–	PROFIBUS DP V0		
EtherNet/IP	–	EtherNet/IP IEC 61784-1		
PROFINET	–	PROFINET IO / RT Class B		
EtherCAT®	–	EtherCAT® COE (CIA DS-301)		
Bus termination				
CANopen	–	Via DIP-switches		
DeviceNet	–	Via DIP-switches		
PROFIBUS	–	Via DIP-switches		

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	BCG05	BCG08	BCG13	BCG19
Measuring range	0 ... 1.25 m	0 ... 3 m	0 ... 5 m	0 ... 10 m
SET (electronic adjustment)				
4 mA ... 20 mA Analog	Teach-in functionality			
0 V ... 10 V Analog	Teach-in functionality			
SSI	-	Via SET cable		
CANopen	-	Via PRESET pushbutton or protocol		
DeviceNet	-	Via PRESET pushbutton or protocol		
PROFIBUS	-	Via PRESET pushbutton or protocol		
EtherNet/IP	-	Via PRESET pushbutton or protocol		
PROFINET	-	Via PRESET pushbutton or protocol		
EtherCAT®	-	Via PRESET pushbutton or protocol		
Encoder profile				
CANopen	-	Device Profile DSP 406 V2.0		
DeviceNet	-	Generic Profile		
PROFIBUS	-	Encoder Profile version 1.1 class 1 and class 2		
EtherNet/IP	-	0 x 22		
PROFINET	-	V4.1 Class3		
EtherCAT®	-	CIA DS-406		

Mechanical data

	BCG05	BCG08	BCG13	BCG19
Measuring range	0 ... 1.25 m	0 ... 3 m	0 ... 5 m	0 ... 10 m
Working temperature range				
4 mA ... 20 mA Analog	-20 ... + 70 °C			
0 V ... 10 V Analog	-20 ... + 70 °C			
SSI with AFM60E	0 ... + 70 °C			
SSI with AFM60B	-20 ... + 70 °C			
CANopen	-20 ... + 70 °C			
DeviceNet	-20 ... + 70 °C			
PROFIBUS	-10 ... + 70 °C			
EtherNet/IP	-20 ... + 70 °C			
PROFINET	-20 ... + 70 °C			
EtherCAT®	-20 ... + 70 °C			
Mass (incl. encoder)				
4 mA ... 20 mA Analog	200 g	650 g	1.2 kg	2.3 kg
0 V ... 10 V Analog	200 g	650 g	1.2 kg	2.3 kg
SSI	-	510 g	1.06 kg	2.16 kg
CANopen	-	840 g	1.39 kg	2.49 kg
DeviceNet	-	840 g	1.39 kg	2.49 kg
PROFIBUS	-	530 g	1.08 kg	2.18 kg
EtherNet/IP	-	450 g	1.0 kg	2.1 kg
PROFINET	-	450 g	1.0 kg	2.1 kg
EtherCAT®	-	450 g	1.0 kg	2.1 kg
Mass (mechanism)	80 g	250 g	800 g	1.9 kg
Measuring wire diameter	0.45 mm	0.55 mm		
Measuring wire material	1.4410 / PA-coated			
Wire draw mechanism housing material	Plastic, Noryl			
Drum circumference	150 mm	230 mm	385 mm	555 mm
Spring return force ¹⁾	Ca. 1 N ... 1.4 N	Ca. 5 N ... 6.3 N	Ca. 4.5 N ... 7 N	Ca. 9 N ... 12 N
Service life of wire draw mechanism	1 million cycles			
Actual wire draw length	1.45 m	3.2 m	5.2 m	10.2 m
Wire acceleration	10 m/s ²		4 m/s ²	8 m/s ²
Adjustment speed	4 m/s			
Integrated encoder				
4 mA ... 20 mA Analog	ACM36			ACM60
0 V ... 10 V Analog	ACM36			ACM60
SSI	-	AFM60 SSI		
CANopen	-	ATM60 CANopen		
DeviceNet	-	ATM60 DeviceNet		
PROFIBUS	-	A3M60		
EtherNet/IP	-	AFM60 EtherNet/IP		
PROFINET	-	AFM60 PROFINET		
EtherCAT®	-	AFM60 EtherCAT®		
Integrated mechanics	MRA-G055-101D4	MRA-G080-103D3	MRA-G130-105D3	MRA-G190-110D3
Part no. Mechanism	5324019	5322778	5322779	5326242

¹⁾ These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

Electrical data

	BCG05	BCG08	BCG13	BCG19
Measuring range	0 ... 1.25 m	0 ... 3 m	0 ... 5 m	0 ... 10 m
Initialization time ¹⁾				
4 mA ... 20 mA Analog	< 2 ms			
0 V ... 10 V Analog	< 2 ms			
SSI	–	50 ms		
CANopen	–	Approx. 12 s		
DeviceNet	–	Approx. 12 s		
PROFIBUS	–	Approx. 1 s		
EtherNet/IP	–	Approx. 12 s		
PROFINET	–	Approx. 12 s		
EtherCAT®	–	Approx. 12 s		
Supply voltage				
4 mA ... 20 mA Analog	19 V ... 33 V			18 V ... 33 V
0 V ... 10 V Analog	19 V ... 33 V			18 V ... 33 V
SSI	–	4.5 V ... 32 V		
CANopen	–	10 V ... 32 V		
DeviceNet	–	10 V ... 32 V		
PROFIBUS	–	10 V ... 32 V		
EtherNet/IP	–	10 V ... 30 V		
PROFINET	–	10 V ... 30 V		
EtherCAT®	–	10 V ... 30 V		
Code type				
SSI	–	Gray		
Power consumption				
4 mA ... 20 mA Analog	Max. 2 W			
0 V ... 10 V Analog	Max. 2 W			
SSI	–	Max. 0.7 W		
CANopen	–	Max. 2 W		
DeviceNet	–	Max. 2 W		
PROFIBUS	–	Max. 1.5 W		
EtherNet/IP	–	Max. 3 W		
PROFINET	–	Max. 3 W		
EtherCAT®	–	Max. 3 W		
MTTFd: mean time to dangerous failure ²⁾				
4 mA ... 20 mA Analog	–			
0 V ... 10 V Analog	–			
SSI	–	250 a		
CANopen	–	150 a		
DeviceNet	–	150 a		
PROFIBUS	–	60 a		
EtherNet/IP	–	80 a		
PROFINET	–	80 a		
EtherCAT®	–	80 a		

¹⁾ Valid positional data can be read once this time has elapsed.

²⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

	BCG05	BCG08	BCG13	BCG19
Measuring range	0 ... 1.25 m	0 ... 3 m	0 ... 5 m	0 ... 10 m
EMC (encoder)				
4 mA ... 20 mA Analog	DIN EN 61000-6-2; DIN EN 61000-6-3			
0 V ... 10 V Analog	DIN EN 61000-6-2; DIN EN 61000-6-3			
SSI	-	DIN EN 61000-6-2; DIN EN 61000-6-3		
CANopen	-	DIN EN 61000-6-2; DIN EN 61000-6-3		
DeviceNet	-	DIN EN 61000-6-2; DIN EN 61000-6-3		
PROFIBUS	-	DIN EN 61000-6-2; DIN EN 61000-6-3		
EtherNet/IP	-	DIN EN 61000-6-2; DIN EN 61000-6-3		
PROFINET	-	DIN EN 61000-6-2; DIN EN 61000-6-3		
EtherCAT®	-	DIN EN 61000-6-2; DIN EN 61000-6-3		
Enclosure rating (encoder)				
4 mA ... 20 mA Analog	IP 65			
0 V ... 10 V Analog	IP 65			
SSI	-	IP 67		
CANopen	-	IP 67		
DeviceNet	-	IP 67		
PROFIBUS	-	IP 67		
EtherNet/IP	-	IP 67		
PROFINET	-	IP 67		
EtherCAT®	-	IP 67		
Enclosure rating (mechanism)	IP 50			
Resistance (encoder)				
To shocks according to DIN EN 60068-2-27				
4 mA ... 20 mA Analog	50 g, 6 ms			
0 V ... 10 V Analog	50 g, 6 ms			
SSI	-	50 g/6 ms, 70 g/6 ms (depending on type)		
CANopen	-	100 g/6 ms		
DeviceNet	-	100 g/6 ms		
PROFIBUS	-	80 g/6 ms		
EtherNet/IP	-	100 g/6 ms		
PROFINET	-	100 g/6 ms		
EtherCAT®	-	100 g/6 ms		
To vibration according to DIN EN 60068-2-6				
4 mA ... 20 mA Analog	4 g Sinus 5 Hz ... 100 Hz			
0 V ... 10 V Analog	4 g Sinus 5 Hz ... 100 Hz			
SSI	-	20 g/10 ... 2,000 Hz, 30 g/10 ... 2,000 Hz (depending on type)		
CANopen	-	20 g/ 10 ... 2,000 Hz		
DeviceNet	-	20 g/ 10 ... 2,000 Hz		
PROFIBUS	-	30 g/ 10 ... 2,000 Hz		
EtherNet/IP	-	30 g/10 ... 2,000 Hz		
PROFINET	-	30 g/10 ... 2,000 Hz		
EtherCAT®	-	30 g/10 ... 2,000 Hz		

	BCG05	BCG08	BCG13	BCG19
Measuring range	0 ... 1.25 m	0 ... 3 m	0 ... 5 m	0 ... 10 m
Permissible relative humidity for integrated encoders ¹⁾				
SSI –	90 %			
CANopen –	98 %			
DeviceNet –	98 %			
PROFIBUS –	95 %			
EtherNet/IP –	90 %			
PROFINET –	90 %			
EtherCAT® –	90 %			

¹⁾ Condensation of the optical scanning not permitted.

Incremental encoders detailed technical data

Performance

	PFG05	PFG08	PFG13	PFG19
Measuring range	0 m ... 1.25 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m
Repeatability ¹⁾	±0.005 %			±0.03 %
Linearity ¹⁾	±0.01 %			±0.05 %
Hysteresis ¹⁾	±0.1 %			±0.04 %
Resolution	0.06 mm	0.014 mm	0.023 mm	0.034 mm

¹⁾ Value refers to wire draw mechanic.

Interfaces

Electrical interface	See type code
Encoder connection type	See type code

Mechanical data

Working temperature range	-20 ... + 70 °C			
Mass (incl. encoder)	230 g	550 g	1.1 kg	2.2 kg
Mass (mechanism)	80 g	250 g	800 g	1.9 kg
Measuring wire diameter	0.45 mm	0.55 mm		
Measuring wire material	1.4410/PA-coated			
Wire draw mechanism housing material	Plastic, Noryl			
Drum circumference	150 mm	230 mm	385 mm	555 mm
Spring return force ¹⁾	Approx. 1 N ... 1.4 N	Approx. 5 N ... 6.3 N	Approx. 4.5 N ... 7 N	Approx. 9 N ... 12 N
Service life of wire draw mechanism	1 million cycles			
Actual wire draw length	1.45 m	3.2 m	5.2 m	10.2 m
Wire acceleration	10 m/s ²		4 m/s ²	8 m/s ²
Adjustment speed	4 m/s			
Integrated encoder	DBS36	DFS60		
Integrated mechanics	MRA-G055-101D4	MRA-G080-103D3	MRA-G130-105D3	MRA-G190-110D3
Part no. Mechanism	5324019	5322778	5322779	5326242

¹⁾ These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

Electrical data

Reference signals, position	90°, electronically, gated with A and B	Quantity: 1 Position: 90° elec. logically gated to A and B
Max. output frequency	300 kHz	600 kHz
Load current	Max. 30 mA	
Initialization time ¹⁾	Max. 3 ms	Max. 30 ms/max. 32 ms with mechanical zero pulse width
Supply voltage	7 V ... 30 V	4.5 V ... 32 V
Power consumption	Max. 0.5 W	Max. 0.7 W
MTTFd: mean time to dangerous failure ²⁾	600 a	300 a

¹⁾ Valid positional data can be read once this time has elapsed.

²⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

	PFG05	PFG08	PFG13	PFG19
Measuring range	0 m ... 1.25 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m
EMC (encoder)	Acc. to EN 61000-6-2 and EN 61000-6-4 (class A)	Acc. to EN 61000-6-2 and EN 61000-6-3		
Enclosure rating (encoder)	IP 65	IP 67		
Enclosure rating (mechanism)	IP 50			
Resistance (encoder)				
To shocks according to DIN EN 60068-2-27	100 g/6 ms	60 g/6 ms		
To vibration according to DIN EN 60068-2-6	20 g, 10 Hz ... 2,000 Hz			
Permissible relative humidity for integrated encoders ¹⁾	90 %			

¹⁾ Condensation of the optical scanning not permitted.

Absolute encoders ordering information

Ecoline absolute type code

Construction size

0	8	80 mm (only in combination with measuring length 03)
1	3	130 mm (only in combination with measuring length 05)
1	9	190 mm (only in combination with measuring length 10)

Electrical interface

A	SSI
C	CANopen ¹⁾
D	DeviceNet ¹⁾
E	EtherCAT®
H	HIPERFACE® (on request)
K	SSI + SinCos (on request)
L	SSI + Incremental HTL (on request)
I	EtherNet/IP
N	PROFINET
P	PROFIBUS
R	SSI + Incremental programmable (on request)
S	SSI + SinCos programmable (on request)
T	SSI + Incremental TTL (on request)

Connection type

A	Connector M23, 12-pin, radial (only in combination with interface A)
B	Connector 3 x M12, axial (only in combination with the electrical interfaces E, I, N and P with axial outlet)
C	Connector M12, 8-pin, radial (only in combination with interface A)
H	Connector for field bus adapter (in combination with the electrical interfaces C and D) ¹⁾
K	Cable 8-core, universal 1.5 m (on request)
L	Cable 8-core, universal 3.0 m (on request)
M	Cable 8-core, universal 5.0 m (on request)

Measuring length

0	3	3 meters
0	5	5 meters
1	0	10 meters

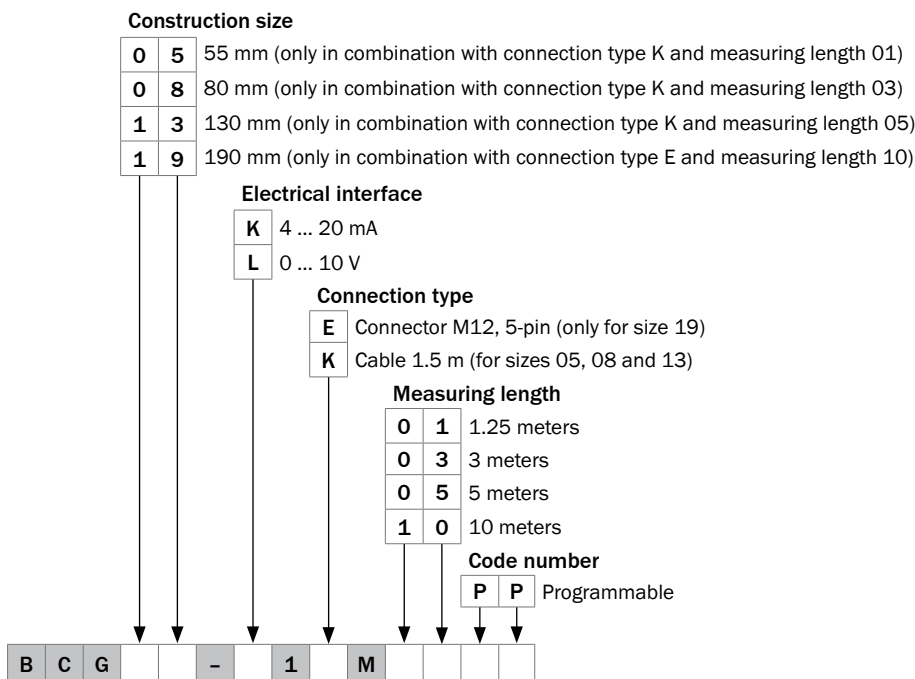
Interface / measuring length

1	8	A = SSI singleturn resolution 4,096 steps / measuring length 3 m
3	6	A = SSI singleturn resolution 8.192 steps / measuring length 3 m
1	1	A = SSI singleturn resolution 4,096 steps / measuring length 5 m
2	1	A = SSI singleturn resolution 8.192 steps / measuring length 5 m
0	7	A = SSI singleturn resolution 4,096 steps / measuring length 10 m
1	5	A = SSI singleturn resolution 8.192 steps / measuring length 10 m
3	6	C = CANopen; D = DeviceNet; P = PROFIBUS / measuring length 3 m
2	1	C = CANopen; D = DeviceNet; P = PROFIBUS / measuring length 5 m
1	5	C = CANopen; D = DeviceNet; P = PROFIBUS / measuring length 10 m
9	9	I = EtherNet/IP; E = EtherCAT®; N = PROFINET / measuring length 3 m
9	9	I = EtherNet/IP; E = EtherCAT®; N = PROFINET / measuring length 5 m
9	9	I = EtherNet/IP; E = EtherCAT®; N = PROFINET / measuring length 10 m

B C G - 1 M

¹⁾ Field bus adapter for CANopen, DeviceNet, and PROFIBUS please order separately (see chapter H "Accessories" page H-399).

Ecoline analog type code



Ordering information

Measuring range	Electrical interface	Connection type	Model name	Part no.
0 m ... 1.25 m	4 mA ... 20 mA Analog	Cable 3-core, radial 1.5 m	BCG05-K1KM01PP	6039745
	0 V ... 10 V Analog	Cable 3-core, radial 1.5 m	BCG05-L1KM01PP	6039746
0 m ... 3 m	4 mA ... 20 mA Analog	Cable 3-core, radial 1.5 m	BCG08-K1KM03PP	6039747
			BCG08-L1KM03PP	6039748
	SSI	Connector M12, 8-pin, radial	BCG08-A1CM0318	1054129
			BCG08-A1CM0336	1054131
			Connector M23, 12-pin, radial	BCG08-A1AM0318
	CANopen	Bus adapter with cable screw fixings or connector ¹⁾	BCG08-C1HM0336	1061026
	DeviceNet	Bus adapter with cable screw fixings or connector ¹⁾	BCG08-D1HM0336	1061027
	PROFIBUS	Connector 3 x M12, 5-pin, axial	BCG08-P1BM0336	1052618
	EtherNet/IP	Connector 3 x M12, 4-pin, axial	BCG08-I1BM0399	1061029
	PROFINET	Connector 3 x M12, 4-pin, axial	BCG08-N1BM0399	1061028
EtherCAT®	Connector 3 x M12, 4-pin, axial	BCG08-E1BM0399	1061030	

¹⁾ Field bus adapter for CANopen, DeviceNet, and PROFIBUS please order separately (see chapter H "Accessories" page H-399).



Measuring range	Electrical interface	Connection type	Model name	Part no.
0 m ... 5 m	4 mA ... 20 mA Analog	Cable 3-core, radial 1.5 m	BCG13-K1KM05PP	6039749
	0 V ... 10 V Analog	Cable 3-core, radial 1.5 m	BCG13-L1KM05PP	6039750
	SSI	Connector M12, 8-pin, radial	BCG13-A1CM0511	1061031
			BCG13-A1CM0521	1061032
		Connector M23, 12-pin, radial	BCG13-A1AM0511	1061033
	CANopen	Bus adapter with cable screw fixings or connector ¹⁾	BCG13-C1HM0521	1061034
	DeviceNet	Bus adapter with cable screw fixings or connector ¹⁾	BCG13-D1HM0521	1061035
	PROFIBUS	Connector 3 x M12, 5-pin, axial	BCG13-P1BM0521	1052619
	EtherNet/IP	Connector 3 x M12, 4-pin, axial	BCG13-I1BM0599	1061037
	PROFINET	Connector 3 x M12, 4-pin, axial	BCG13-N1BM0599	1061036
EtherCAT®	Connector 3 x M12, 4-pin, axial	BCG13-E1BM0599	1061038	
0 m ... 10 m	4 mA ... 20 mA Analog	Connector M12, 5-pin, radial	BCG19-K1EM10PP	6048294
	0 V ... 10 V Analog	Connector M12, 5-pin, radial	BCG19-L1EM10PP	6048295
	SSI	Connector M12, 8-pin, radial	BCG19-A1CM1007	1061039
			BCG19-A1CM1015	1061040
		Connector M23, 8-pin, radial	BCG19-A1AM1007	1056983
	CANopen	Bus adapter with cable screw fixings or connector ¹⁾	BCG19-C1HM1015	1061041
	DeviceNet	Bus adapter with cable screw fixings or connector ¹⁾	BCG19-D1HM1015	1061042
	PROFIBUS	Connector 3 x M12, 5-pin, axial	BCG19-P1BM1015	1052620
	EtherNet/IP	Connector 3 x M12, 4-pin, axial	BCG19-I1BM1099	1061044
	PROFINET	Connector 3 x M12, 4-pin, axial	BCG19-N1BM1099	1061043
EtherCAT®	Connector 3 x M12, 4-pin, axial	BCG19-E1BM1099	1061045	

¹⁾ Field bus adapter for CANopen, DeviceNet, and PROFIBUS please order separately (see chapter H "Accessories" page H-399).

Incremental encoders ordering information

Ecoline incremental type code

Construction size

0	5	55 mm (only in combination with electrical interface A or E and measuring length 01)
0	8	80 mm (only in combination with measuring length 03)
1	3	130 mm (only in combination with measuring length 05)
1	9	190 mm (only in combination with measuring length 10)

Electrical interface

A	4.5 ... 5.5 V, TTL/RS422, 6 channel
C	10 ... 32 V TTL/push pull, 6 channel
E	HTL/push pull, 6 channel (volts depending on the encoder)
P	4.5 ... 32 V, TTL/HTL, programmable (on request)

Connection type

A	Connector M23, 12-pin, radial
B	Connector M23, 12-pin, axial (on request)
C	Connector M12, 8-pin, radial
J	Cable 8-core, universal 0.5 m (on request, for measuring length 01)
K	Cable 8-core, universal 1.5 m (for measuring length 01)
L	Cable 8-core, universal 3.0 m (on request)
M	Cable 8-core, universal 5.0 m (on request)

Measuring length

0	1	1.25 meters
0	3	3 meters
0	5	5 meters
1	0	10 meters

Interface / measuring length

6	0	A = 4.5 ... 5.5 V, TTL/RS422, 6 channel / measuring length 1.25 m
7	1	A = 4.5 ... 5.5 V, TTL/RS422, 6 channel / measuring length 3 m
4	4	A = 4.5 ... 5.5 V, TTL/RS422, 6 channel / measuring length 5 m
2	9	A = 4.5 ... 5.5 V, TTL/RS422, 6 channel / measuring length 10 m
7	1	C = 10 ... 32 V TTL/push pull, 6 channel / measuring length 3 m
4	4	C = 10 ... 32 V TTL/push pull, 6 channel / measuring length 5 m
2	9	C = 10 ... 32 V TTL/push pull, 6 channel / measuring length 10 m
6	0	E = HTL/push pull, 6 channel (volts depending on the encoder)/ measuring length 1.25 m
7	1	E = HTL push pull, 6 channel (volts depending on the encoder)/ measuring length 3 m
4	4	E = HTL/push pull, 6 channel (volts depending on the encoder)/ measuring length 5 m
2	9	E = HTL/push pull, 6 channel (volts depending on the encoder)/ measuring length 10 m

F



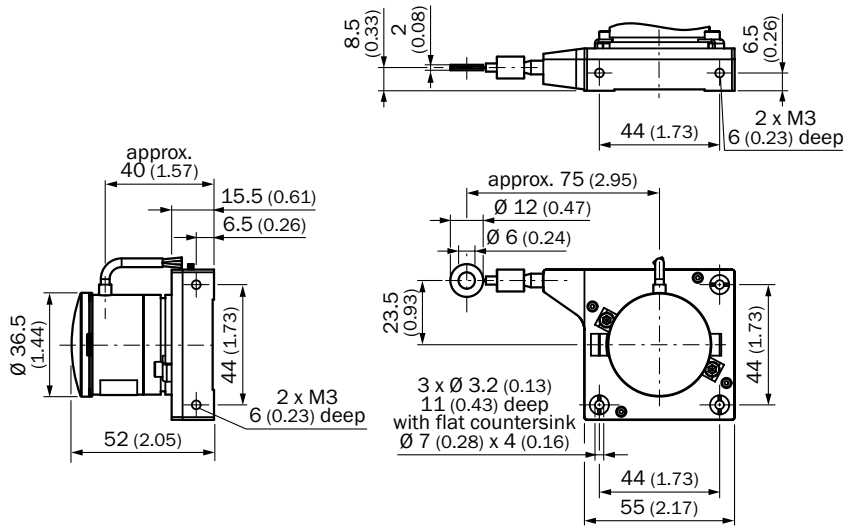
Ordering information

Measuring range	Electrical interface	Connection type	Model name	Part no.
0 m ... 1.25 m	TTL/RS422	Cable, 8-core, universal, 1.5 m	PFG05-A1KM0160	1060972
	HTL/push pull	Cable, 8-core, universal, 1.5 m	PFG05-E1KM0160	1060971
0 m ... 3 m	TTL/RS422	Connector M12, 8-pin, radial	PFG08-A1CM0371	1060974
		Connector M23, 12-pin, radial	PFG08-A1AM0371	1060977
	HTL/push pull	Connector M12, 8-pin, radial	PFG08-E1CM0371	1060979
		Connector M23, 12-pin, radial	PFG08-E1AM0371	1060981
0 m ... 5 m	TTL/RS422	Connector M12, 8-pin, radial	PFG13-A1CM0544	1061015
		Connector M23, 12-pin, radial	PFG13-A1AM0544	1061016
	HTL/push pull	Connector M12, 8-pin, radial	PFG13-E1CM0544	1061017
		Connector M23, 12-pin, radial	PFG13-E1AM0544	1061018
0 m ... 10 m	TTL/RS422	Connector M12, 8-pin, radial	PFG19-A1CM1029	1061020
		Connector M23, 12-pin, radial	PFG19-A1AM1029	1061021
	HTL/push pull	Connector M12, 8-pin, radial	PFG19-E1CM1029	1061022
		Connector M23, 12-pin, radial	PFG19-E1AM1029	1061023

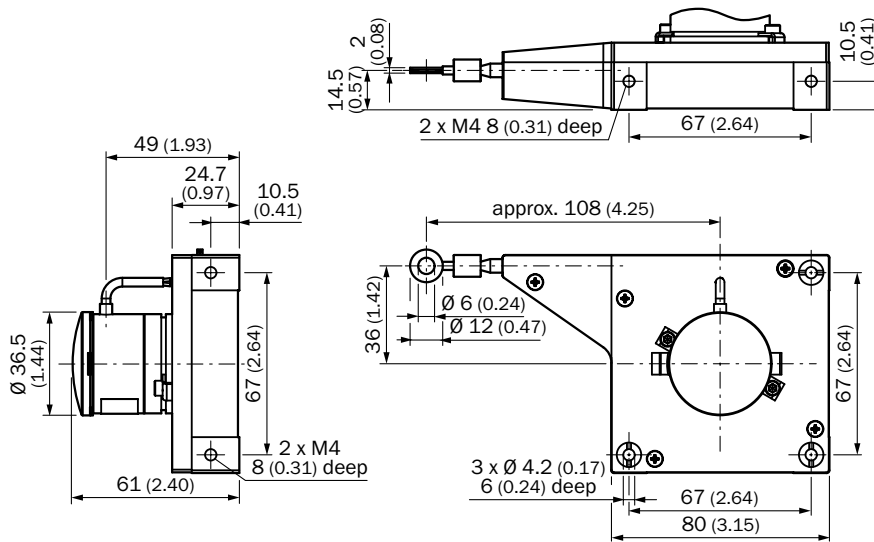
Dimensional drawings

dimensions in mm (inch)

BCG05
Analog

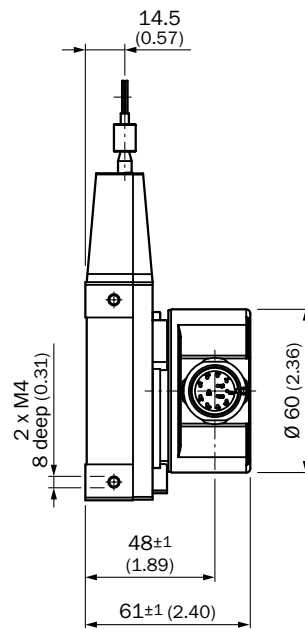
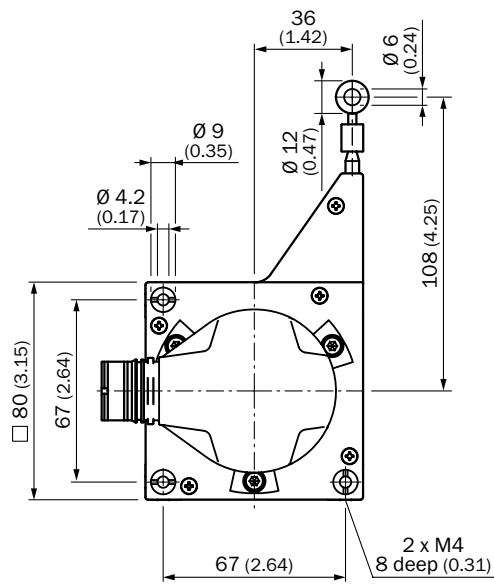
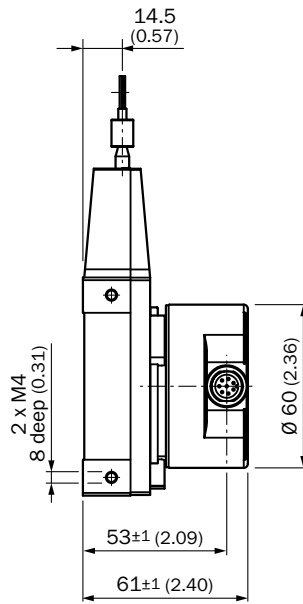
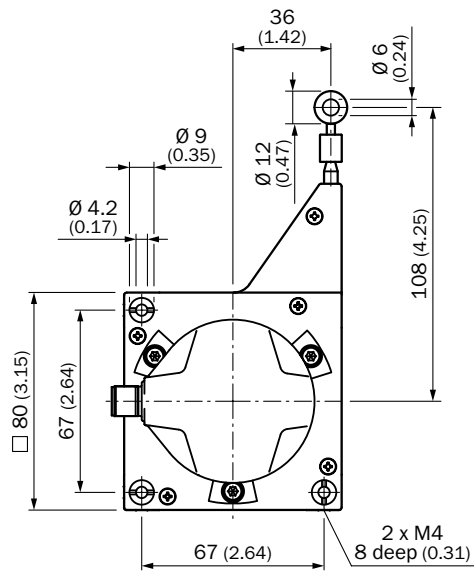


BCG08
Analog



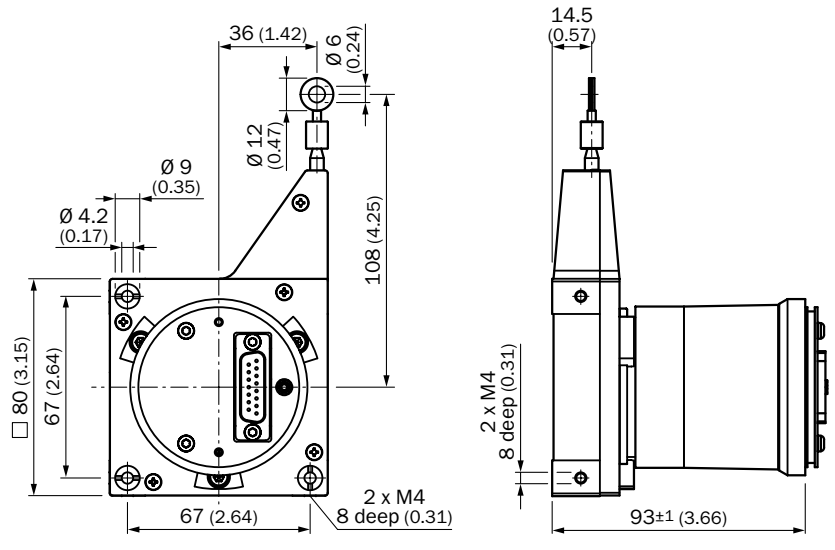
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BCG08
SSI

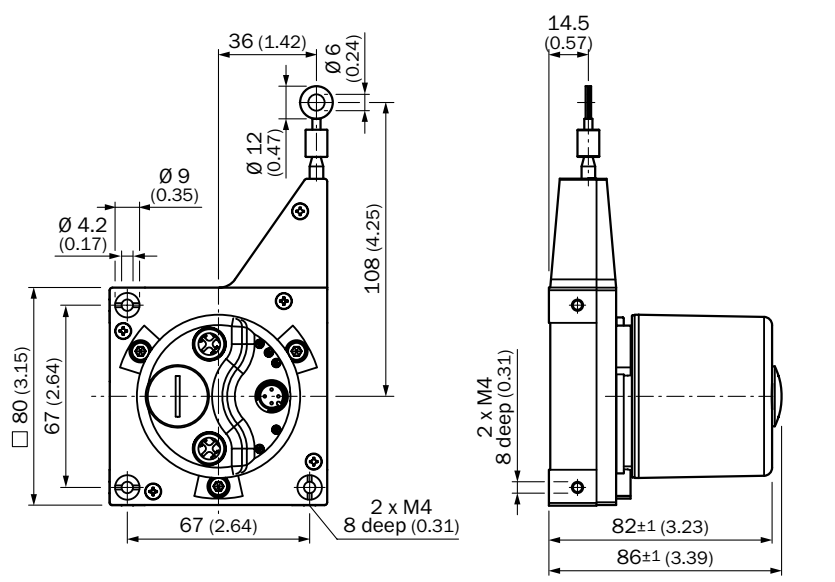


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BCG08
CANopen, DeviceNET

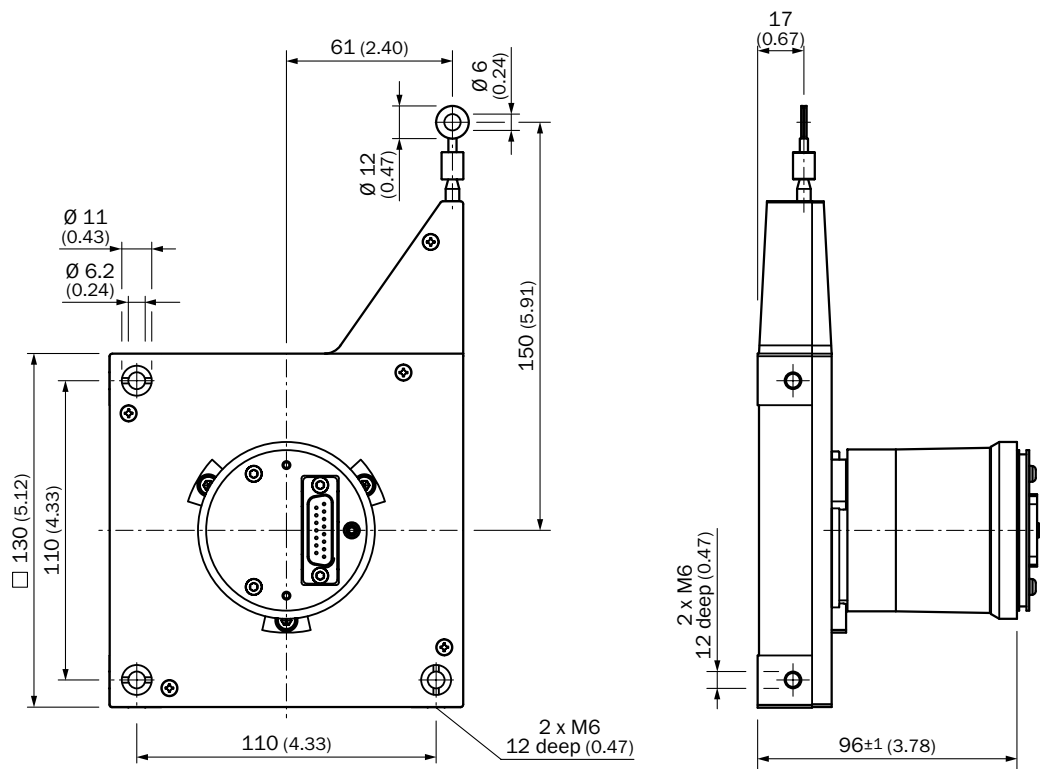


BCG08
EtherNET/IP, EtherCAT®, PROFINET

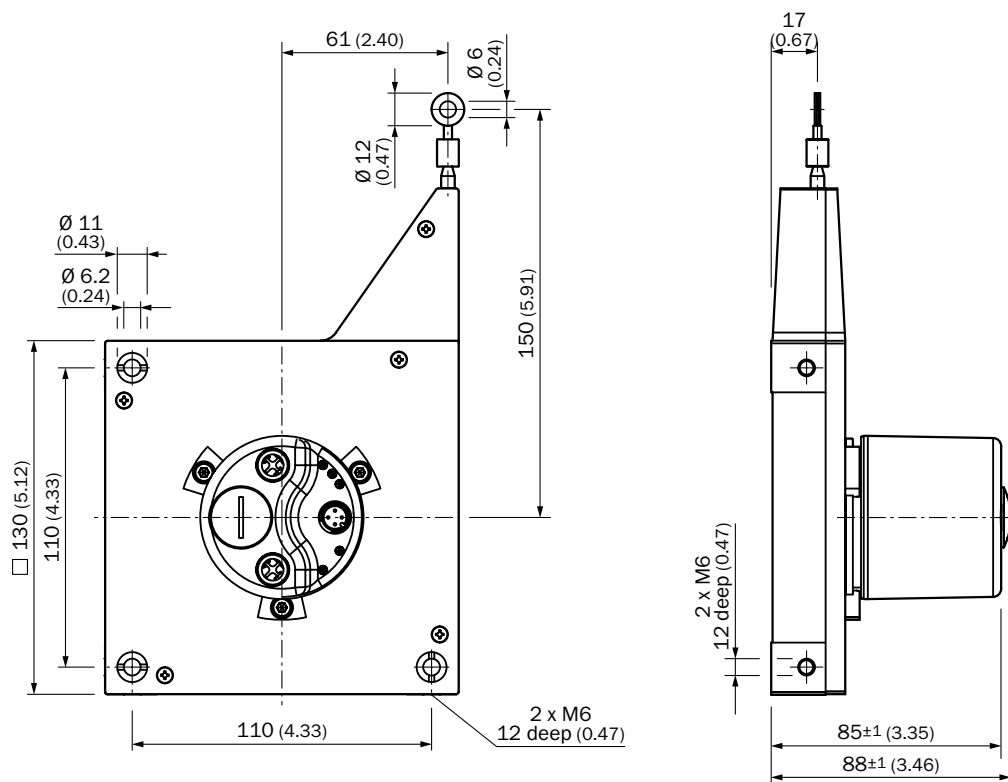


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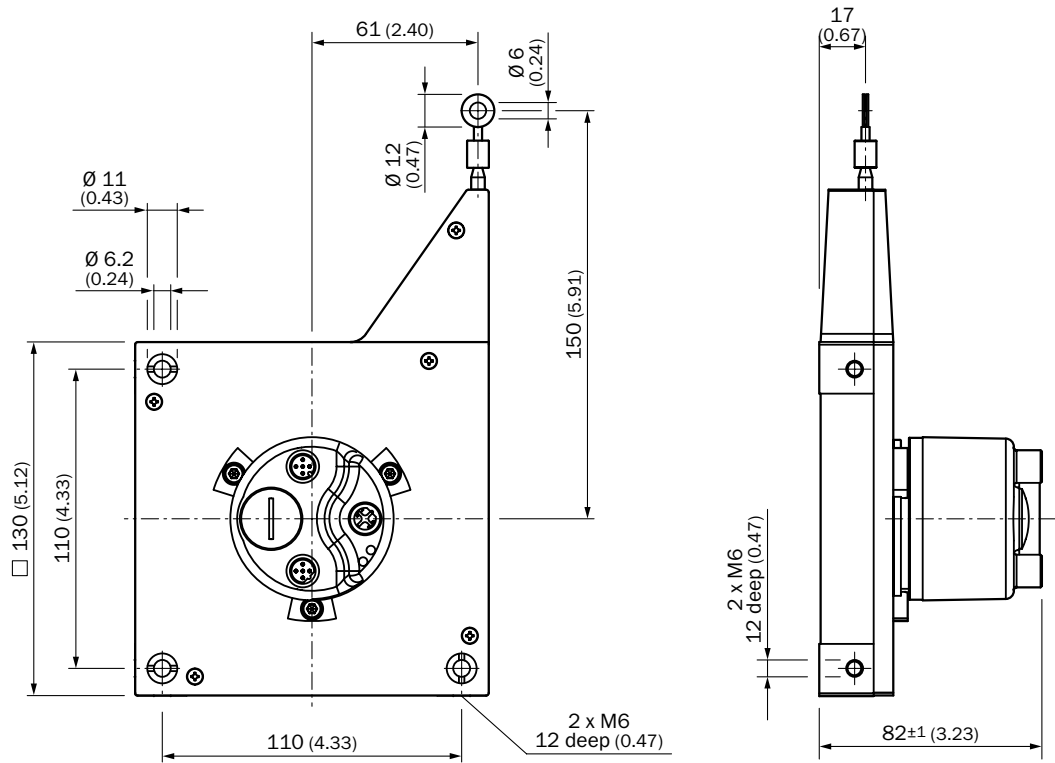
BCG13
CANopen, DeviceNet



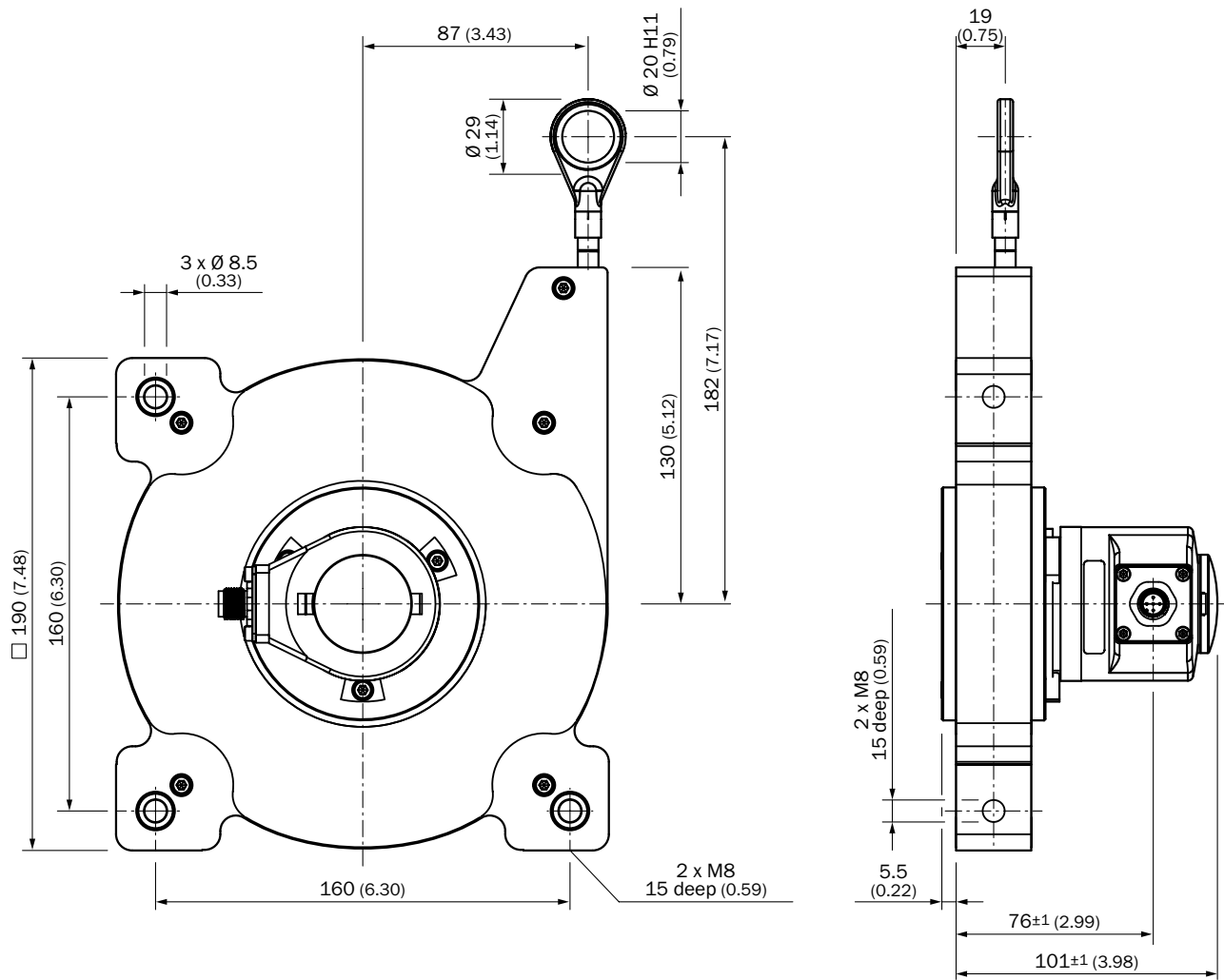
BCG13
EtherNET/IP, EtherCAT®, PROFINET



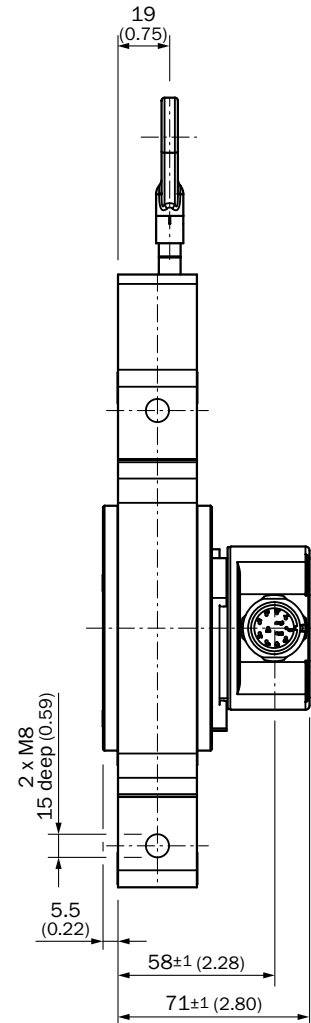
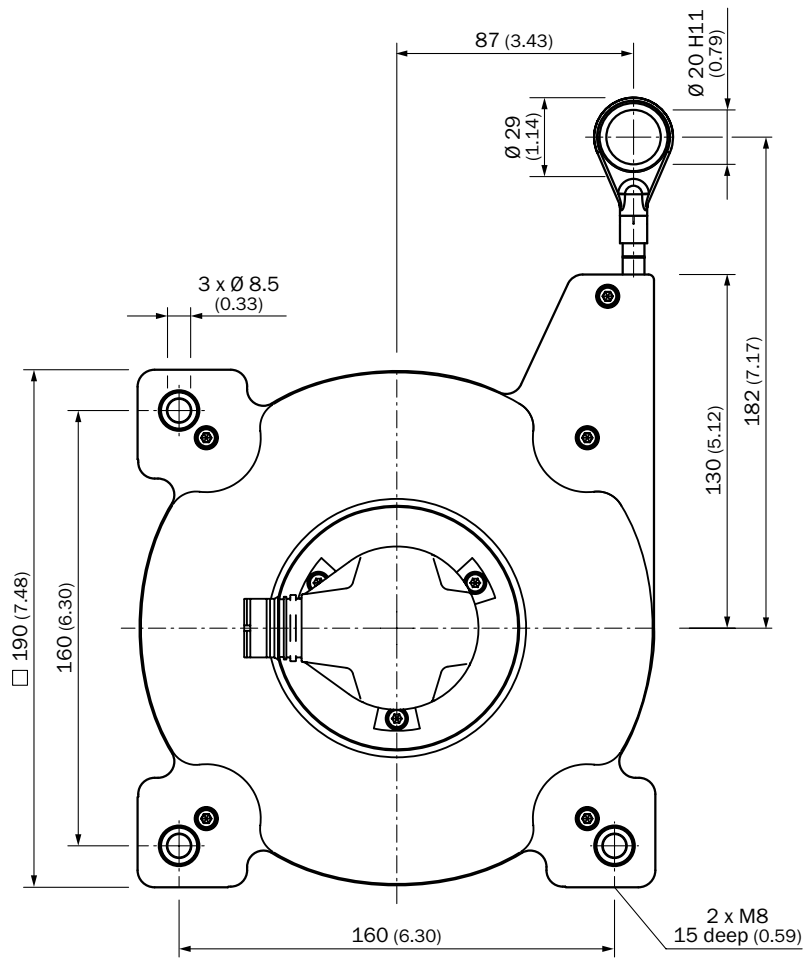
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**BCG13
PROFIBUS****F**

BCG19
Analog

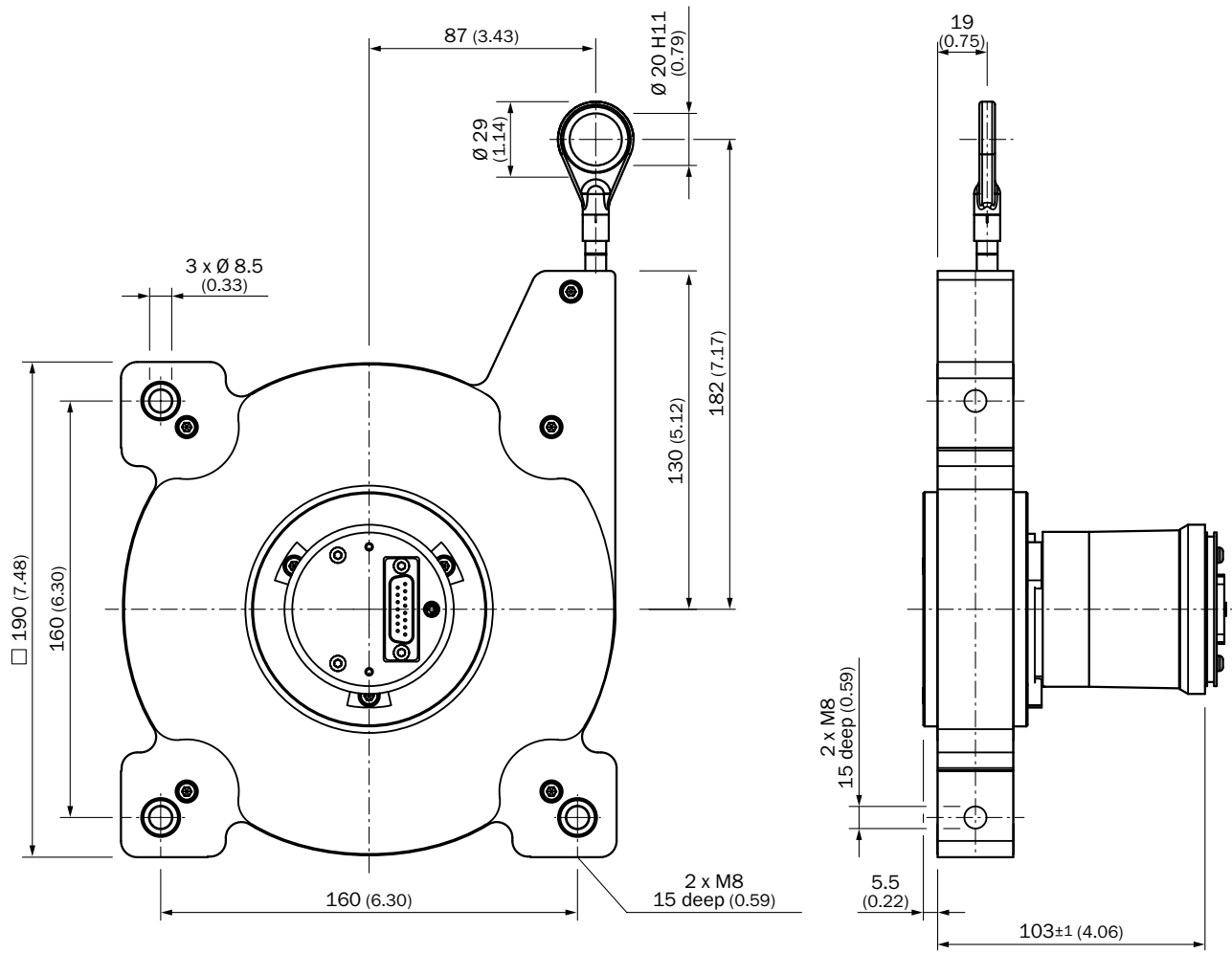


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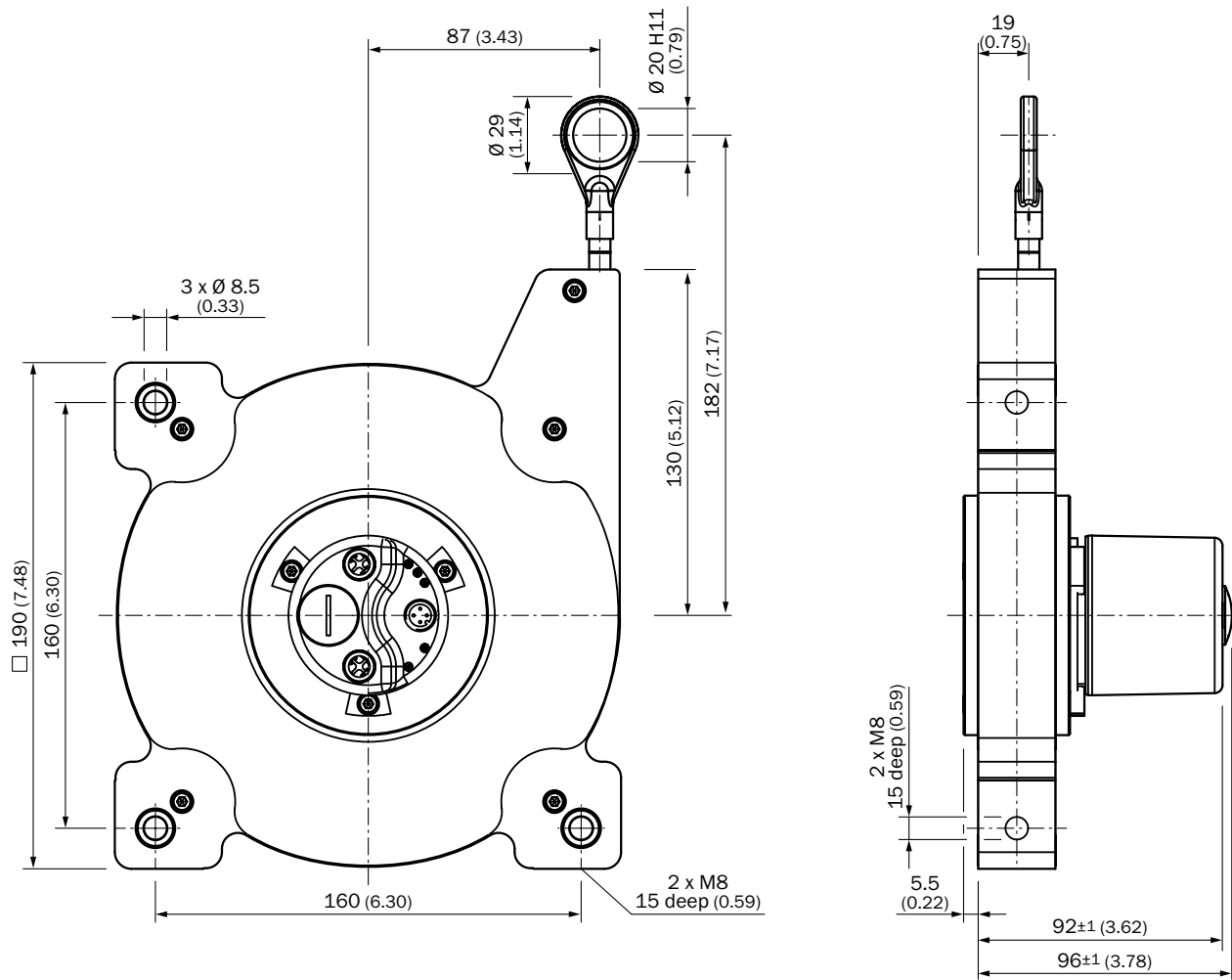


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BCG19
CANopen, DeviceNet

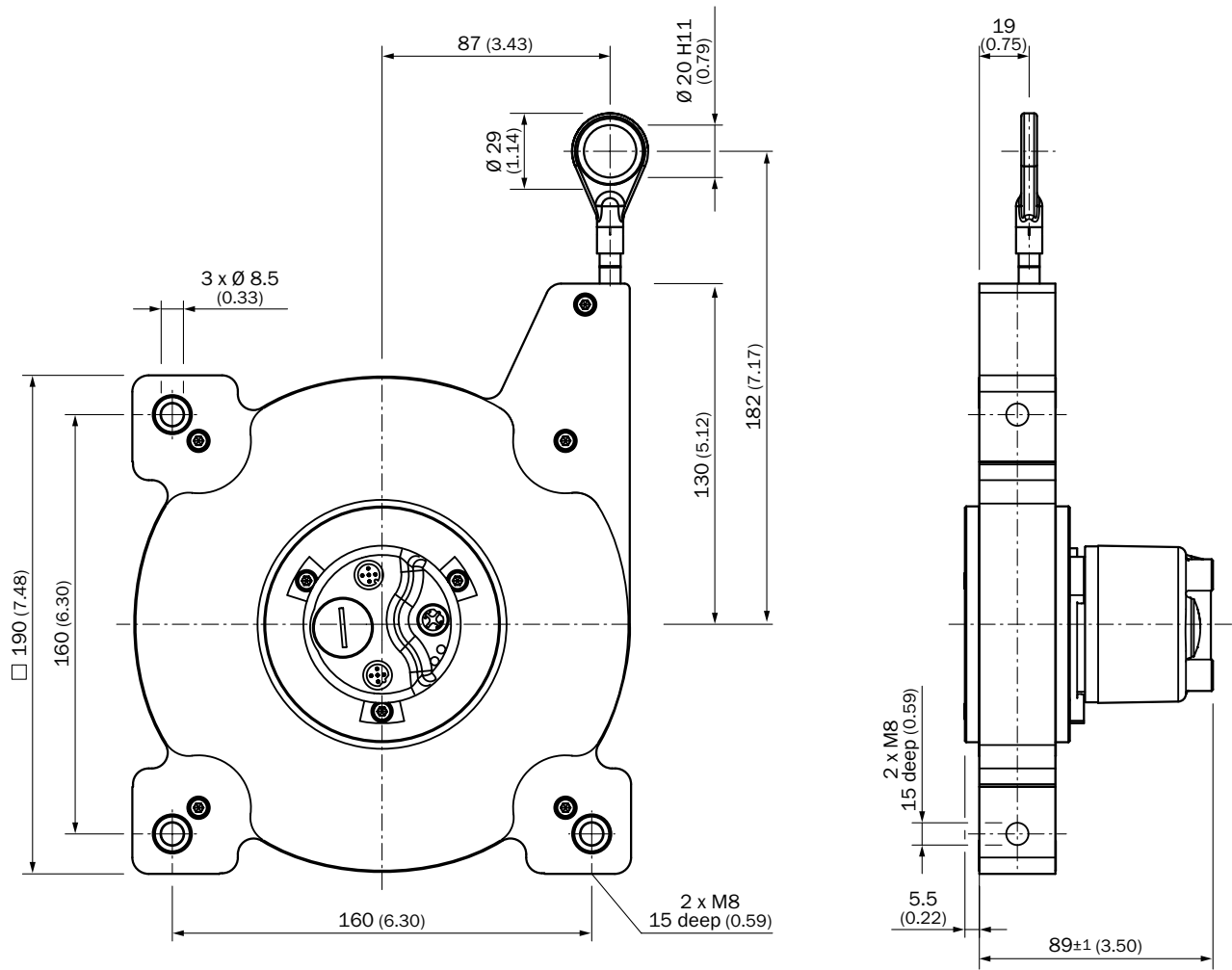


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BCG19
EtherNET/IP, EtherCAT®, PROFINET

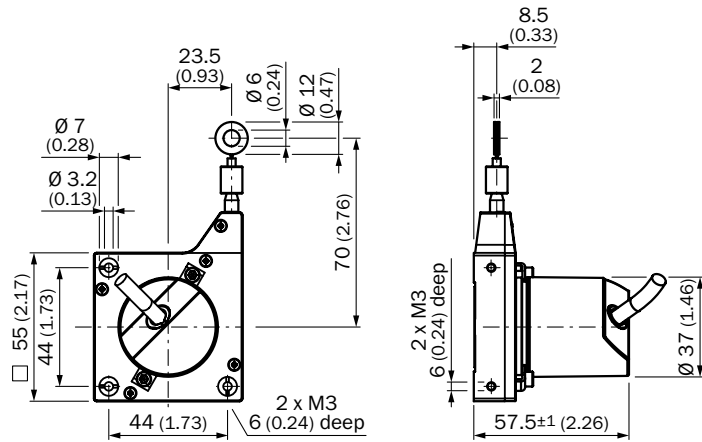
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**BCG19
PROFIBUS**

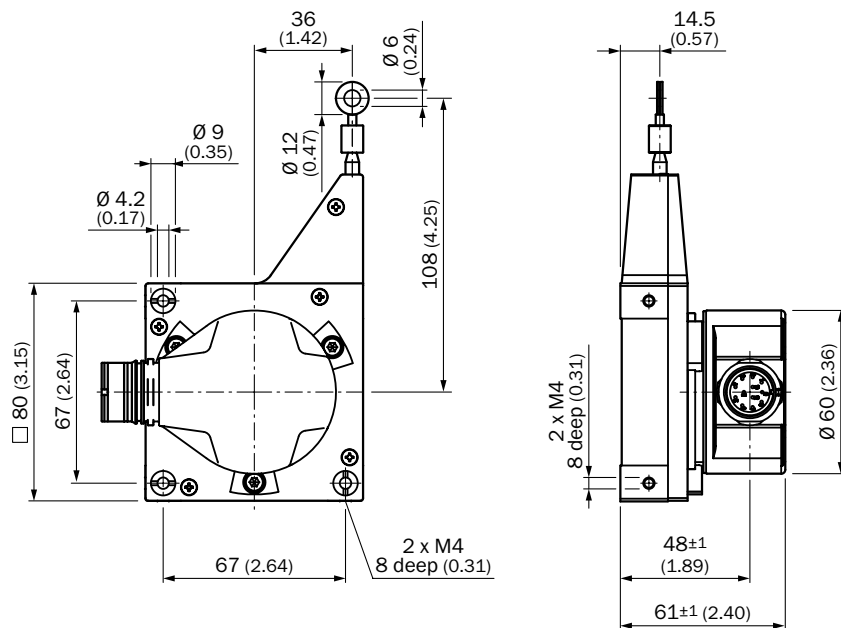
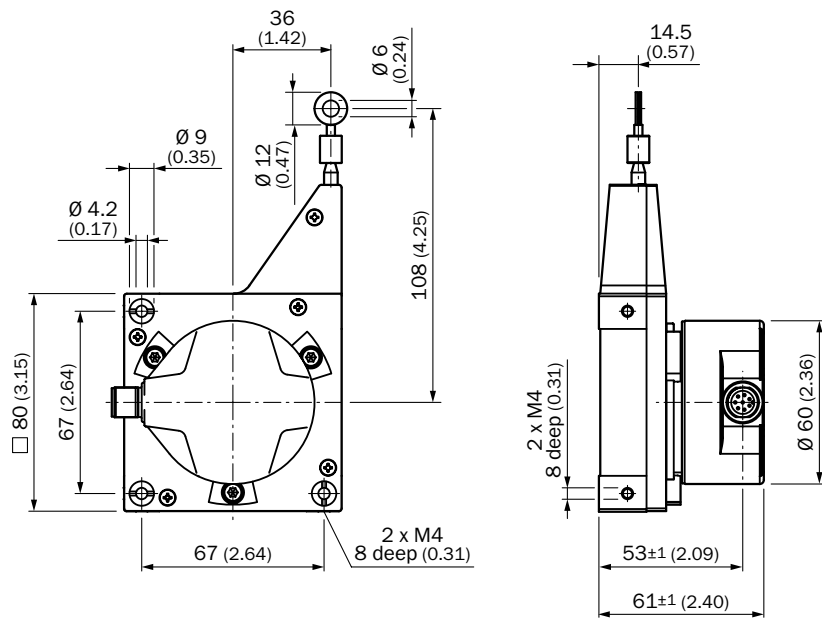


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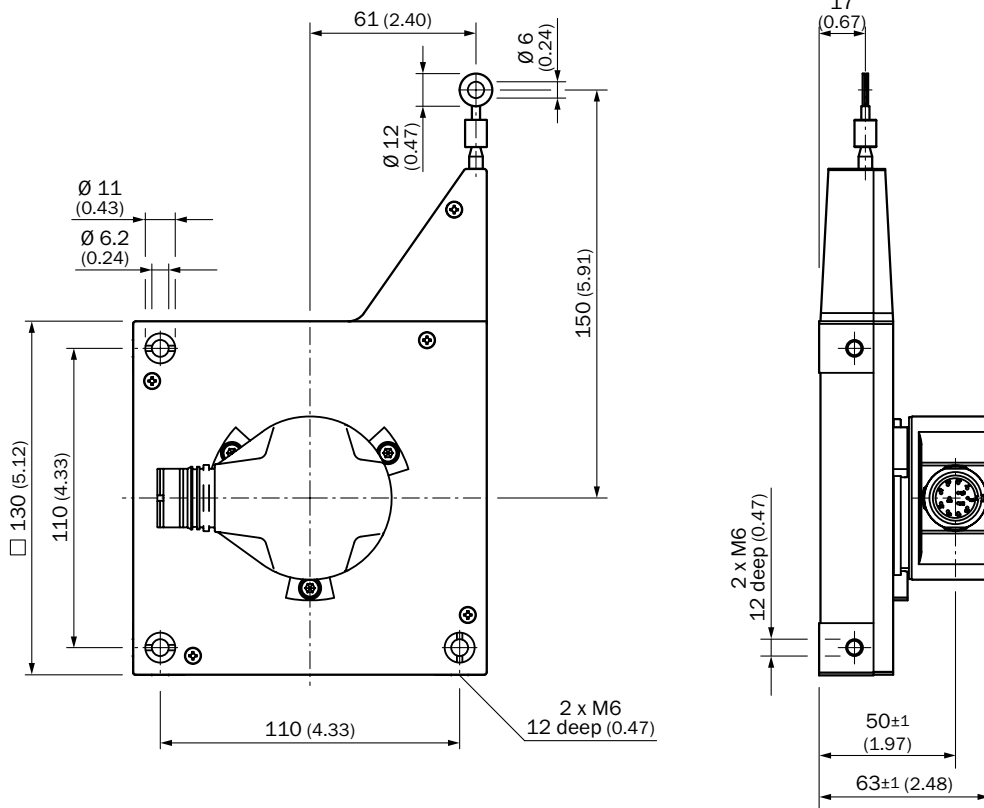
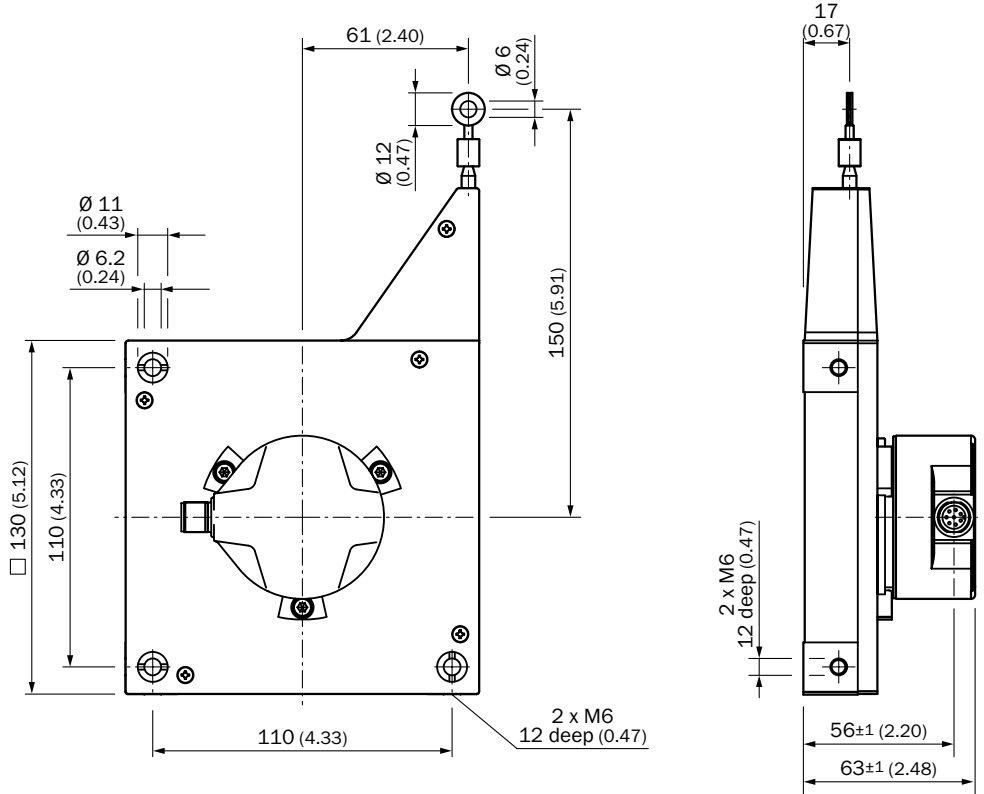
PFG05



PFG08



PFG13



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Recommended accessories

Wire draw mechanism

Description	Measuring length	Model name	Part no.
Ecoline wire draw mechanism for 36 series face mount flange with 6 mm shaft	1.25 m	MRA-G055-101D4	5324019
	3.0 m	MRA-G080-103D3	5322778
Ecoline wire draw mechanism for 60 series face mount flange with 6 mm shaft	5.0 m	MRA-G130-105D3	5322779
	10.0 m	MRA-G190-110D3	5326242

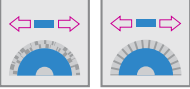
Plug connectors and cables


Description	Cable length	Model name	Part no.
Cable socket, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 6 mm	-	DOS-1205-G	6009719
Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 6 mm	-	STE-1205-G	6022083
Cable socket, M12, 5-pin, straight, pre-wired with 5-core cable, 5 x 0.34 mm ² , shielded, cable diameter 5.9 mm	1.5 m	DOL-1205-G1M5ACSCO	6049451
	3.0 m	DOL-1205-G03MACSCO	6049452
	5.0 m	DOL-1205-G05MACSCO	6049453
	10.0 m	DOL-1205-G10MACSCO	6049454
Cable socket, M12, 5-pin, angled, pre-wired with 5-core cable, 5 x 0.34 mm ² , shielded, cable diameter 5.9 mm	1.5 m	DOL-1205-W1M5ACSCO	6049455
	3.0 m	DOL-1205-W03MACSCO	6049456
	5.0 m	DOL-1205-W05MACSCO	6049457
	10.0 m	DOL-1205-W10MACSCO	6049458




→ For additional accessories, please see page H-399

Compact design – with integrated encoder







Additional information

Detailed technical data..... F-323

Ordering information..... F-329

Dimensional drawings F-330

Recommended accessories..... F-331

Product description

In the Compact family, the encoder is integrated into the wire draw mechanics. This integration provides the encoder with the best possible protection in rugged industrial environments. These encoders provide a measuring range up to 5 m with high resolution in an absolute or incremental output.

ged industrial environments. These encoders provide a measuring range up to 5 m with high resolution in an absolute or incremental output.

At a glance

- Measuring lengths: 2 m ... 5 m
- Integrated measuring system
- Compact housing (90 x 90 x 90 mm)
- Incremental and absolute versions
- High resolution

Your benefits

- Industrial designed encoder integrated in an aluminum housing makes it less susceptible to external damage, saving time and reducing maintenance costs
- Extremely precise measurements by eliminating the coupling between the encoder and the mechanism
- Space-saving installation, since the encoder is directly integrated into the wire draw mechanics.
- Very precise measurements thanks to its high resolution

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→ www.mysick.com/en/Compact

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.



BKS absolute encoders detailed technical data

Performance

	BKS02	BKS05
Measuring range	0 m ... 2 m	0 m ... 5 m
Linearity	≤ ± 0.7 mm	
Measuring step	≥ 0.05 mm	
Adjustment speed	3.5 m/s	
Wire acceleration	≤ 20 m/s ²	
Repeat accuracy typ.	3 measuring steps	

Interfaces

Electrical interface	12 V ... 30 V SSI
Connection type	Connector, M23, 12-pin
Interface signals	Clock +, Clock -, Data +, Data-
Clock frequency ¹⁾	1 MHz

¹⁾ Min. LOW level (Clock +) 500 ns.

Mechanical data

Mass	1.5 kg	
Measuring wire diameter	0.6 mm	
Measuring wire material	Highly flexible stranded steel (PA 12 sheathed)	
Housing material	Aluminium	
Spring return force ¹⁾	5 N ... 6 N	4 N ... 6 N
Life of wire draw mechanism ^{2) 3)}	800,000 cycles	

¹⁾ These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

²⁾ Average values, which depend on the application.

³⁾ At high operating speeds over great lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

Electrical data

Initialization time ¹⁾	200 s
Position forming time	0.1 ms
Supply voltage	12 V ... 30 V
Code sequence	Rising at wire pull-out
Code type	24 Bit/Gray
MTTFd: mean time to dangerous failure ²⁾	150 years (EN ISO 13849)

¹⁾ Valid positional data can be read once this time has elapsed.

²⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

	BKS02	BKS05
Measuring range	0 m ... 2 m	0 m ... 5 m
Working temperature range	-10 °C ... +70 °C	
Storage temperature range	-20 °C ... +80 °C	
EMC (encoder)	According to EN 61000-6-2 and EN 61000-6-3	
Enclosure rating	IP 52 (according to IEC 60529), note required mounting position	
Resistance (encoder)		
To shocks according to DIN EN 60068-2-27	20 g/6 ms	
To vibration according to DIN EN 60068-2-6	10 g/10 ... 2,000 Hz	
Permissible relative humidity for integrated encoders	90 %, condensation not permitted	

XKS absolute encoders detailed technical data

Performance

	XKS02	XKS05
Measuring range	0 m ... 2 m	0 m ... 5 m
Length of period	1.1953 mm	
Linearity	$\leq \pm 0.7$ mm	
Non-linearity	± 0.01 mm	
Measuring step ¹⁾	≥ 0.295 μ m	
Piston speed	3.5 m/s	
Wire acceleration	≤ 20 m/s ²	
Repeat accuracy typ	$\leq 0.15^\circ$	

¹⁾ With 12 bit resolution.

Interfaces

Electrical interface	7 V ... 12 V HIPERFACE®
Connection type	Connector, M12, 8-pin
Interface signals	Process data channel = SIN, REFSIN, COS, REFCOS analogue, differential, Parameter channel = RS 485 digital
Number of sine/cosine periods per revolution	128

Mechanical data

Mass	1.5 kg
Measuring wire diameter	0.6 mm
Measuring wire material	Highly flexible stranded steel (PA 12 sheathed)
Housing material	Aluminium
Spring return force ¹⁾	5 N ... 6 N 4 N ... 6 N
Life of wire draw mechanism ^{2) 3)}	800,000 cycles

¹⁾ These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

²⁾ Average values, which depend on the application.

³⁾ At high operating speeds over great lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

Electrical data

Operating power consumption (no load)	60 mA
Output frequency sine/cosine period	0 kHz ... 65 kHz
Available memory area	1,792 Byte
EEPROM	2048 EEPROM
Supply voltage	7 V ... 12 V
Code sequence	Rising at wire pull-out
Code type	Binary
MTTFd: mean time to dangerous failure ¹⁾	250 years (EN ISO 13849)

¹⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

	PKS02	PKS05
Measuring range	0 m ... 2 m	0 m ... 5 m
Working temperature range	-10 °C ... +70 °C	
Storage temperature range	-20 °C ... +80 °C	
EMC (encoder)	According to EN 61000-6-2 and EN 61000-6-3	
Enclosure rating	IP 52 (according to IEC 60529), note required mounting position	
Resistance (encoder)		
To shocks according to DIN EN 60068-2-27	20 g/6 ms	
To vibration according to DIN EN 60068-2-6	10 g/10 ... 2,000 Hz	
Permissible relative humidity for integrated encoders	90 %, condensation not permitted	

PKS incremental encoders detailed technical data

Performance

	PKS02	PKS05
Measuring range	0 m ... 2 m	0 m ... 5 m
Linearity	$\leq \pm 0.7 \text{ mm}$	
Measuring step ¹⁾	$\geq 0.05 \text{ mm}$	
Piston speed	3.5 m/s	
Wire acceleration	$\leq 20 \text{ m/s}^2$	
Repeat accuracy typ	3 measuring steps	

¹⁾ Assuming that the control / counter evaluating the edges of the A + B pulses.

Interfaces

Electrical interface	4.5 V ... 5.5 V TTL/RS422
Connection type	Connector, M23, 12-pin

Mechanical data

Mass	1.5 kg	
Measuring wire diameter	0.6 mm	
Measuring wire material	Highly flexible stranded steel (PA 12 sheathed)	
Housing material	Aluminium	
Spring return force ¹⁾	5 N ... 6 N	4 N ... 6 N
Life of wire draw mechanism ^{2) 3)}	800,000 cycles	

¹⁾ These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

²⁾ Average values, which depend on the application.

³⁾ At high operating speeds over great lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

Electrical data

Operating power consumption (no load)	60 mA	
Output current	$\leq 20 \text{ mA}$	
Reference signal	1/765 measuring steps	
Initialization time ¹⁾	40 s	
Supply voltage	4.5 V ... 5.5 V	
MTTFd: mean time to dangerous failure ²⁾	400 years (EN ISO 13849)	

¹⁾ Valid positional data can be read once this time has elapsed.

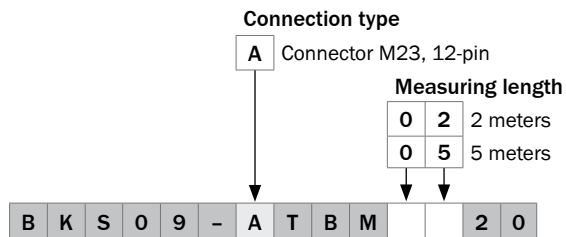
²⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

	PKS02	PKS05
Measuring range	0 m ... 2 m	0 m ... 5 m
Working temperature range	-10 °C ... +70 °C	
Storage temperature range	-20 °C ... +80 °C	
EMC (encoder)	According to EN 61000-6-2 and EN 61000-6-3	
Enclosure rating	IP 52 (according to IEC 60529), note required mounting position	
Resistance (encoder)		
To shocks according to DIN EN 60068-2-27	20 g/6 ms	
To vibration according to DIN EN 60068-2-6	10 g/10 ... 2,000 Hz	
Permissible relative humidity for integrated encoders	90 %, condensation not permitted	

Absolute encoders ordering information

Compact BKS absolute type code



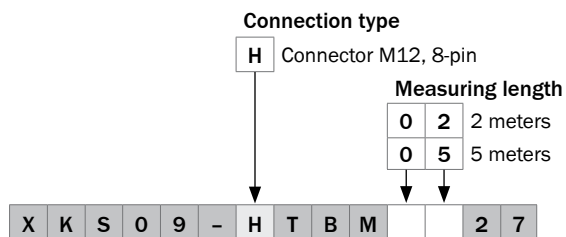
Ordering information

- **Electrical interface:** 12 V ... 30 V SSI
- **Connection type:** Connector M23, 12-pin radial

Measuring range	Model name	Part no.
0 m ... 2 m	BKS09-ATBM0220	1035240
0 m ... 5 m	BKS09-ATBM0520	1035241

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Compact XKS absolute type code



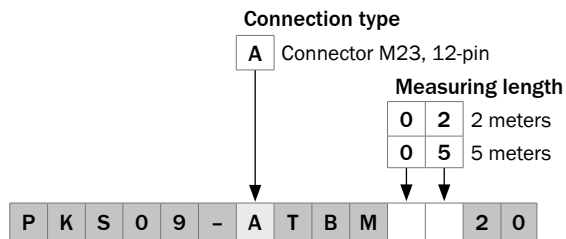
Ordering information

- **Electrical interface:** 7 V ... 12 V HIPERFACE®
- **Connection type:** Connector M12, 8-pin radial

Measuring range	Model name	Part no.
0 m ... 2 m	XKS09-HTBM0227	1035436
0 m ... 5 m	XKS09-HTBM0527	1035437

Incremental encoders ordering information

Compact PKS incremental type code



Ordering information

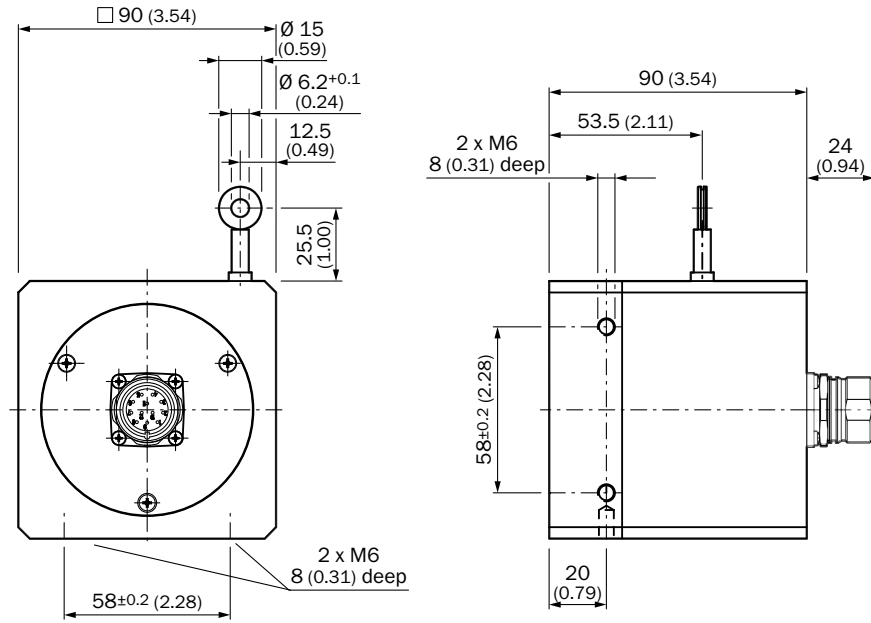
- **Electrical interface:** 4.5 V ... 5.5 V TTL/RS422
- **Connection type:** Connector M23, 12-pin radial

Measuring range	Model name	Part no.
0 m ... 2 m	PKS09-ATBM0220	1035242
0 m ... 5 m	PKS09-ATBM0520	1035243

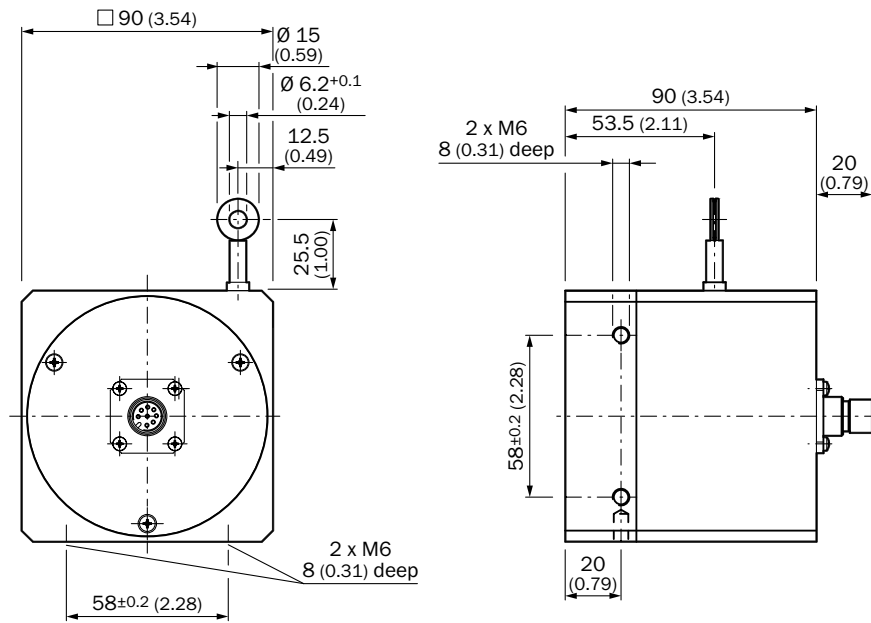
Dimensional drawings

dimensions in mm

BKS und PKS



XKS



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Recommended accessories

Plug connectors and cables

- SSI interface

Description	Cable length	Model name	Part no.
Cable socket, M23, 12-pin, straight, pre-wired with 11-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, suitable for drag chain, cable diameter 7.8 mm, suitable for wire draw encoder BKS with SSI interface	2.0 m	DOL-2312-G02MLA5	2030680
	7.0 m	DOL-2312-G07MLA5	2030683
	10.0 m	DOL-2312-G10MLA5	2030686
	15.0 m	DOL-2312-G15MLA5	2030690
	20.0 m	DOL-2312-G20MLA5	2030693
	25.0 m	DOL-2312-G25MLA5	2030697
	30.0 m	DOL-2312-G30MLA5	2030700
Cable socket, M23, 12-pin, straight, pre-wired with 12-core SSI cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , shielded, suitable for drag chain, cable diameter 7.8 mm	1.5 m	DOL-2312-G1M5MA1	2029200
	3.0 m	DOL-2312-G03MMA1	2029201
	5.0 m	DOL-2312-G05MMA1	2029202
	10.0 m	DOL-2312-G10MMA1	2029203
	20.0 m	DOL-2312-G20MMA1	2029204
	30.0 m	DOL-2312-G30MMA1	2029205
Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	STE-2312-G	6027537
Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	DOS-2312-G	6027538
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, UV and salt water resistant, diam. 7.8 mm	-	LTG-2612-MW	6028516

- TTL interface

Description	Cable length	Model name	Part no.
Cable socket, M23, 12-pin, straight, pre-wired with 11-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, cable diameter 7.8 mm ¹⁾	2.0 m	DOL-2312-G02MLA3	2030682
	7.0 m	DOL-2312-G07MLA3	2030685
	10.0 m	DOL-2312-G10MLA3	2030688
	15.0 m	DOL-2312-G15MLA3	2030692
	20.0 m	DOL-2312-G20MLA3	2030695
	25.0 m	DOL-2312-G25MLA3	2030699
	30.0 m	DOL-2312-G30MLA3	2030702
Cable socket, M23, 12-pin, straight, 11-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, cable diameter 7.8 mm ¹⁾	1.5 m	DOL-2312-G1M5MA3	2029212
	3.0 m	DOL-2312-G03MMA3	2029213
	5.0 m	DOL-2312-G05MMA3	2029214
	10.0 m	DOL-2312-G10MMA3	2029215
	20.0 m	DOL-2312-G20MMA3	2029216
	30.0 m	DOL-2312-G30MMA3	2029217
Data cable by the meter 4 x 2 x 0.15 mm ² with shielding, diam. 5.6 mm	-	LTG-2308-MW	6027529
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² with shielding, diam. 7.5 mm	-	LTG-2411-MW	6027530
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, diam. 7.8 mm	-	LTG-2512-MW	6027531
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, UV and salt water resistant, diam. 7.8 mm	-	LTG-2612-MW	6028516

¹⁾ NB: Only in combination with electrical interfaces A, C, E and P.

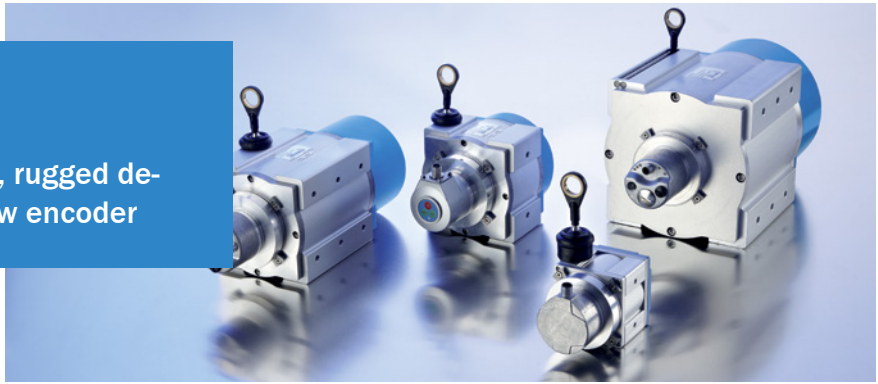
- HIPERFACE® interface

Description	Cable length	Model name	Part no.
HIPERFACE® cable socket, M12, 8-pin, straight, shielded, can be wired	-	DOS-1208-GA	6028369
Cable socket, 8-pin, straight, pre-wired with 8-core cable, 4 x 2 x 0.25 mm ² , shielded, cable diameter 7.0 mm	2.0 m	DOL-1208-G02MAC1	6032866
	5.0 m	DOL-1208-G05MAC1	6032867
	10.0 m	DOL-1208-G10MAC1	6032868
	20.0 m	DOL-1208-G20MAC1	6032869

→ For additional accessories, please see page H-399

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Measuring lengths up to 50 m, rugged design – the heavy-duty wire draw encoder








EtherCAT® is registered trademark and patent technology, licensed by Beckhoff Automation GmbH, Germany.

Additional information

Detailed technical data F-335

Ordering information F-343

Dimensional drawings F-349

Recommended accessories F-369

Product description

With wire draw lengths from 2 to 50 m, the HighLine series of wire draw encoders have enormous range. Thanks to guide rollers, the HighLine series enables flexible measurement paths – even around obstacles. Their rugged housing

and dirt-resistant brush assemblies allow the encoder to be used in the toughest of environments, including dust, shock and vibration, which ensure a long service lifetime.

At a glance

- 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
- Highly resistant to shock and vibrations
- Very high resolution possible
- Expandable using external accessories

Your benefits

- Reliable solution in harsh environments
- Long service life due to rugged industrial housing
- Quick and easy installation without the need for precise linear guidance
- Low integration and maintenance costs
- Customization option reduces storage costs
- Teach-in function enables fast installation

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→ www.mysick.com/en/HighLine

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.



Absolute encoders detailed technical data

Performance

	BTF08	BTF08	BTF13	BTF13	BTF13	BTF13	BTF19
Measuring range	0 m ... 2 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m	0 m ... 20 m	0 m ... 30 m	0 m ... 50 m
Repeatability ¹⁾	±0.1 %						
Linearity ¹⁾	±0.1 %						
Hysteresis ¹⁾	±0.05 %						
Resolution							
4 mA ... 20 mA Analog	0.01 mm		0.02 mm			-	-
0 V ... 10 V Analog	0.01 mm		0.02 mm			-	-
SSI	0.025 mm		0.05 mm				0.1 mm
CANopen	0.02 mm		0.04 mm				0.06 mm
DeviceNet	0.02 mm		0.04 mm				0.06 mm
PROFIBUS (A3M60)	0.02 mm		0.04 mm				0.06 mm
PROFIBUS (ATM60)	0.02 mm		0.04 mm				0.06 mm
EtherNet/IP	0.001 mm						0.002 mm
PROFINET	0.001 mm						0.002 mm
EtherCAT®	0.001 mm						0.002 mm

¹⁾ Value refers to wire draw mechanic.

Interfaces

Electrical interface	See type code						
Encoder connection type	See type code						
Clock frequency							
4 mA ... 20 mA Analog	32 kHz					-	-
0 V ... 10 V Analog	32 kHz					-	-
SSI	1 MHz						
Address setting							
CANopen	0 ... 63 (DIP-switches or protocol)						
DeviceNet	0 ... 63 (DIP-switches or protocol)						
PROFIBUS (A3M60)	0 ... 127 (DIP-switches)						
PROFIBUS (ATM60)	0 ... 127 (DIP-switches)						
EtherNet/IP	Via DHCP / DEC-switches						
PROFINET	Via DCP						
EtherCAT®	-						
Protocol							
CANopen	Communication Profile DS 301 V4.0						
DeviceNet	DeviceNet Specification, Release 2.0						
PROFIBUS (A3M60)	PROFIBUS DP V0						
PROFIBUS (ATM60)	Encoder Profile (07hex) – Class 2						
EtherNet/IP	EtherNet/IP IEC 61784-1						
PROFINET	PROFINET IO / RT Class B						
EtherCAT®	EtherCAT® COE (CIA DS-301)						

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	BTF08	BTF08	BTF13	BTF13	BTF13	BTF13	BTF19
Measuring range	0 m ... 2 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m	0 m ... 20 m	0 m ... 30 m	0 m ... 50 m
Bus termination							
CANopen	Via DIP-switches						
DeviceNet	Via DIP-switches						
PROFIBUS (A3M60)	Via DIP-switches						
PROFIBUS (ATM60)	Via DIP-switches						
SET (electronic adjustment)							
4 mA ... 20 mA Analog	Teach-in functionality					-	-
0 V ... 10 V Analog	Teach-in functionality					-	-
SSI	Via SET cable						
CANopen	Via PRESET pushbutton or protocol						
DeviceNet	Via PRESET pushbutton or protocol						
PROFIBUS (A3M60)	Via PRESET pushbutton or protocol						
PROFIBUS (ATM60)	Via PRESET pushbutton or protocol						
EtherNet/IP	Via PRESET pushbutton or protocol						
PROFINET	Via PRESET pushbutton or protocol						
EtherCAT®	Via PRESET pushbutton or protocol						
Encoder profile							
CANopen	Device Profile DSP 406 V2.0						
DeviceNet	Generic Profile						
PROFIBUS (A3M60)	Encoder Profile version 1.1 Class 1 and Class 2						
PROFIBUS (ATM60)	Encoder Profile (07hex) – Class 2						
EtherNet/IP	0 x 22						
PROFINET	V4.1 Class3						
EtherCAT®	CIA DS-406						

Mechanical data

	BTF08	BTF08	BTF13	BTF13	BTF13	BTF13	BTF19
Measuring range	0 m ... 2 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m	0 m ... 20 m	0 m ... 30 m	0 m ... 50 m
Working temperature range							
4 mA ... 20 mA Analog	-20 ... +70 °C					-	-
0 V ... 10 V Analog	-20 ... +70 °C					-	-
SSI	-20 ... +70 °C						
CANopen	-20 ... +70 °C						
DeviceNet	-20 ... +70 °C						
PROFIBUS (A3M60)	-10 ... +70 °C						
PROFIBUS (ATM60)	-20 ... +70 °C						
EtherNet/IP	-20 ... +70 °C						
PROFINET	-20 ... +70 °C						
EtherCAT®	-20 ... +70 °C						
Mass (incl. encoder)							
4 mA ... 20 mA Analog	1.7 kg	1.9 kg	3.2 kg	3.9 kg	5.4 kg	-	-
0 V ... 10 V Analog	1.7 kg	1.9 kg	3.2 kg	3.9 kg	5.4 kg	-	-
SSI	1.8 kg	2 kg	3.3 kg	4 kg	5.5 kg	6.7 kg	17 kg
CANopen	1.89 kg	2.09 kg	3.39 kg	4.09 kg	5.59 kg	6.79 kg	17.09 kg
DeviceNet	1.89 kg	2.09 kg	3.39 kg	4.09 kg	5.59 kg	6.79 kg	17.09 kg
PROFIBUS (A3M60)	1.58 kg	1.78 kg	3.08 kg	3.78 kg	5.28 kg	6.48 kg	16.78 kg
PROFIBUS (ATM60)	1.89 kg	2.09 kg	3.39 kg	4.09 kg	5.59 kg	6.79 kg	17.09 kg
EtherNet/IP	1.5 kg	1.7 kg	3.0 kg	3.7 kg	5.2 kg	6.4 kg	16.7 kg
PROFINET	1.5 kg	1.7 kg	3.0 kg	3.7 kg	5.2 kg	6.4 kg	16.7 kg
EtherCAT®	1.5 kg	1.7 kg	3.0 kg	3.7 kg	5.2 kg	6.4 kg	16.7 kg
Mass (mechanism)	1.3 kg	1.5 kg	2.8 kg	3.5 kg	5 kg	6.2 kg	16.5 kg
Measuring wire diameter	1.35 mm				0.81 mm		1.35 mm
Measuring wire material	Highly flexible steel cable						
Wire draw mechanism housing material	Aluminum (anodized), die-cast zinc		Aluminum (anodized), plastic				Aluminum (anodized), die-cast zinc
Drum circumference	200 mm		334.1 mm		332.4 mm		491.5 mm
Spring return force ¹⁾	6 N ... 14 N		15 N ... 20 N	10 N ... 20 N			18 N ... 37 N
Service life of wire draw mechanism	1 million cycles						
Actual wire draw length	2.2 m	3.2 m	5.2 m	10.2 m	20.2 m	30.2 m	50.2 m
Wire acceleration	40 m/s ²		70 m/s ²	40 m/s ²	30 m/s ²	15 m/s ²	18 m/s ²
Adjustment speed	4 m/s						
Integrated encoder							
4 mA ... 20 mA Analog	ACM60					-	-
0 V ... 10 V Analog	ACM60					-	-
SSI	ATM60 SSI						
CANopen	ATM60 CANopen						
DeviceNet	ATM60 DeviceNet						
PROFIBUS (A3M60)	A3M60						
PROFIBUS (ATM60)	ATM60 PROFIBUS						
EtherNet/IP	AFM60 EtherNet/IP						

¹⁾ These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

	BTF08	BTF08	BTF13	BTF13	BTF13	BTF13	BTF19
Measuring range	0 m ... 2 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m	0 m ... 20 m	0 m ... 30 m	0 m ... 50 m
	PROFINET	AFM60 PROFINET					
	EtherCAT®	AFM60 EtherCAT®					
Integrated mechanics	MRA-F080-102D2	MRA-F080-103D2	MRA-F130-105D2	MRA-F130-110D2	MRA-F130-120D1	MRA-F130-130D1	MRA-F190-150D2
Part no. mechanism	6028625	6030125	6028626	6028627	6028628	6028629	6028630

Electrical data

Initialization time ¹⁾							
	4 mA ... 20 mA Analog	< 2 ms				-	-
	0 V ... 10 V Analog	< 2 ms				-	-
	SSI	1050 ms					
	CANopen	Approx. 12 s					
	DeviceNet	Approx. 12 s					
	PROFIBUS (A3M60)	Approx. 1 s					
	PROFIBUS (ATM60)	Approx. 12 s					
	EtherNet/IP	Approx. 12 s					
	PROFINET	Approx. 12 s					
	EtherCAT®	Approx. 12 s					
Supply voltage							
	Analog	18 V ... 33 V				-	-
	SSI	10 V ... 32 V					
	CANopen	10 V ... 32 V					
	DeviceNet	10 V ... 32 V					
	PROFIBUS (A3M60)	10 V ... 32 V					
	PROFIBUS (ATM60)	10 V ... 32 V					
	EtherNet/IP	10 V ... 30 V					
	PROFINET	10 V ... 30 V					
	EtherCAT®	10 V ... 30 V					
Code type							
	SSI	Gray					
Power consumption							
	4 mA ... 20 mA Analog	Max. 2 W				-	-
	0 V ... 10 V Analog	Max. 2 W				-	-
	SSI	Max. 0.8 W					
	CANopen	Max. 2.0 W					
	DeviceNet	Max. 2.0 W					
	PROFIBUS (A3M60)	Max. 1.5 W					
	PROFIBUS (ATM60)	Max. 2.0 W					
	EtherNet/IP	Max. 3 W					
	PROFINET	Max. 3 W					
	EtherCAT®	Max. 3 W					

¹⁾ Valid positional data can be read once this time has elapsed.

²⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

	BTF08	BTF08	BTF13	BTF13	BTF13	BTF13	BTF19
Measuring range	0 m ... 2 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m	0 m ... 20 m	0 m ... 30 m	0 m ... 50 m
MTTFd: mean time to dangerous failure ²⁾							
4 mA ... 20 mA Analog	-						
0 V ... 10 V Analog	-						
SSI	150 a						
CANopen	150 a						
DeviceNet	150 a						
PROFIBUS (A3M60)	60 a						
PROFIBUS (ATM)	150 a						
EtherNet/IP	80 a						
PROFINET	80 a						
EtherCAT®	80 a						

¹⁾ Valid positional data can be read once this time has elapsed.

²⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

EMC (encoder)							
4 mA ... 20 mA Analog	DIN EN 61000-6-2; DIN EN 61000-6-3				-		-
0 V ... 10 V Analog	DIN EN 61000-6-2; DIN EN 61000-6-3				-		-
SSI	DIN EN 61000-6-2; DIN EN 61000-6-3						
CANopen	DIN EN 61000-6-2; DIN EN 61000-6-3						
DeviceNet	DIN EN 61000-6-2; DIN EN 61000-6-3						
PROFIBUS (A3M60)	DIN EN 61000-6-2; DIN EN 61000-6-3						
PROFIBUS (ATM60)	DIN EN 61000-6-2; DIN EN 61000-6-3						
EtherNet/IP	DIN EN 61000-6-2; DIN EN 61000-6-3						
PROFINET	DIN EN 61000-6-2; DIN EN 61000-6-3						
EtherCAT®	DIN EN 61000-6-2; DIN EN 61000-6-3						
Enclosure rating (encoder)							
4 mA ... 20 mA Analog	IP 65				-		-
0 V ... 10 V Analog	IP 65				-		-
SSI	IP 67						
CANopen	IP 67						
DeviceNet	IP 67						
PROFIBUS (A3M60)	IP 67						
PROFIBUS (ATM60)	IP 67						
EtherNet/IP	IP 67						
PROFINET	IP 67						
EtherCAT®	IP 67						
Enclosure rating (mechanism)	IP 50						IP 31

F

	BTF08	BTF08	BTF13	BTF13	BTF13	BTF13	BTF19
Measuring range	0 m ... 2 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m	0 m ... 20 m	0 m ... 30 m	0 m ... 50 m
Resistance (encoder)							
To shocks according to DIN EN 60068-2-27							
4 mA ... 20 mA Analog	50 g, 6 ms					-	-
0 V ... 10 V Analog	50 g, 6 ms					-	-
SSI	100 g/6 ms						
CANopen	100 g/6 ms						
DeviceNet	100 g/6 ms						
PROFIBUS (A3M60)	100 g/6 ms						
PROFIBUS (ATM60)	100 g/6 ms						
EtherNet/IP	100 g/6 ms						
PROFINET	100 g/6 ms						
EtherCAT®	100 g/6 ms						
To vibration according to DIN EN 60068-2-6							
4 mA ... 20 mA Analog	4 g Sinus 5 Hz ... 100 Hz					-	-
0 V ... 10 V Analog	4 g Sinus 5 Hz ... 100 Hz					-	-
SSI	20 g/10 ... 2,000 Hz						
CANopen	20 g/10 ... 2,000 Hz						
DeviceNet	20 g/10 ... 2,000 Hz						
PROFIBUS (A3M60)	20 g/10 ... 2,000 Hz						
PROFIBUS (ATM60)	20 g/10 ... 2,000 Hz						
EtherNet/IP	30 g/10 ... 2,000 Hz						
PROFINET	30 g/10 ... 2,000 Hz						
EtherCAT®	30 g/10 ... 2,000 Hz						
Permissible relative humidity for integrated encoders ¹⁾							
4 mA ... 20 mA Analog	-						
0 V ... 10 V Analog	-						
SSI	90 %						
CANopen	98 %						
DeviceNet	98 %						
PROFIBUS (A3M60)	95 %						
PROFIBUS (ATM60)	98 %						
EtherNet/IP	90 %						
PROFINET	90 %						
EtherCAT®	90 %						

¹⁾ Condensation of the optical scanning not permitted.

Incremental encoders detailed technical data

Performance

	PRF08	PRF08	PRF13	PRF13	PRF13	PRF13	PRF19
Measuring range	0 m ... 2 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m	0 m ... 20 m	0 m ... 30 m	0 m ... 50 m
Repeatability ¹⁾	±0.1 %						
Linearity ¹⁾	±0.1 %						
Hysteresis ¹⁾	±0.05 %						
Resolution	0.1 mm		0.2 mm				0.4 mm

¹⁾ Value refers to wire draw mechanic..

Interfaces

Electrical interface	See type code
Encoder connection type	See type code

Mechanical data

Working temperature range	-20 ... +70 °C						
Mass	1.6 kg	1.8 kg	3.1 kg	3.8 kg	5.3 kg	6.5 kg	16.8 kg
Measuring wire diameter	1.35 mm				0.81 mm		1.35 mm
Measuring wire material	Highly flexible steel cable						
Wire draw mechanism housing material	Aluminum (anodized), die-cast zinc		Aluminum (anodized), plastic				Aluminum (anodized), die-cast zinc
Drum circumference	200 mm		334.1 mm		332.4 mm		491.5 mm
Spring return force ¹⁾	6 N ... 14 N		15 N ... 20 N				18 N ... 37 N
Service life of wire draw mechanism	1 million cycles						
Actual wire draw length	2.2 m	3.2 m	5.2 m	10.2 m	20.2 m	30.2 m	50.2 m
Wire acceleration	40 m/s ²		70 m/s ²	40 m/s ²	30 m/s ²	15 m/s ²	18 m/s ²
Adjustment speed	4 m/s						
Integrated encoder	DFS60						
Integrated mechanics	MRA-F080-102D2	MRA-F080-103D2	MRA-F130-105D2	MRA-F130-110D2	MRA-F130-120D1	MRA-F130-130D1	MRA-F190-150D2
Part no. Mechanism	6028625	6030125	6028626	6028627	6028628	6028629	6028630

¹⁾ These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

Electrical data

Load current	Max. 30 mA
Reference signals, position	Quantity: 1 Position: 90 ° elec. logically grated to A and B
Max. output frequency	820 kHz
Supply voltage	4,5 V ... 32 V
Power consumption	Max. 0.7 W
Initialization time ¹⁾	Max. 30 ms/max. 32 ms with mechanical zero pulse width
MTTFd: mean time to dangerous failure ²⁾	300 a

¹⁾ Valid positional data can be read once this time has elapsed.

²⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

	PRF08	PRF08	PRF13	PRF13	PRF13	PRF13	PRF19
Measuring range	0 m ... 2 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m	0 m ... 20 m	0 m ... 30 m	0 m ... 50 m
EMC (encoder)	According to EN 61000-6-2 and EN 61000-6-3						
Enclosure rating (encoder)	IP 67						
Enclosure rating (mechanism)	IP 50						
Resistance (encoder)							
To shocks according to DIN EN 60068-2-27	60 g/6 ms						
To vibration according to DIN EN 60068-2-6	20 g/10 ... 2,000 Hz						
Permissible relative humidity for integrated encoders ¹⁾	90 %						

¹⁾ Condensation of the optical scanning not permitted.

Absolute encoders ordering information

HighLine absolute type code

Construction size

0	8	80 mm (only in combination with measuring length 02 and 03)
1	3	130 mm (only in combination with measuring length 05, 10, 20, 30)
1	9	190 mm (only in combination with measuring length 50)

Electrical interface

A	SSI
C	CANopen ¹⁾
D	DeviceNet ¹⁾
E	EtherCAT®
H	HIPERFACE® (on request)
K	SSI + SinCos (on request)
L	SSI + Incremental HTL (on request)
I	EtherNet/IP
N	PROFINET
P	PROFIBUS
R	SSI + Incremental programmable (on request)
S	SSI + SinCos programmable (on request)
T	SSI + Incremental TTL (on request)

Connection type

A	Connector M23, 12-pin, radial (only in combination with interface A)
B	Connector 3 x M12, axial (only in combination with the electrical interfaces E, I, N and P with axial outlet)
C	Connector M12, 8-pin, radial (only in combination with interface A)
H	Connector for field bus adapter (in combination with the electrical interfaces C, D and P with radial outlet) ¹⁾
K	Cable 8-core, universal 1.5 m (on request)
L	Cable 8-core, universal 3.0 m (on request)
M	Cable 8-core, universal 5.0 m (on request)

Measuring length

0	2	2 meters
0	3	3 meters
0	5	5 meters
1	0	10 meters
2	0	20 meters
3	0	30 meters
5	0	50 meters

Interface / measuring length

4	0	A = SSI / measuring length 2 m, 3 m
2	0	A = SSI / measuring length 5 m, 10 m, 20 m, 30 m
1	0	A = SSI / measuring length 50 m
4	1	C = CANopen; D = DeviceNet; P = PROFIBUS / measuring length 2 m, 3 m
2	5	C = CANopen; D = DeviceNet; P = PROFIBUS / measuring length 5 m, 10 m, 20 m, 30 m
1	7	C = CANopen; D = DeviceNet; P = PROFIBUS / measuring length 50 m
9	9	I = EtherNet/IP / measuring length 2 m, 3 m
9	9	E = EtherCAT® / measuring length 5 m, 10 m, 20 m, 30 m
9	9	N = PROFINET / measuring length 50 m



¹⁾ Field bus adapter for CANopen, DeviceNet, and PROFIBUS please order separately (see chapter H "Accessories" page H-399).

Measuring range	Electrical interface	Connection type	Model name	Part no.
0 m ... 3 m	0 mA ... 20 mA Analog	Connector M12, 5-pin, radial	BTF08-K1EM03PP	1060970
	0 V ... 10 V Analog	Connector M12, 5-pin, radial	BTF08-L1EM03PP	1060973
	SSI	Connector M23, 12-pin, radial	BTF08-A1AM0340	1034892
	CANopen®	Bus adapter with cable gland or connector ¹⁾	BTF08-C1HM0341	1034895
	DeviceNet	Bus adapter with cable gland or connector ¹⁾	BTF08-D1HM0341	1034894
	PROFIBUS	Connector 3 x M12, 5-pins, axial	BTF08-P1BM0341	1060975
		Bus adapter with cable gland or connector ¹⁾	BTF08-P1HM0341	1034893
	EtherNet/IP	Connector 3 x M12, 4-pins, axial	BTF08-I1BM0399	1060978
	PROFINET	Connector 3 x M12, 4-pins, axial	BTF08-N1BM0399	1060976
	EtherCAT®	Connector 3 x M12, 4-pins, axial	BTF08-E1BM0399	1060980
0 m ... 5 m	4 mA ... 20 mA	Connector M12, 5-pin, radial	BTF13-K1EM05PP	1060982
	0 V ... 10 V Analog	Connector M12, 5-pin, radial	BTF13-L1EM05PP	1060983
	SSI	Connector M23, 12-pin, radial	BTF13-A1AM0520	1034300
	CANopen®	Bus adapter with cable gland or connector ¹⁾	BTF13-C1HM0525	1034318
	DeviceNet	Bus adapter with cable gland or connector ¹⁾	BTF13-D1HM0525	1034312
	PROFIBUS	Bus adapter with cable gland or connector ¹⁾	BTF13-P1HM0525	1034306
		Connector 3 x M12, 5-pins, axial	BTF13-P1BM0525	1060985
	EtherNet/IP	Connector 3 x M12, 4-pins, axial	BTF13-I1BM0599	1060987
	PROFINET	Connector 3 x M12, 4-pins, axial	BTF13-N1BM0599	1060986
	EtherCAT®	Connector 3 x M12, 4-pins, axial	BTF13-E1BM0599	1060988

¹⁾ Bus adapter please order separately.

Measuring range	Electrical interface	Connection type	Model name	Part no.
0 m ... 10 m	4 mA ... 20 mA Analog	Connector M12, 5-pin, radial	BTF13-K1EM10PP	1060989
	0 V ... 10 V Analog	Connector M12, 5-pin, radial	BTF13-L1EM10PP	1060990
	SSI	Connector M23, 12-pin, radial	BTF13-A1AM1020	1034301
	CANopen®	Bus adapter with cable gland or connector ¹⁾	BTF13-C1HM1025	1034319
	DeviceNet	Bus adapter with cable gland or connector ¹⁾	BTF13-D1HM1025	1034313
	PROFIBUS	Bus adapter with cable gland or connector ¹⁾	BTF13-P1HM1025	1034307
			Connector 3 x M12, 5-pins, axial	BTF13-P1BM1025
	EtherNet/IP	Connector 3 x M12, 4-pins, axial	BTF13-I1BM1099	1060993
	PROFINET	Connector 3 x M12, 4-pins, axial	BTF13-N1BM1099	1060992
EtherCAT®	Connector 3 x M12, 4-pins, axial	BTF13-E1BM1099	1060994	
0 m ... 20 m	4 mA ... 20 mA Analog	Connector M12, 5-pin, radial	BTF13-K1EM20PP	1060995
	0 V ... 10 V Analog	Connector M12, 5-pin, radial	BTF13-L1EM20PP	1060996
	SSI	Connector M23, 12-pin, radial	BTF13-A1AM2020	1034302
	CANopen®	Bus adapter with cable gland or connector ¹⁾	BTF13-C1HM2025	1034320
	DeviceNet	Bus adapter with cable gland or connector ¹⁾	BTF13-D1HM2025	1034314
	PROFIBUS	Bus adapter with cable gland or connector ¹⁾	BTF13-P1HM2025	1034308
			Connector 3 x M12, 5-pins, axial	BTF13-P1BM2025
	EtherNet/IP	Connector 3 x M12, 4-pins, axial	BTF13-I1BM2099	1060999
	PROFINET	Connector 3 x M12, 4-pins, axial	BTF13-N1BM2099	1060998
EtherCAT®	Connector 3 x M12, 4-pins, axial	BTF13-E1BM2099	1061000	

¹⁾ Bus adapter please order separately.

Measuring range	Electrical interface	Connection type	Model name	Part no.
0 m ... 20 m	SSI	Connector M23, 12-pin, radial	BTF13-A1AM3020	1034303
	CANopen®	Bus adapter with cable gland or connector ¹⁾	BTF13-C1HM3025	1034321
	DeviceNet	Bus adapter with cable gland or connector ¹⁾	BTF13-D1HM3025	1034315
	PROFIBUS	Bus adapter with cable gland or connector ¹⁾	BTF13-P1HM3025	1034309
		Connector 3 x M12, 5-pins, axial	BTF13-P1BM3025	1061003
	EtherNet/IP	Connector 3 x M12, 4-pins, axial	BTF13-I1BM3099	1061005
	PROFINET	Connector 3 x M12, 4-pins, axial	BTF13-N1BM3099	1061004
	EtherCAT®	Connector 3 x M12, 4-pins, axial	BTF13-E1BM3099	1061006
0 m ... 50 m	SSI	Connector M23, 12-pin, radial	BTF19-A1AM5010	1034304
	CANopen®	Bus adapter with cable gland or connector ¹⁾	BTF19-C1HM5017	1034322
	DeviceNet	Bus adapter with cable gland or connector ¹⁾	BTF19-D1HM5017	1034316
	PROFIBUS	Bus adapter with cable gland or connector ¹⁾	BTF19-P1HM5017	1034310
		Connector 3 x M12, 5-pins, axial	BTF19-P1BM5017	1061009
	EtherNet/IP	Connector 3 x M12, 4-pins, axial	BTF19-I1BM5099	1061011
	PROFINET	Connector 3 x M12, 4-pins, axial	BTF19-N1BM5099	1061010
	EtherCAT®	Connector 3 x M12, 4-pins, axial	BTF19-E1BM5099	1061012

¹⁾ Bus adapter please order separately.

Incremental encoders ordering information

HighLine incremental type code

Construction size

0	8	80 mm (only in combination with measuring length 02 and 03)
1	3	130 mm (only in combination with measuring length 05, 10, 20, 30)
1	9	190 mm (only in combination with measuring length 50)

Electrical interface

A	4.5 ... 5.5 V, TTL/RS422, 6 channel
C	10 ... 32 V TTL/push pull, 6 channel
E	10 ... 32 V HTL/push pull, 6 channel
P	4.5 ... 32 V TTL/HTL, programmable (on request)

Connection type

A	Connector M23, 12-pin, radial
B	Connector M23, 12-pin, axial (on request)
C	Connector M12, 8-pin, radial (on request)
K	Cable 8-core, universal 1.5 m (on request)
L	Cable 8-core, universal 3.0 m (on request)
M	Cable 8-core, universal 5.0 m (on request)

Measuring length

0	2	2 meters
0	3	3 meters
0	5	5 meters
1	0	10 meters
2	0	20 meters
3	0	30 Meter
5	0	50 Meter

Interface / measuring length

4	0	A = 4.5 ... 5.5 V, TTL/RS422, 6 channel / measuring length 2 m, 3 m
2	0	C = 10 ... 32 V TTL/push pull, 6 channel / measuring length 5 m, 10 m, 20 m, 30 m
1	0	E = 10 ... 32 V HTL/push pull, 6 channel / measuring length 50 m



F

Ordering information

- **Connection type:** Connector M23, 12-pin, radial

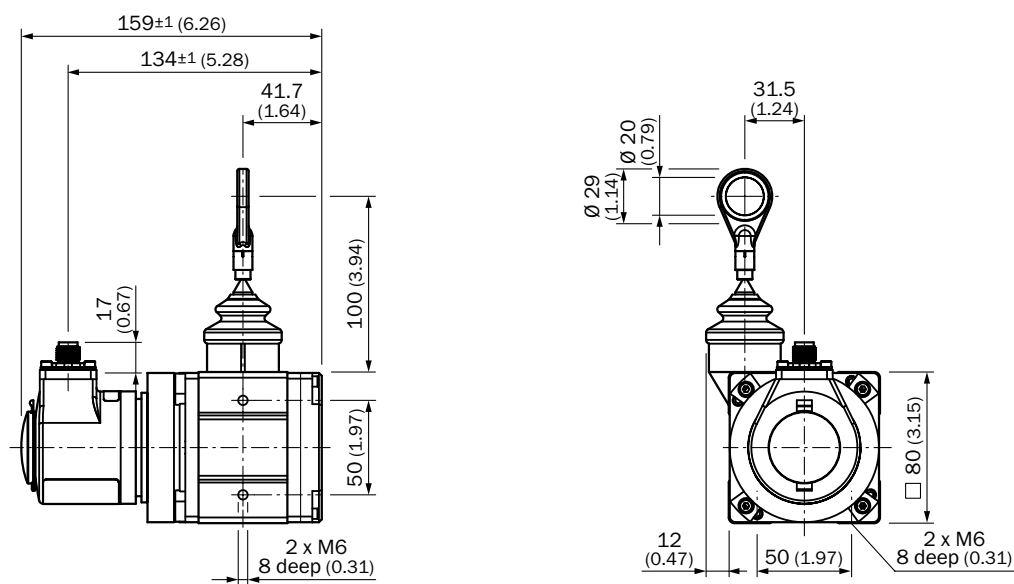
Measuring range	Electrical interface	Model name	Part no.
0 m ... 2 m	4.5 V ... 5.5 V TTL/RS422	PRF08-A1AM0240	1034323
	10 V ... 32 V TTL/RS422	PRF08-C1AM0240	1034329
	10 V ... 32 V HTL/push pull	PRF08-E1AM0240	1034335
0 m ... 3 m	4.5 V ... 5.5 V TTL/RS422	PRF08-A1AM0340	1034896
	10 V ... 32 V TTL/RS422	PRF08-C1AM0340	1034897
	10 V ... 32 V HTL/push pull	PRF08-E1AM0340	1034898

Measuring range	Electrical interface	Model name	Part no.
0 m ... 5 m	4.5 V ... 5.5 V TTL/RS422	PRF13-A1AM0520	1034324
	10 V ... 32 V TTL/RS422	PRF13-C1AM0520	1034330
	10 V ... 32 V HTL/push pull	PRF13-E1AM0520	1034336
0 m ... 10 m	4.5 V ... 5.5 V TTL/RS422	PRF13-A1AM1020	1034325
	10 V ... 32 V TTL/RS422	PRF13-C1AM1020	1034331
	10 V ... 32 V HTL/push pull	PRF13-E1AM1020	1034337
0 m ... 20 m	4.5 V ... 5.5 V TTL/RS422	PRF13-A1AM2020	1034326
	10 V ... 32 V TTL/RS422	PRF13-C1AM2020	1034332
	10 V ... 32 V HTL/push pull	PRF13-E1AM2020	1034338
0 m ... 30 m	4.5 V ... 5.5 V TTL/RS422	PRF13-A1AM3020	1034327
	10 V ... 32 V TTL/RS422	PRF13-C1AM3020	1034333
	10 V ... 32 V HTL/push pull	PRF13-E1AM3020	1034339
0 m ... 50 m	4.5 V ... 5.5 V TTL/RS422	PRF19-A1AM5010	1034328
	10 V ... 32 V TTL/RS422	PRF19-C1AM5010	1034334
	10 V ... 32 V HTL/push pull	PRF19-E1AM5010	1034340

Dimensional drawings

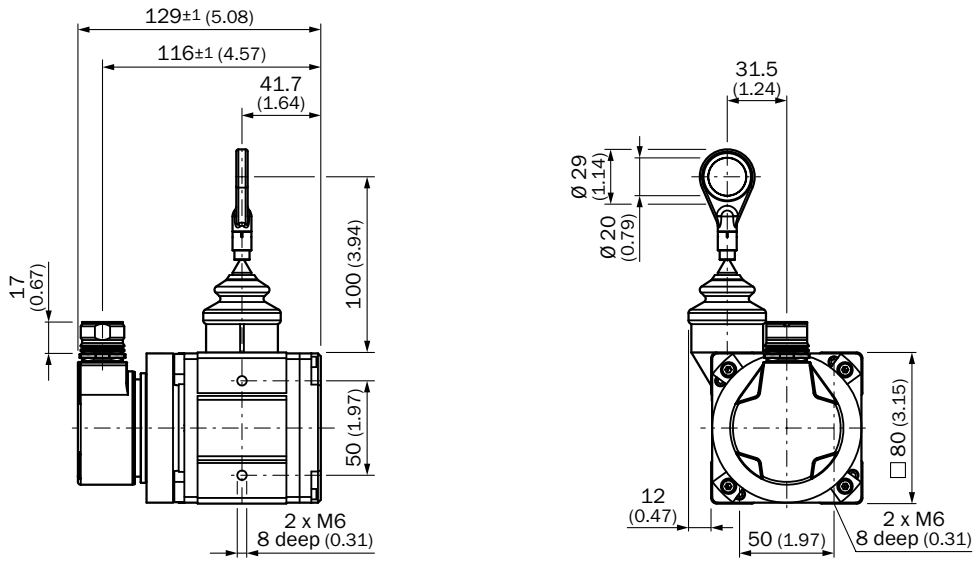
dimensions in mm

BTF08 up to 2 m Analog

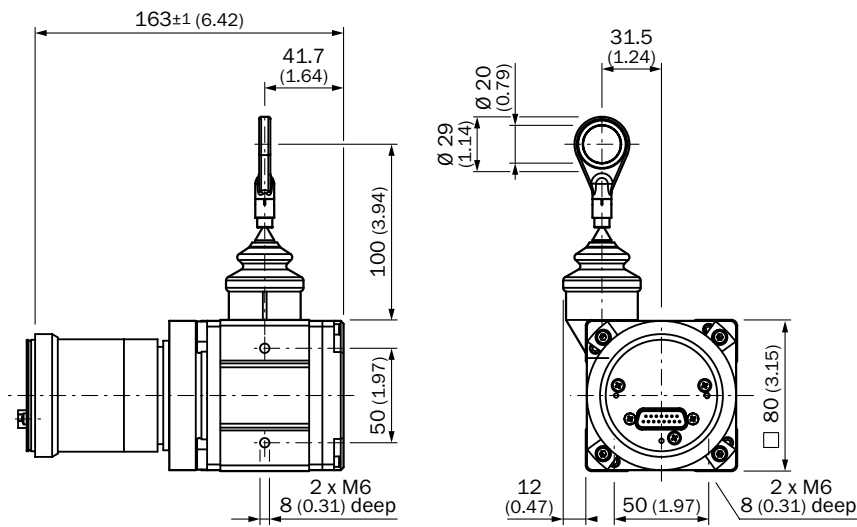


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BTF08 up to 2 m
SSI

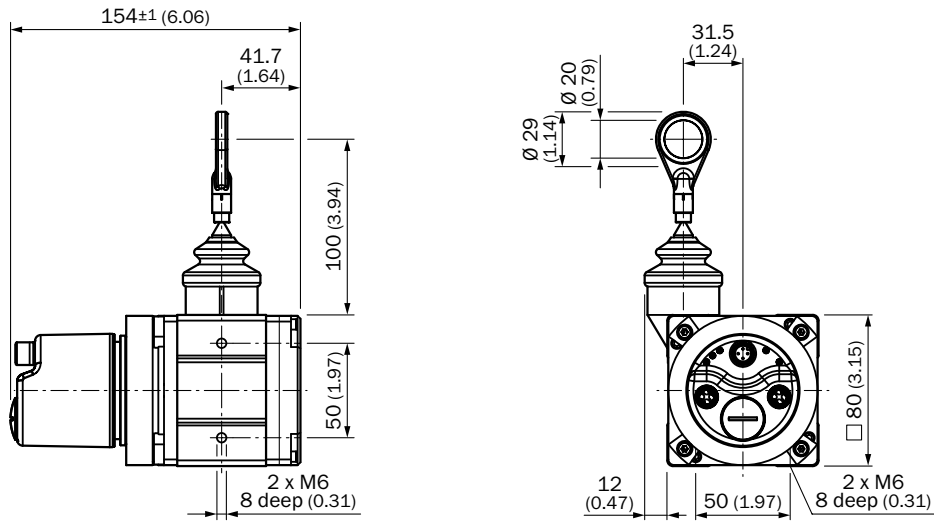


BTF08 up to 2 m
CANopen, PROFIBUS (ATM60), DeviceNET

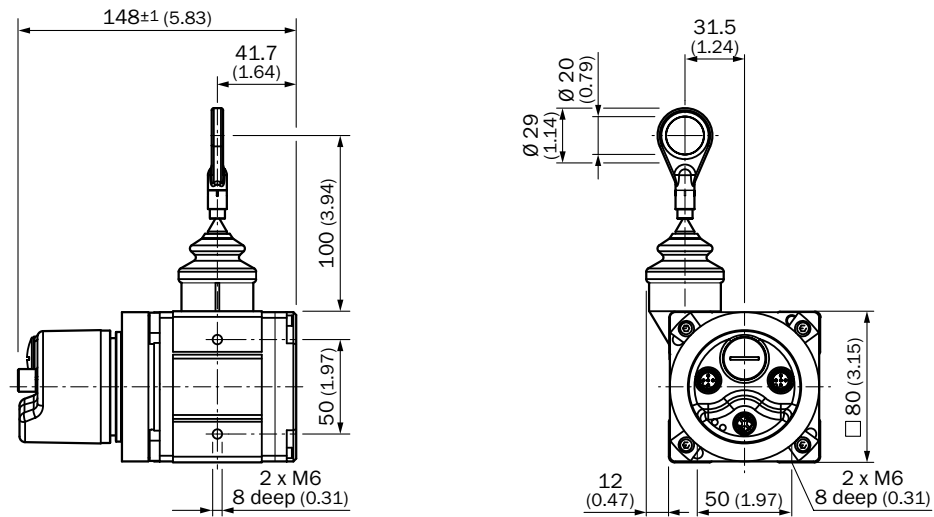


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BTF08 up to 2 m
EtherNET/IP, EtherCAT®, PROFINET

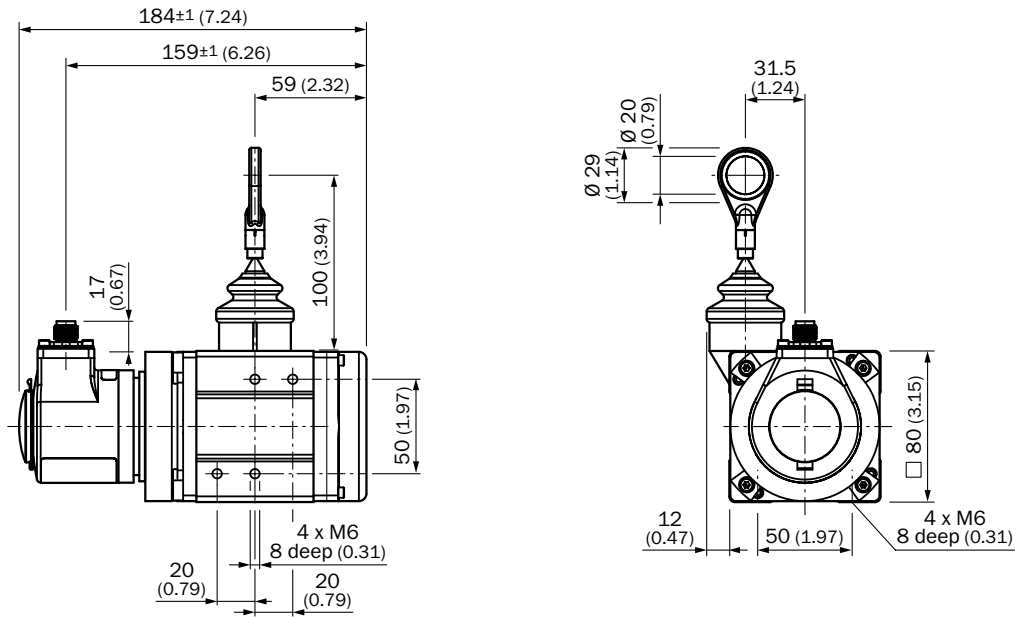


BTF08 up to 2 m
PROFIBUS (A3M60)

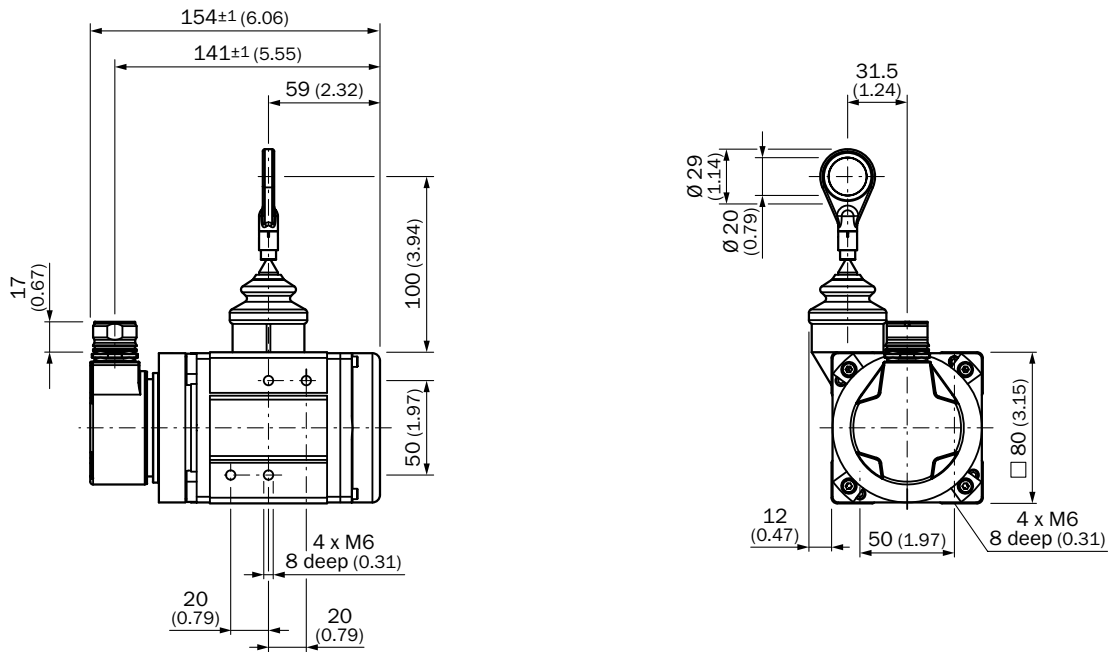


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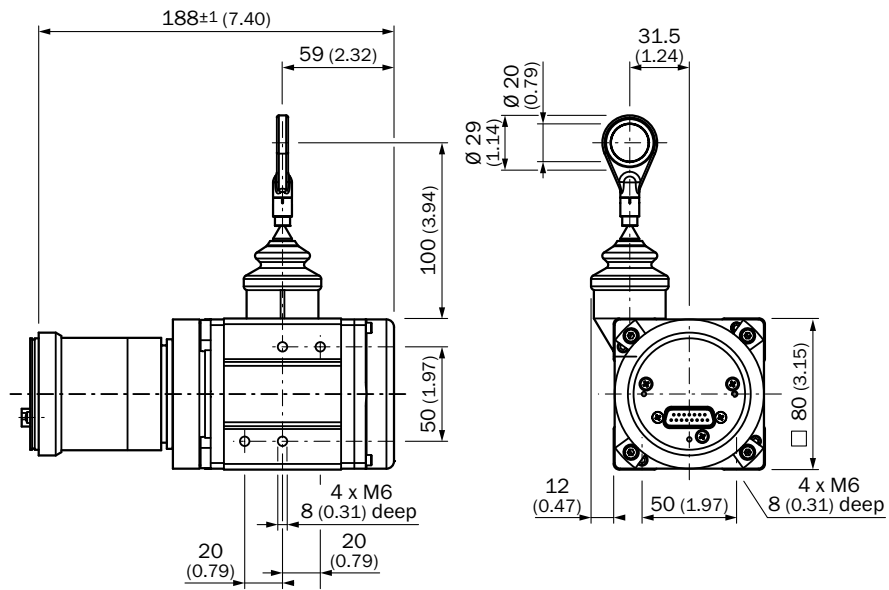
BTF08 up to 3 m
Analog



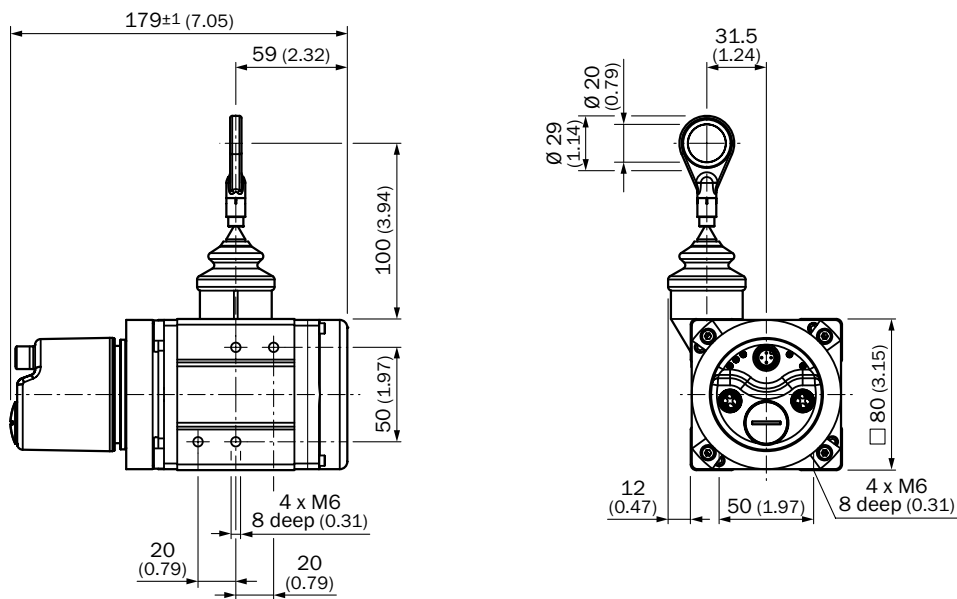
BTF08 up to 3 m
SSI



BTF08 up to 3 m
CANopen, PROFIBUS (ATM60), DeviceNET

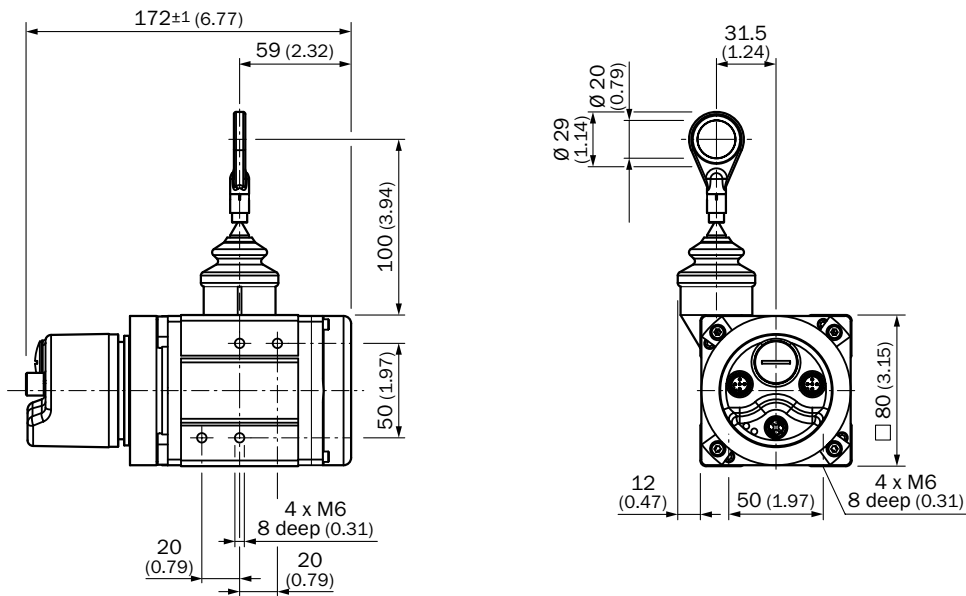


BTF08 up to 3 m
EtherNET/IP, EtherCAT®, PROFINET

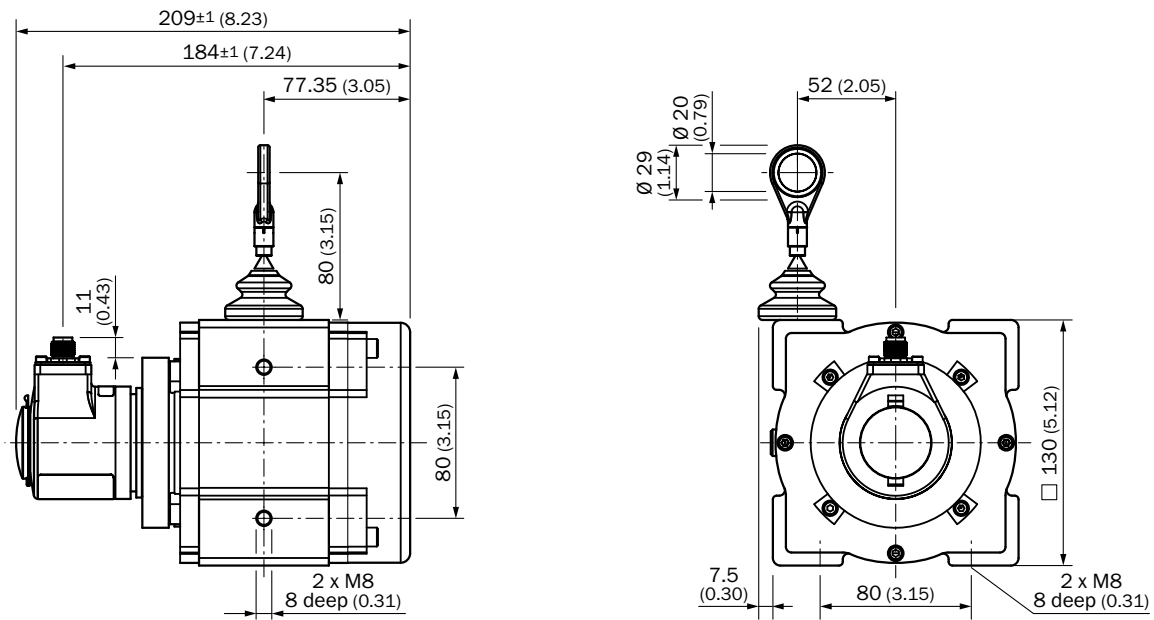


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**BTF08 up to 3 m
PROFIBUS (A3M60)**

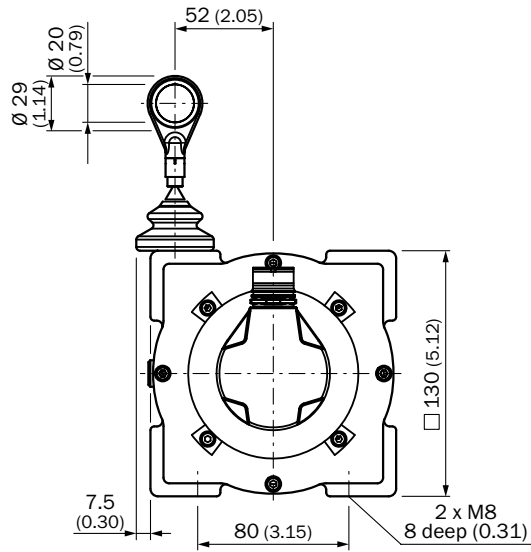
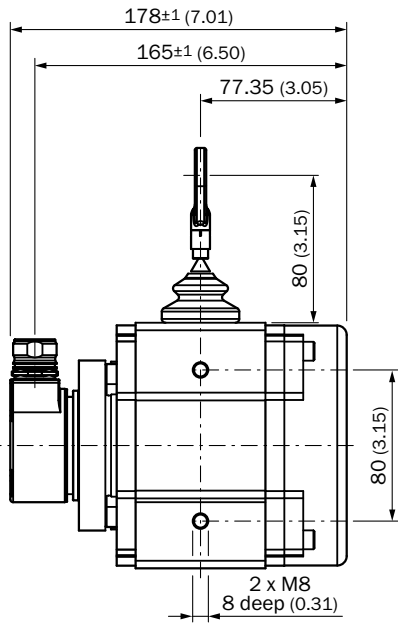


**BTF13 up to 5 m
Analog**

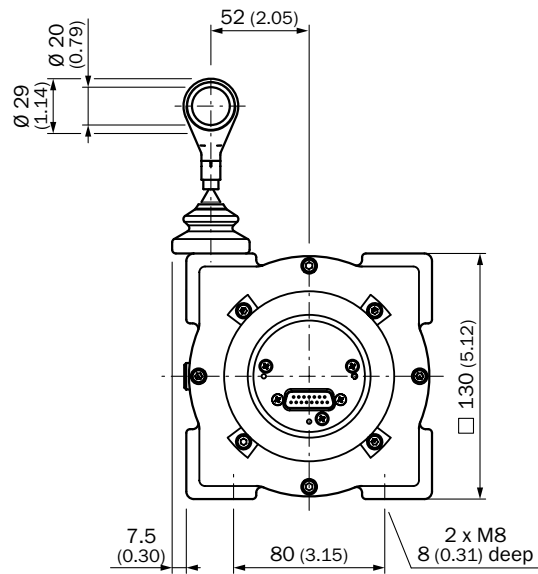
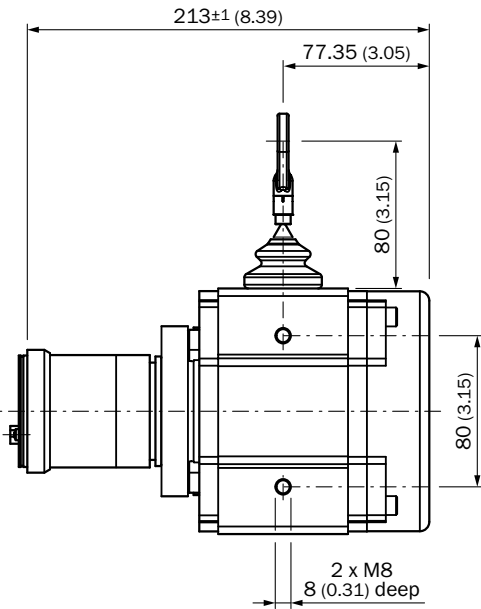


F

**BTF13 up to 5 m
SSI**

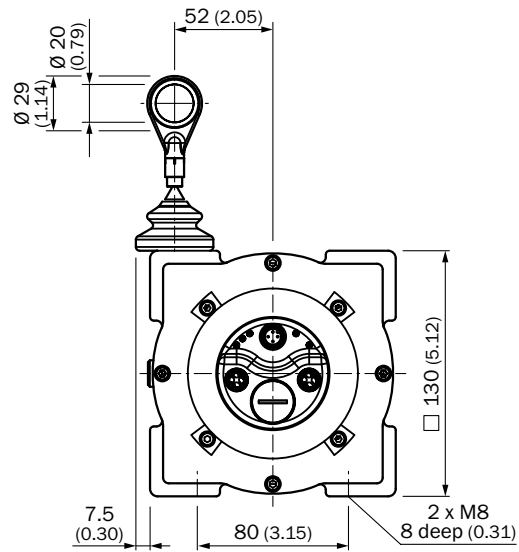
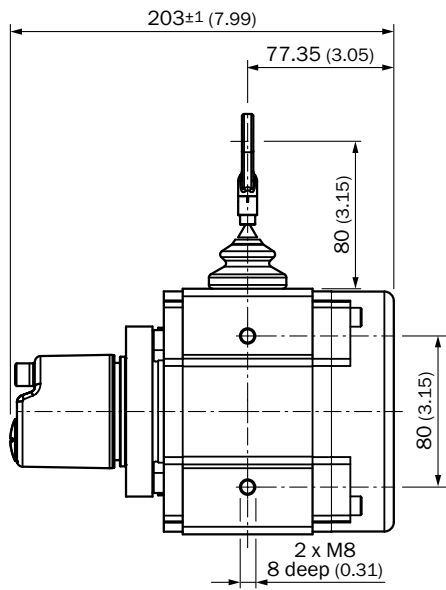


**BTF13 up to 5 m
CANopen, PROFIBUS (ATM60), DeviceNET**

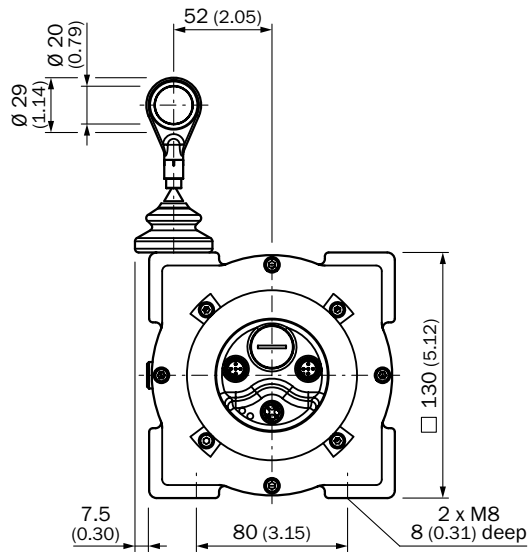
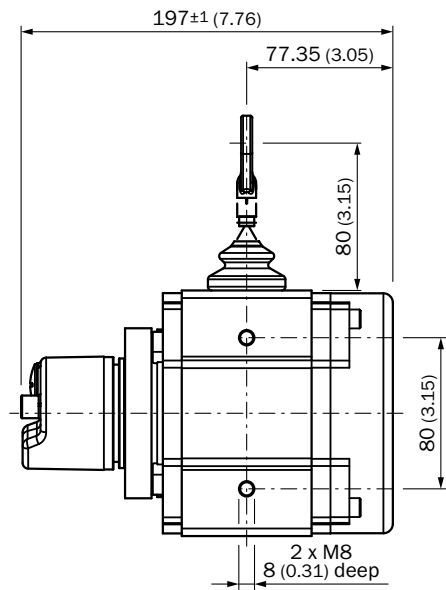


F

BTF13 up to 5 m
EtherNET/IP, EtherCAT®, PROFINET

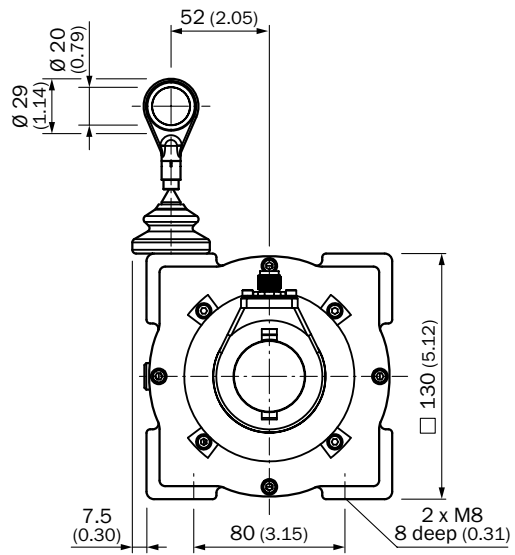
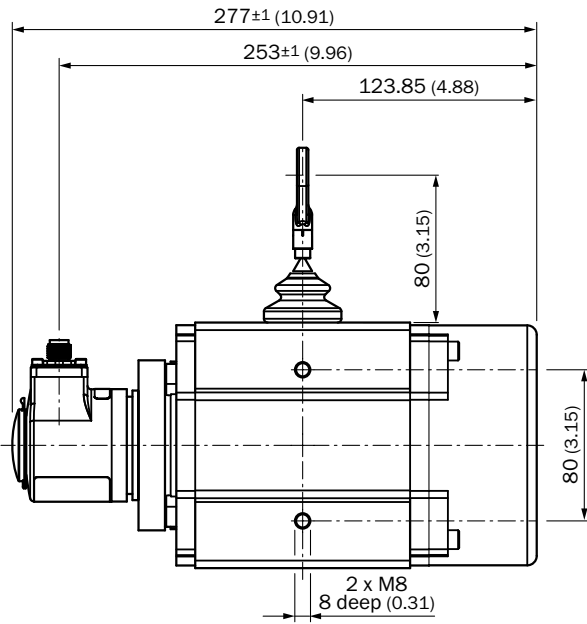


BTF13 up to 5 m
PROFIBUS (A3M60)

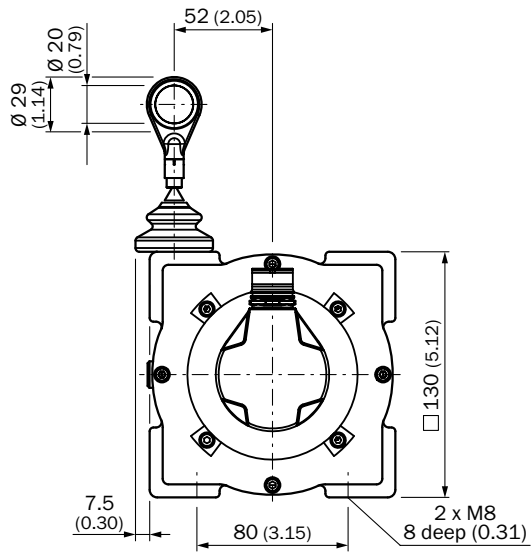
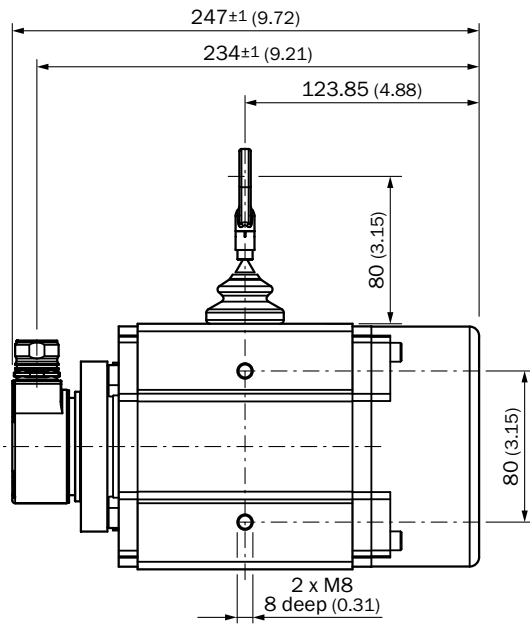


F

BTF13 up to 10 m
Analog

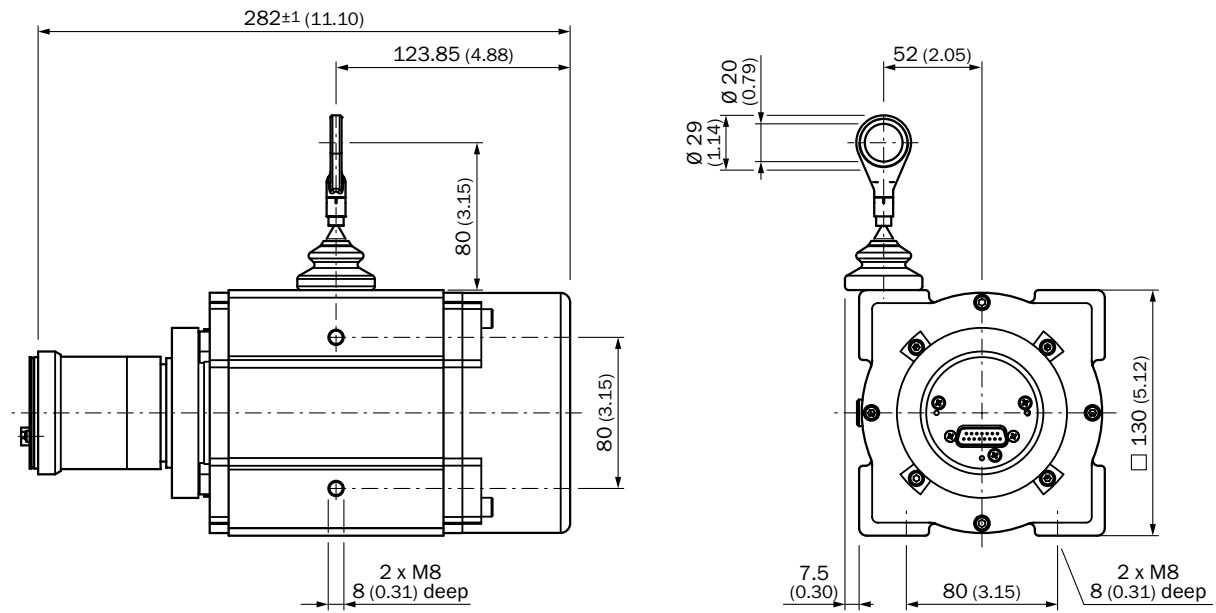


BTF13 up to 10 m
SSI

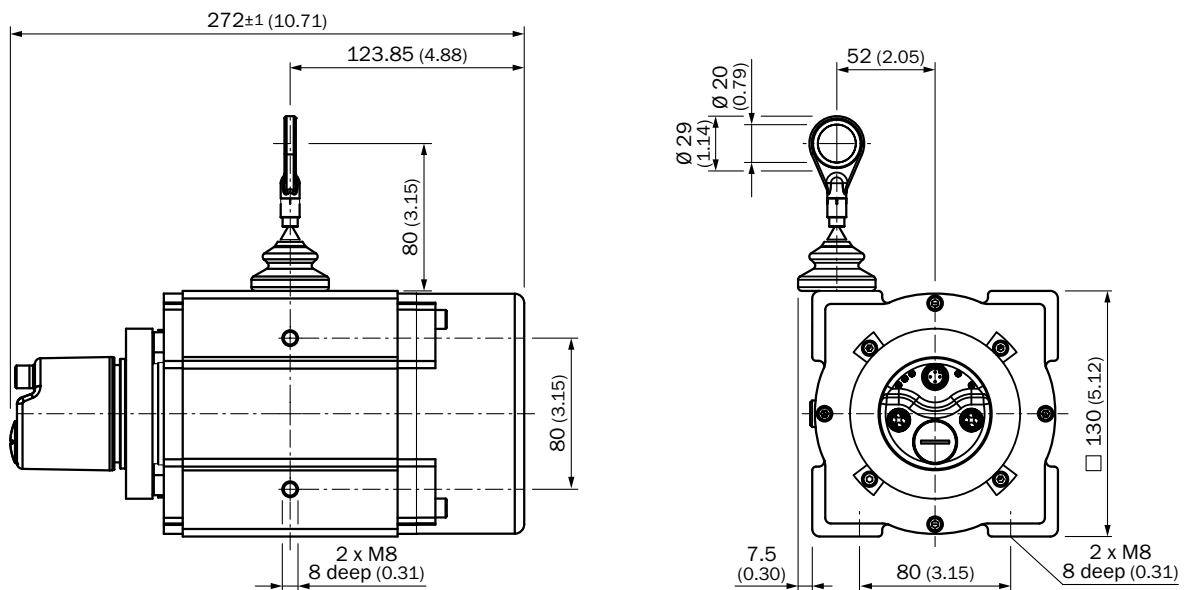


F

BTF13 up to 10 m
CANopen, PROFIBUS (ATM60), DeviceNET

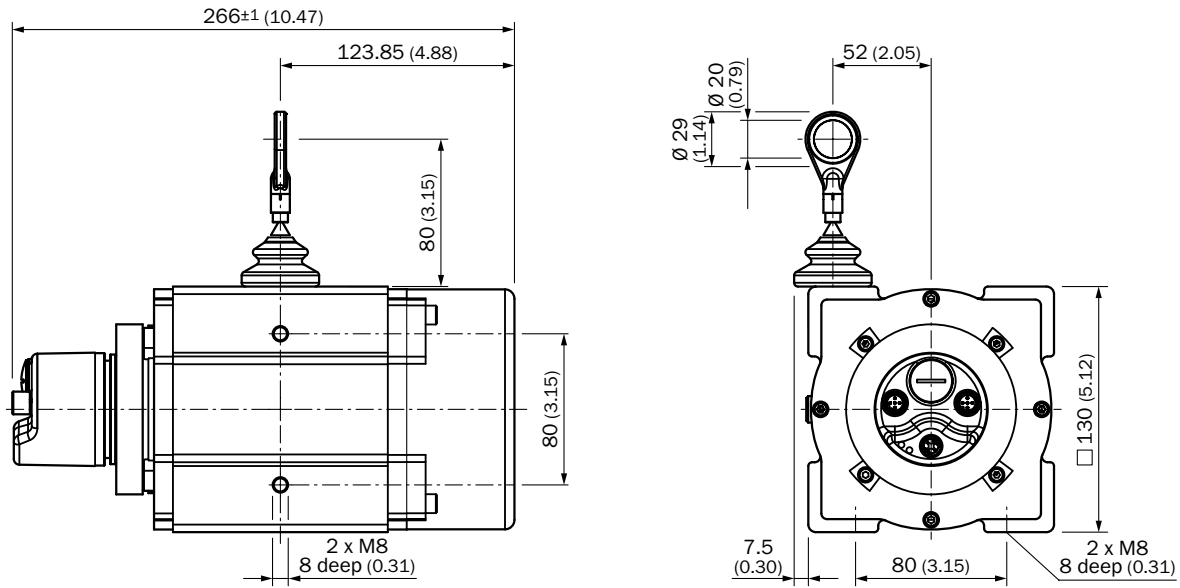


BTF13 up to 10 m
EtherNET/IP, EtherCAT®, PROFINET

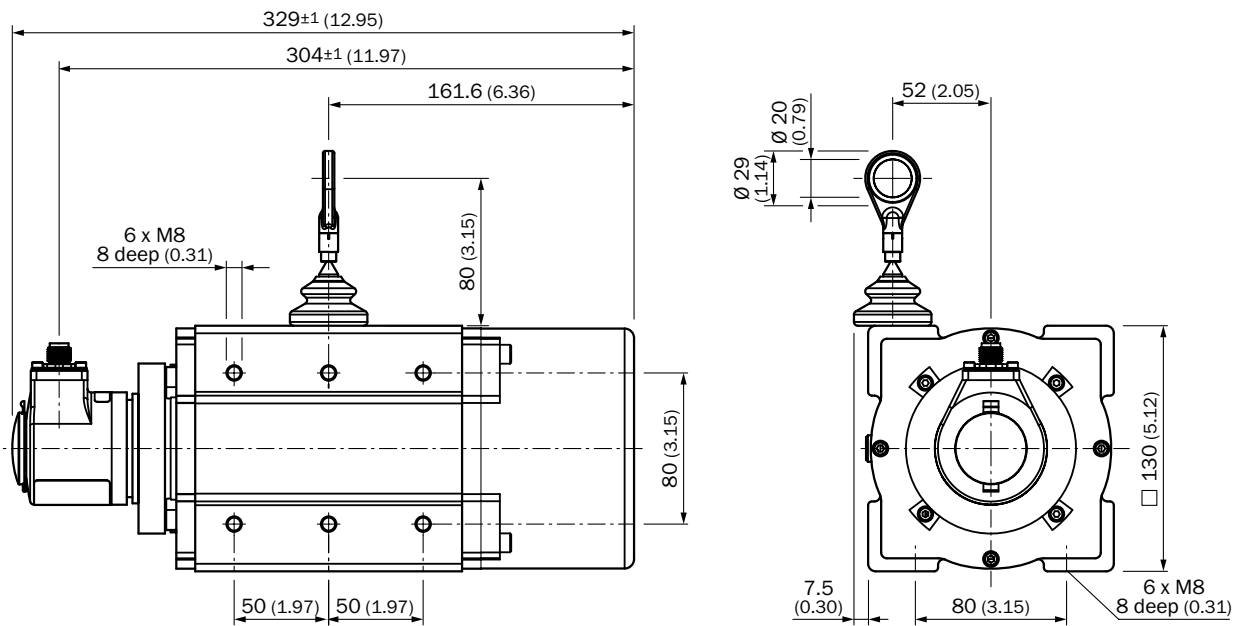


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**BTF13 up to 10 m
PROFIBUS (A3M60)**

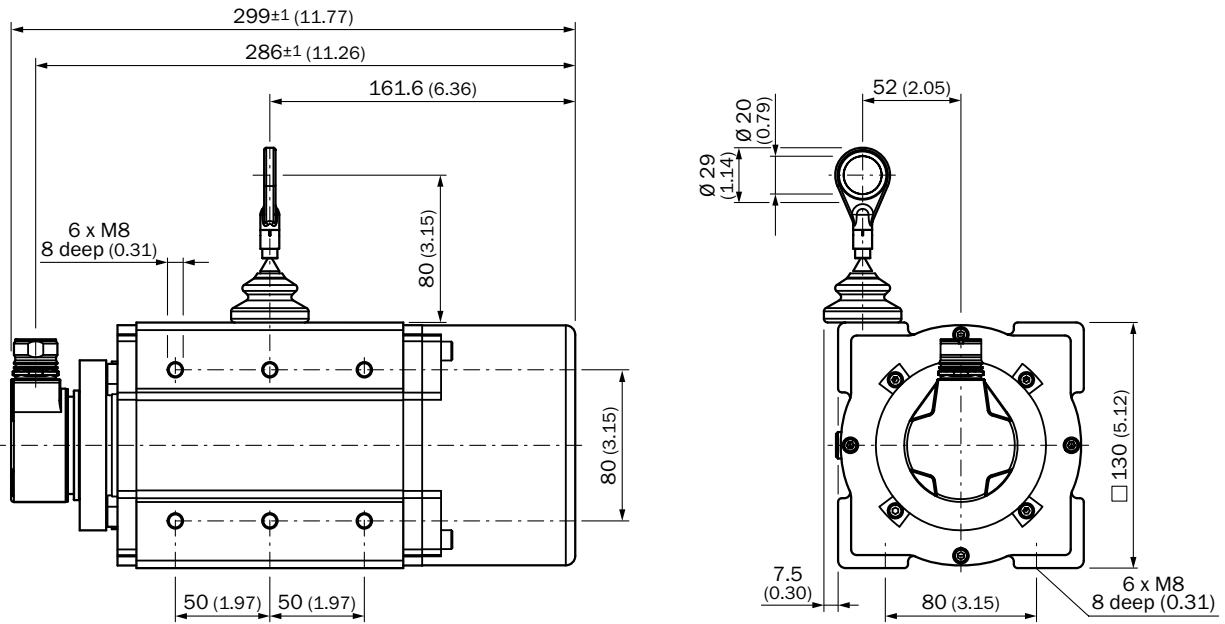


**BTF13 up to 20 m
Analog**

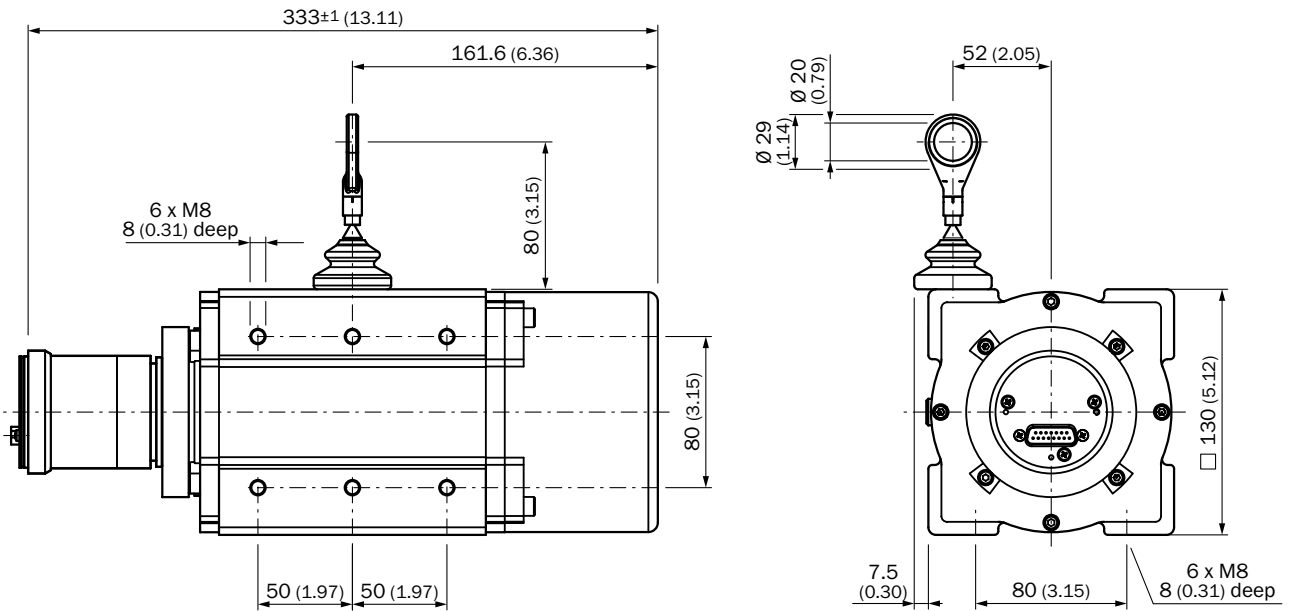


F

BTF13 up to 20 m
SSI

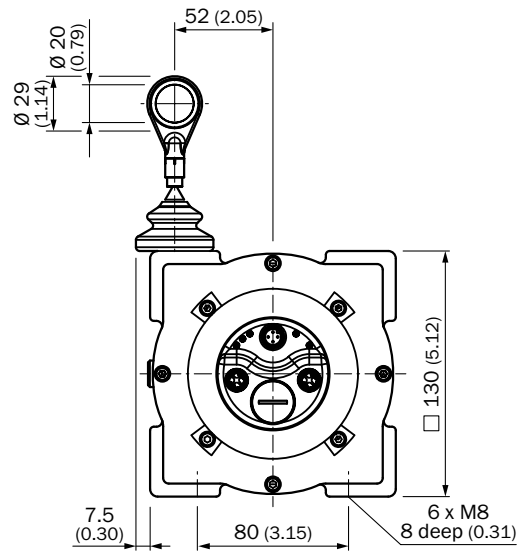
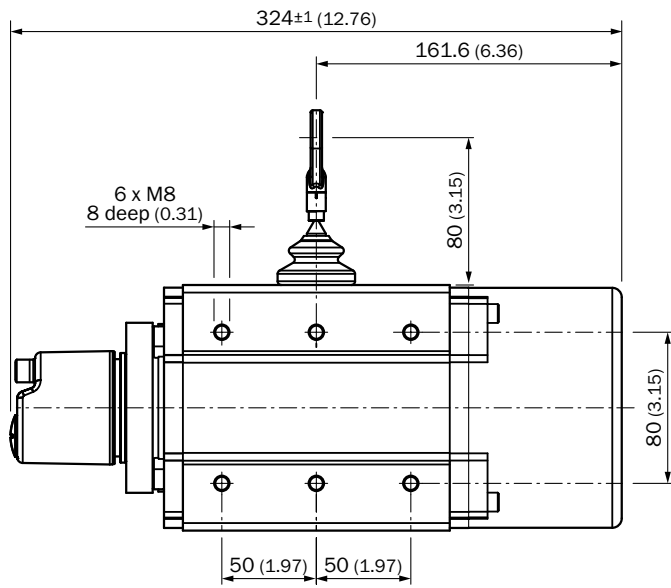


BTF13 up to 20 m
CANopen, PROFIBUS (ATM60), DeviceNET

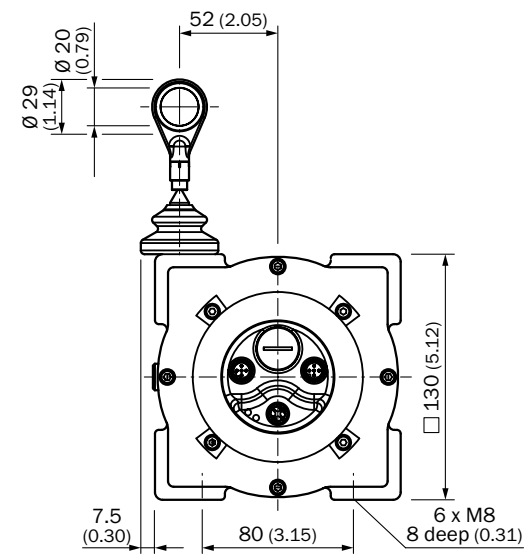
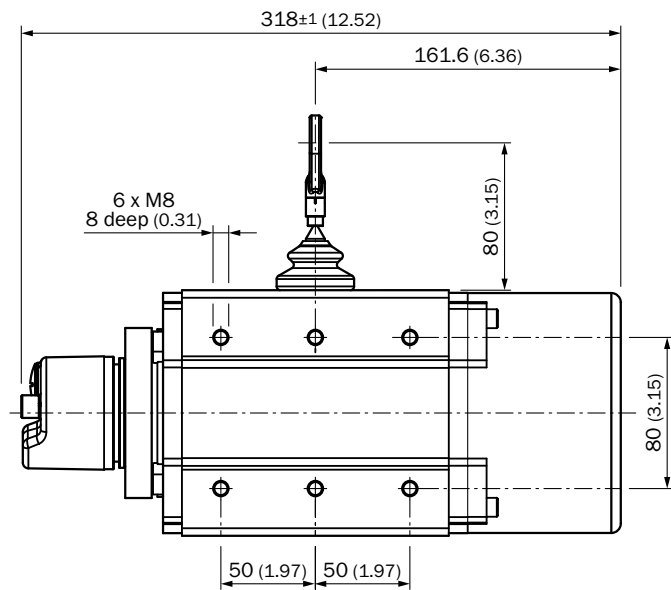


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BTF13 up to 20 m
EtherNET/IP, EtherCAT®, PROFINET

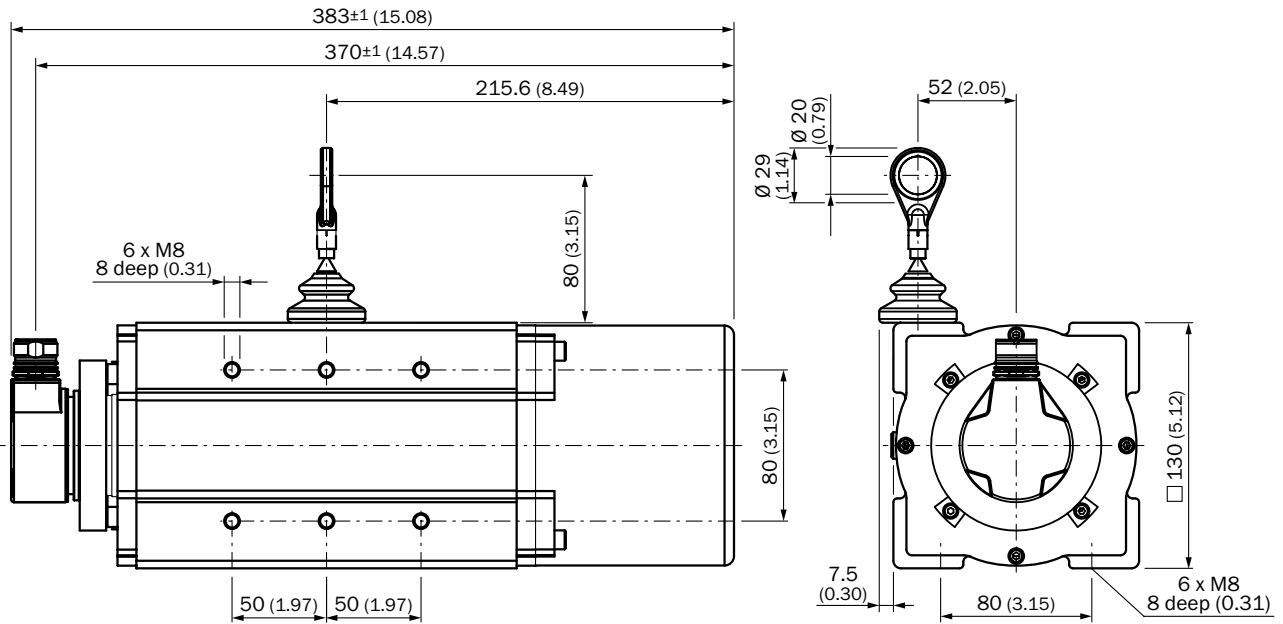


BTF13 up to 20 m
PROFIBUS (A3M60)

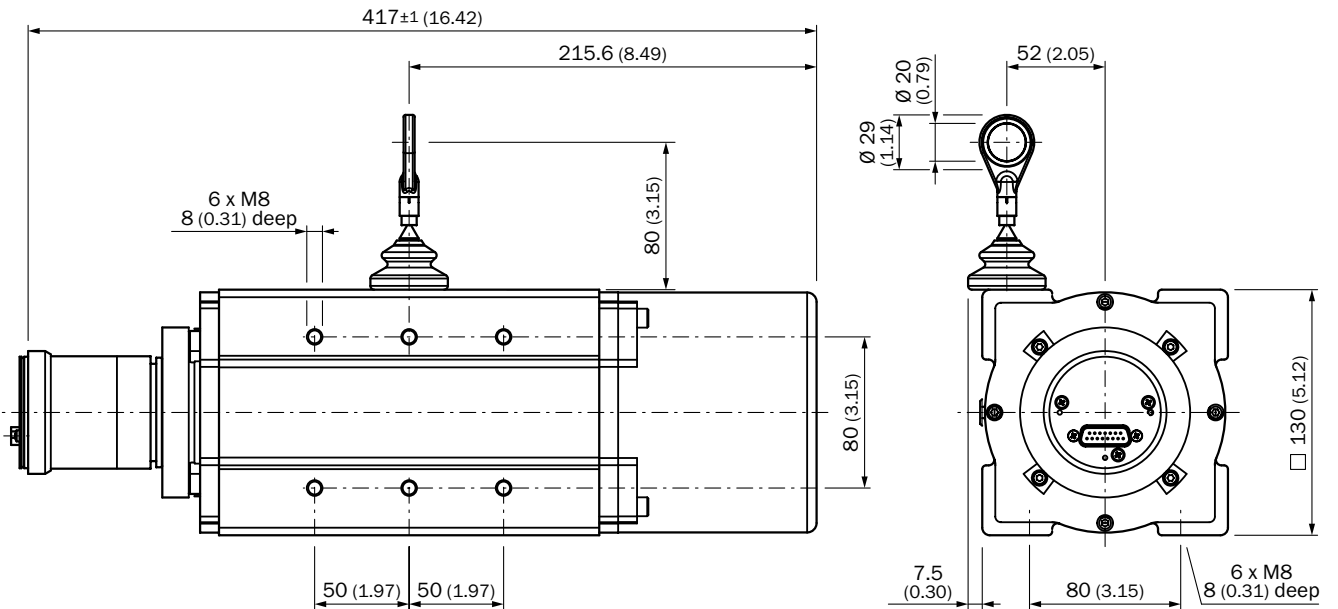


F

BTF13 up to 30 m
SSI

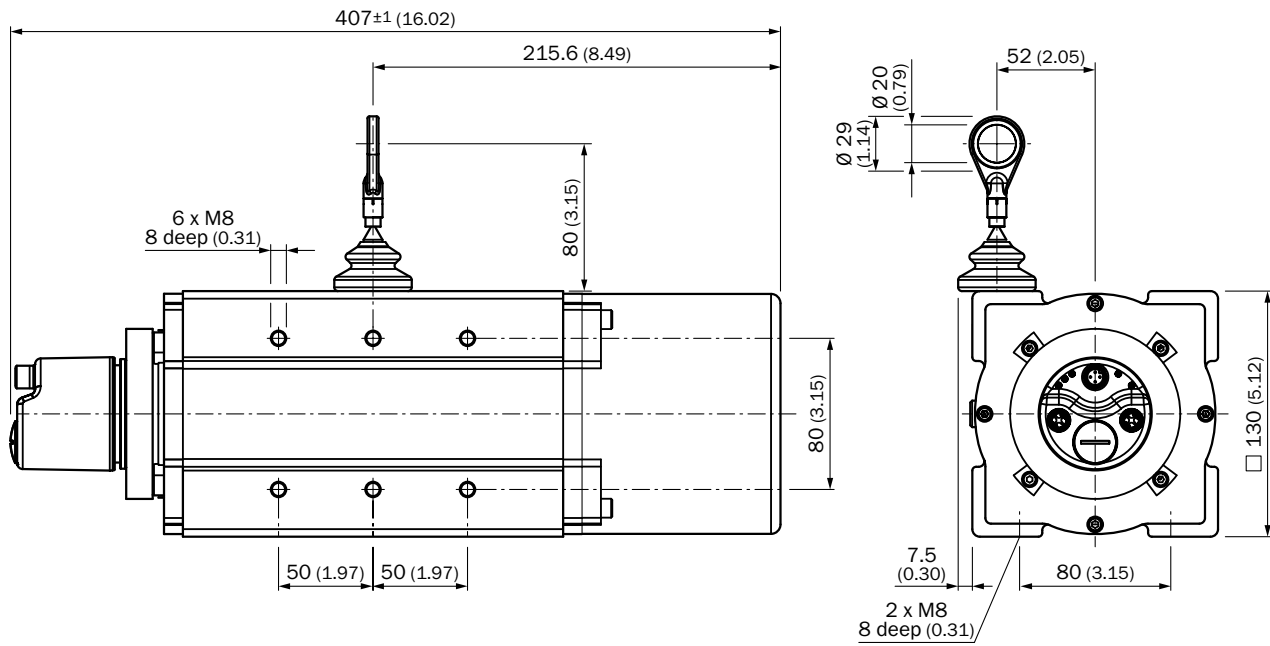


BTF13 up to 30 m
CANopen, PROFIBUS (ATM60), DeviceNET

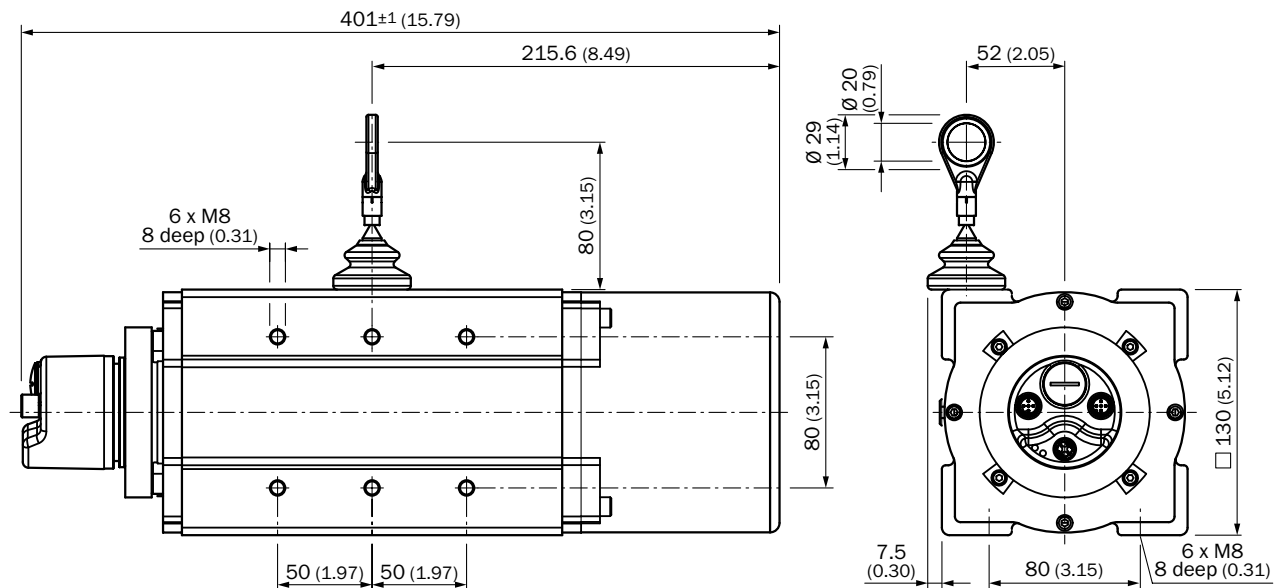


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BTF13 up to 30 m
EtherNET/IP, EtherCAT®, PROFINET

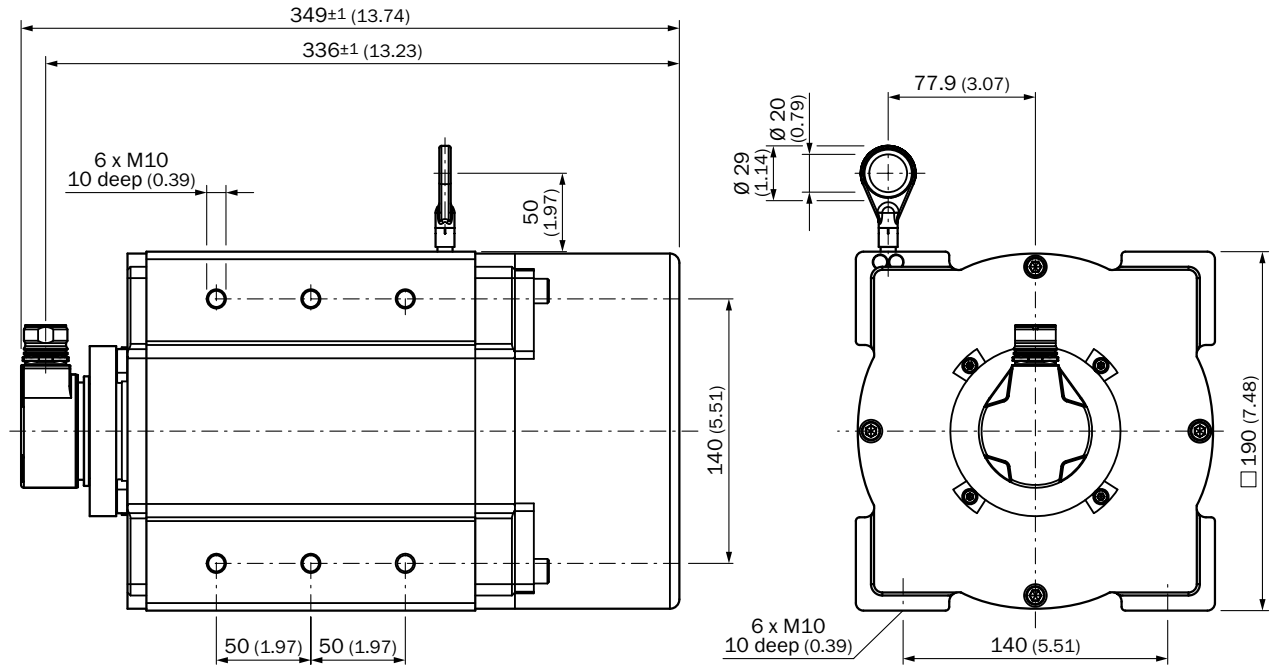


BTF13 up to 30 m
PROFIBUS (A3M60)

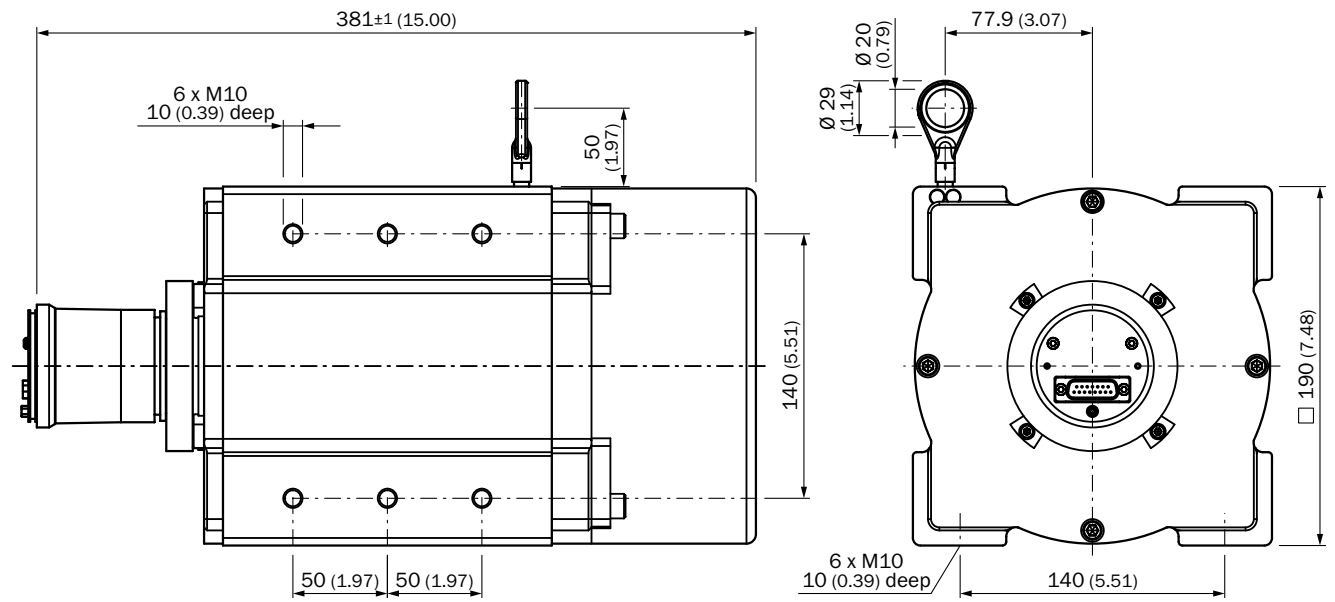


F

**BTF19 up to 50 m
SSI**

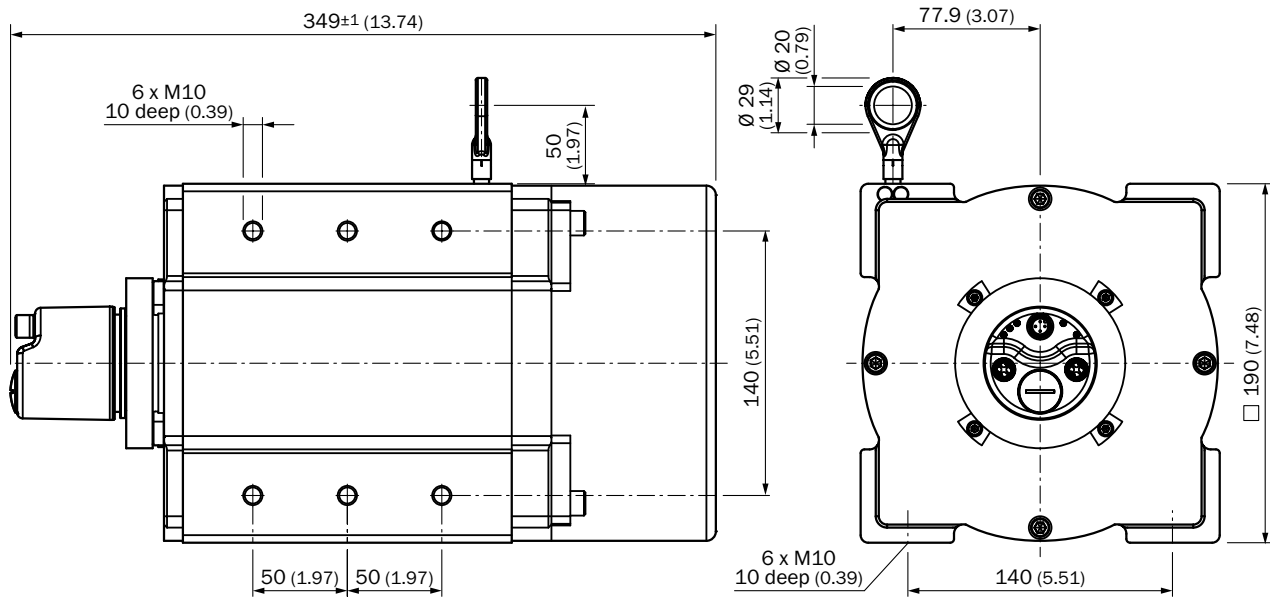


**BTF19 up to 50 m
CANopen, PROFIBUS (ATM60), DeviceNET**

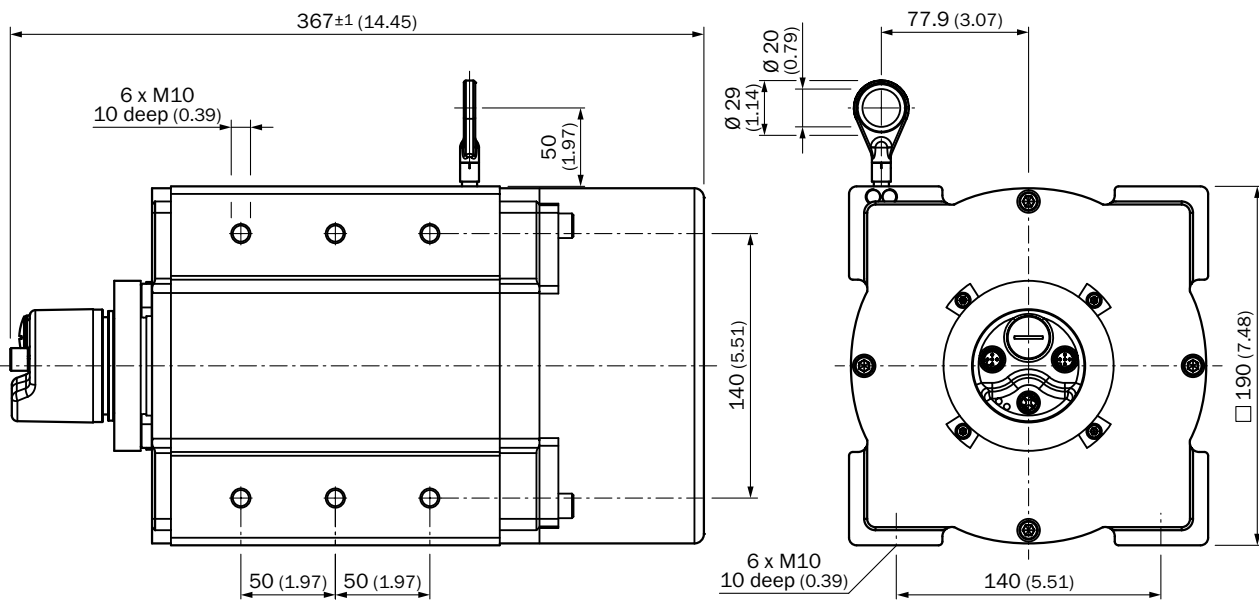


F

BTF19 up to 50 m
EtherNET/IP, EtherCAT®, PROFINET

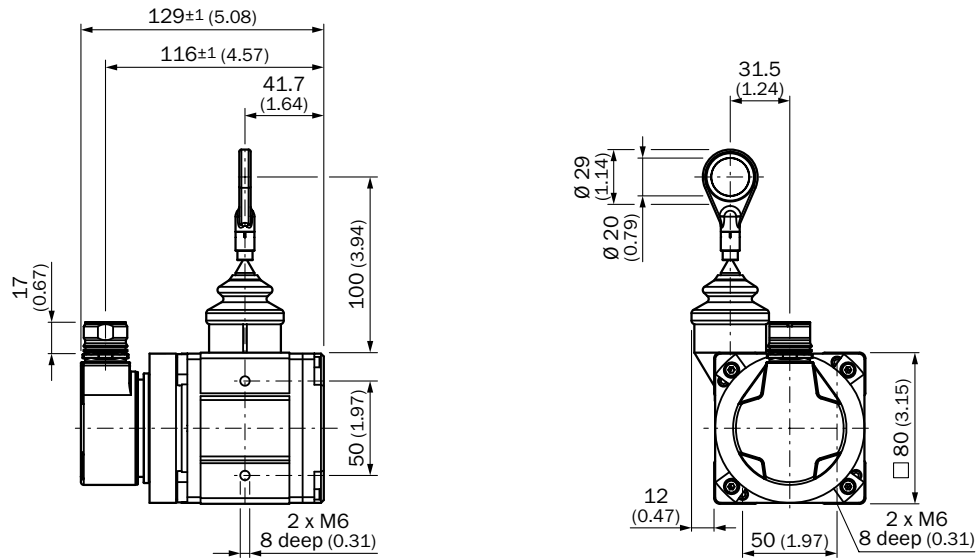


BTF19 up to 50 m
PROFIBUS (A3M60)

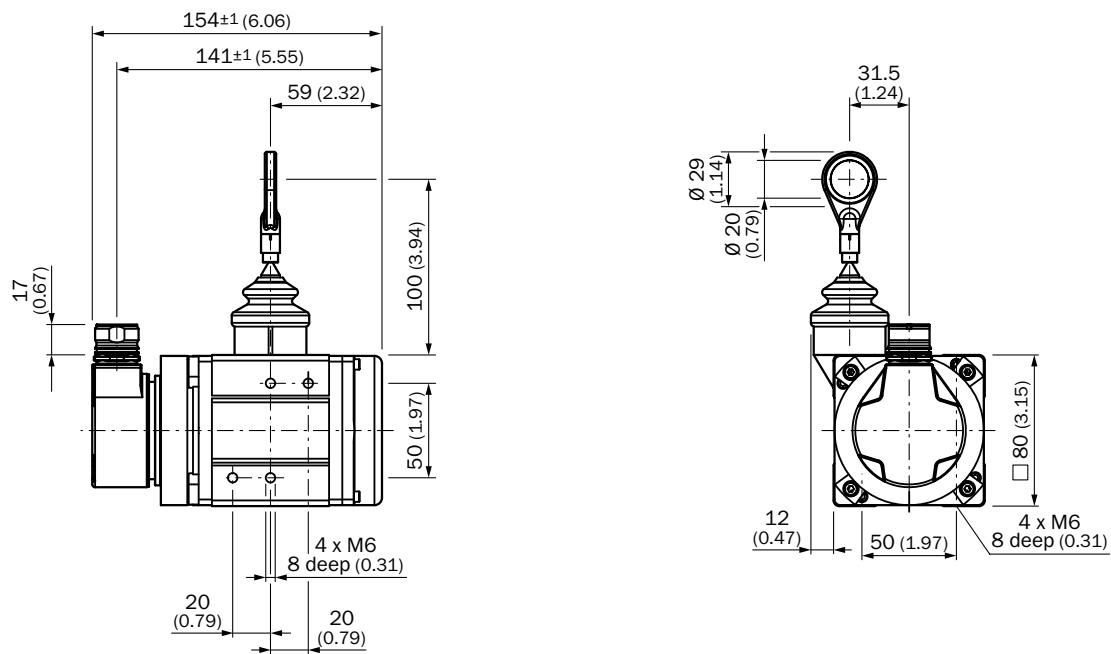


F

PRF08 up to 2 m

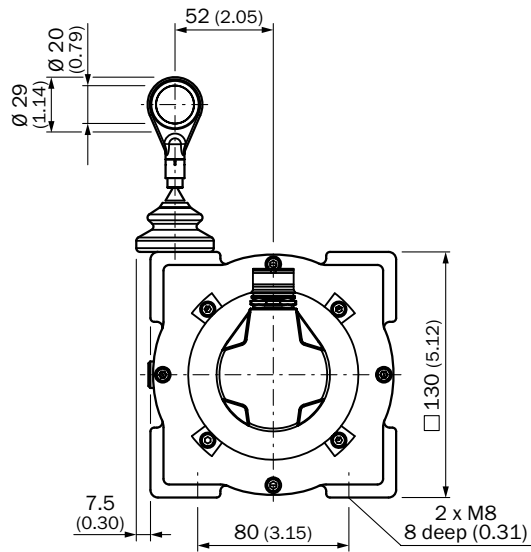
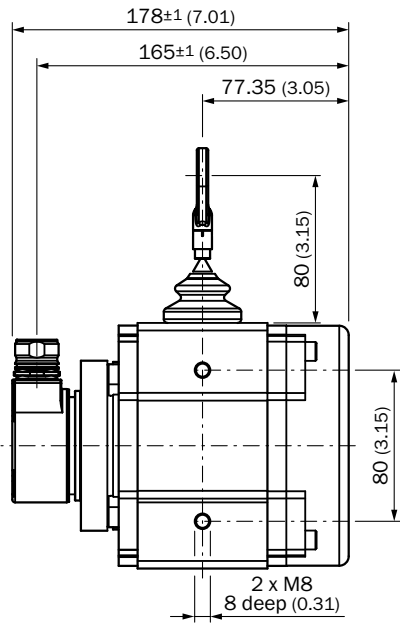


PRF08 up to 3 m

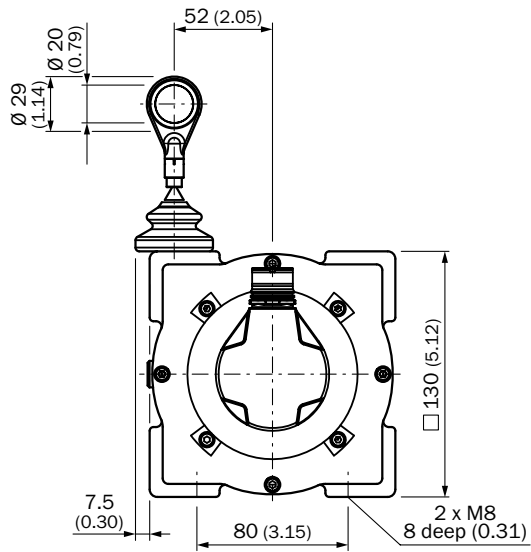
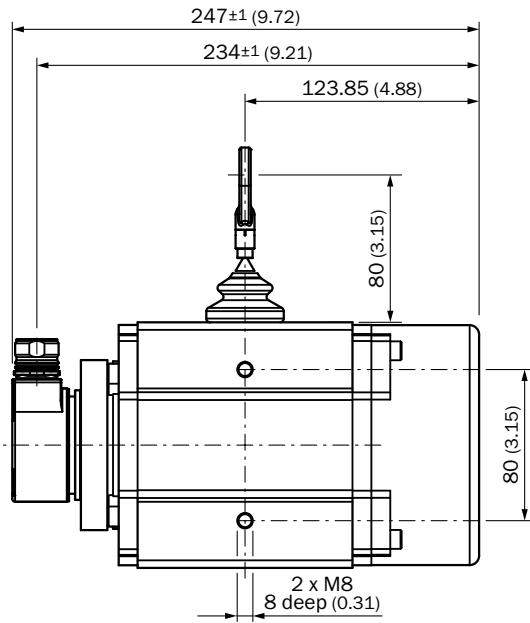


F

PRF13 up to 5 m

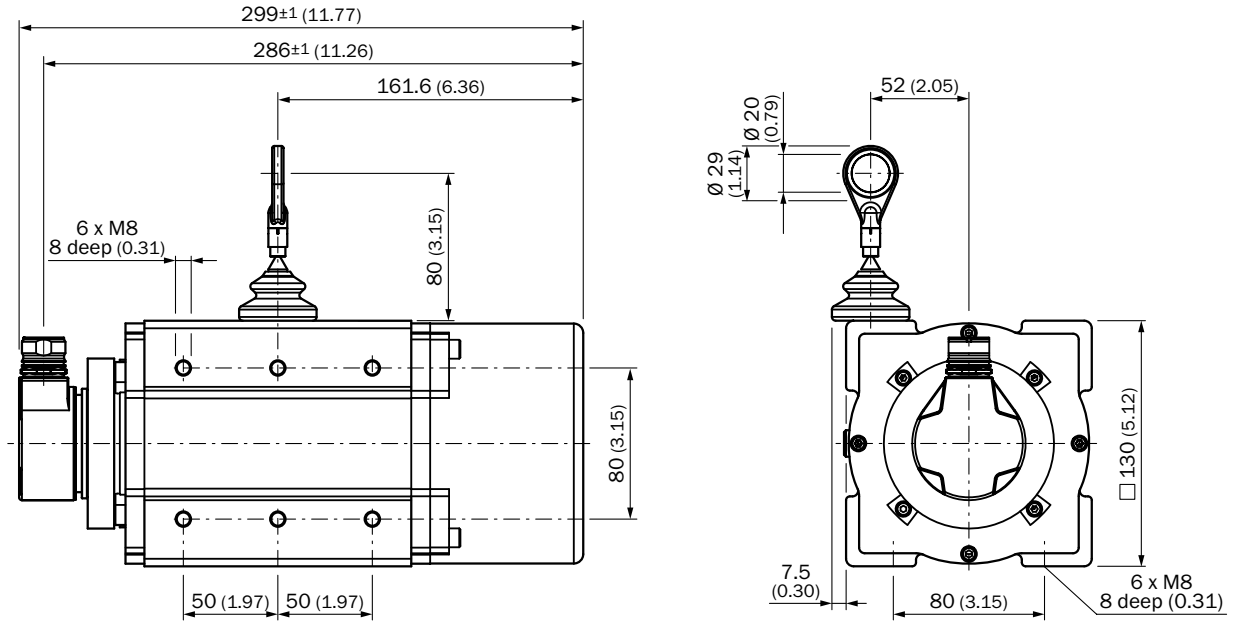


PRF13 up to 10 m

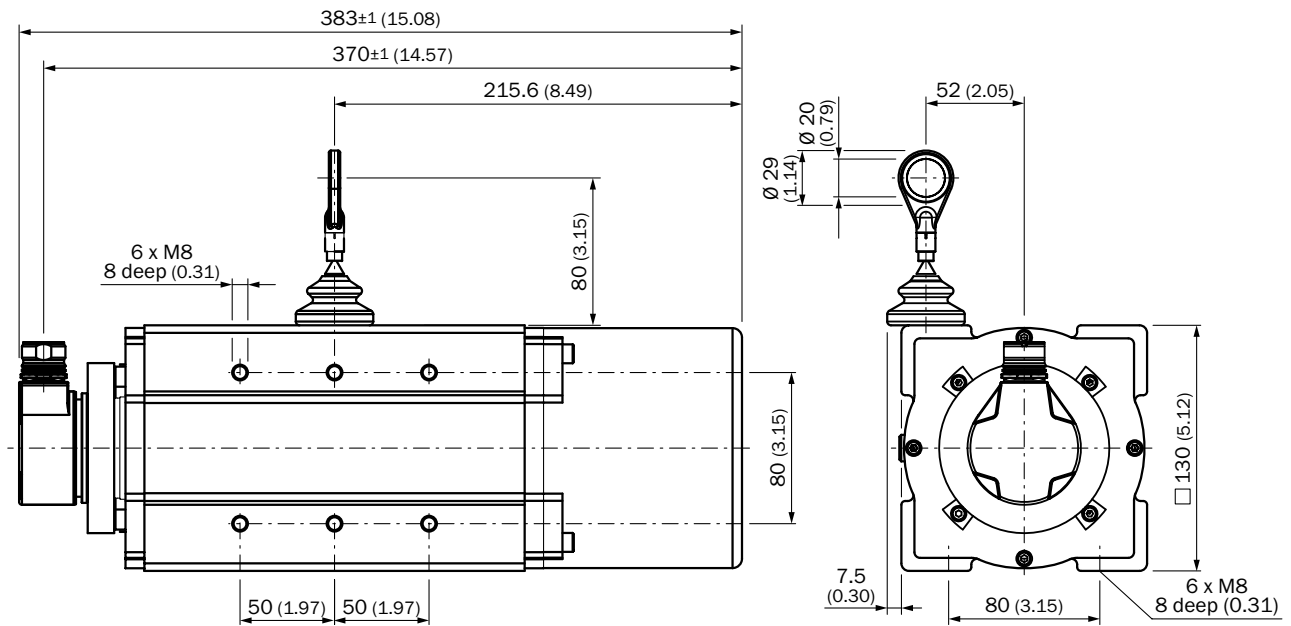


F

PRF13 up to 20 m

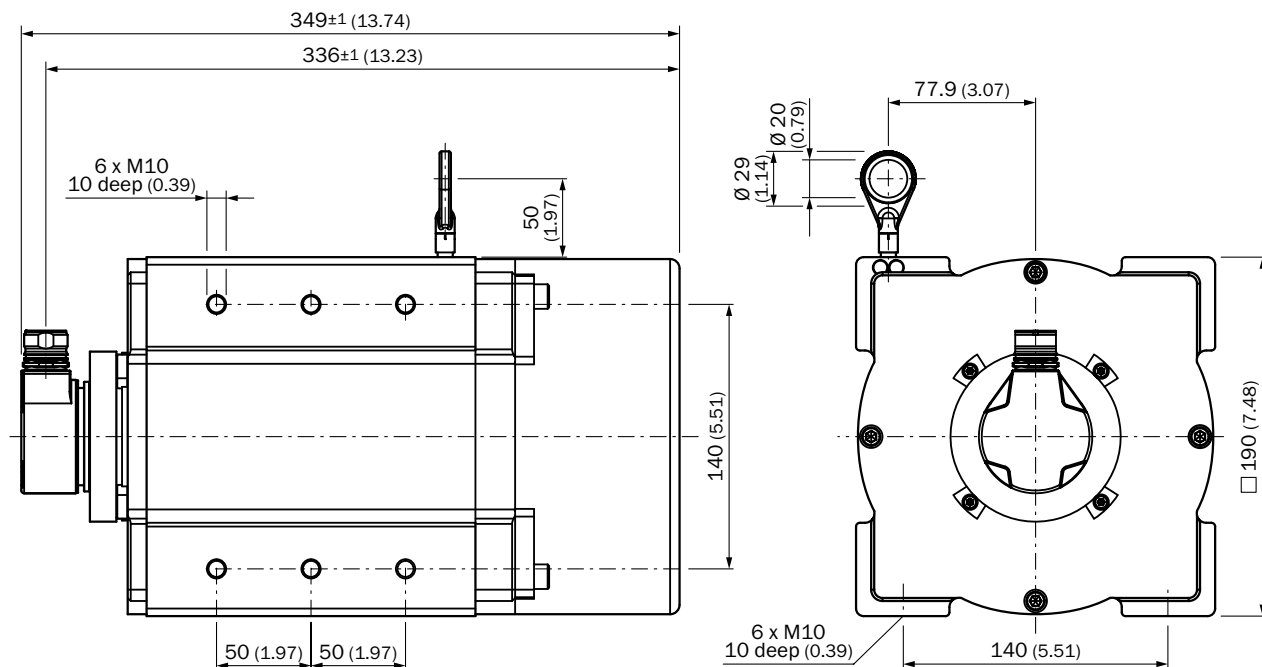


PRF13 up to 30 m



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PRF19 up to 50 m



Recommended accessories

Adapters/distributors

Brief description	Model name	Part no.
PROFIBUS connection adapter KA3, 3 x PG ¹⁾	AD-ATM60-KA3PR	2029225
	AD-ATM60-SR3PR	2031985
CANopen connection adapter KR1, 1 x PG ²⁾	AD-ATM60-KR1CO	2029230
	AD-ATM60-KR2CO	2029231
	AD-ATM60-KR3CO	2029232
	AD-ATM60-SR1CO	2031686
	AD-ATM60-SR2CO	2020935
	AD-ATM60-SR1DN	2029226
DeviceNet connection adapter SR1, 1 x M12, 5-pin ³⁾	AD-ATM60-SR2DN	2029227
	AD-ATM60-KR1DN	2029228
	AD-ATM60-KR2DN	2029229

¹⁾ Dimensional drawing see page E-223.

²⁾ Dimensional drawing see page E-241.

³⁾ Dimensional drawing see page E-249.

Wire draw mechanism

Brief description	Measuring length	Model name	Part no.
HighLine wire draw mechanism for 60's servo flange with 6 mm shaft	2.0 m	MRA-F080-102D2	6028625
	3.0 m	MRA-F080-103D2	6030125
	5.0 m	MRA-F130-105D2	6028626
	10.0 m	MRA-F130-110D2	6028627
	20.0 m	MRA-F130-120D1	6028628
	30.0 m	MRA-F130-130D1	6028629
	50.0 m	MRA-F190-150D2	6028630

Other accessories

Brief description	Model name	Part no.
Wire draw deflection pulley for wire draw mechanism MRA-F080 (2 m and 3 m from HighLine series)	MRA-F080-R	6028632
Wire draw deflection pulley for wire draw mechanism MRA-F130 (5 m, 10 m, 20 m and 30 m from HighLine series)	MRA-F130-R	6028631
Spare joint ball for insertion in wire end ring	GELENKKUGEL F. SEILZUG BTF/PRF/MRA	5318683
Additional brush attachment for wire draw mechanism MRA-F080 (2 m and 3 m from HighLine series)	MRA-F080-B	6045341
Additional brush attachment for wire draw mechanism MRA-F130 (5 m, 10 m, 20 m and 30 m from HighLine series)	MRA-F130-B	6038562

Plug connectors and cables

- PROFIBUS interface

Description	Cable length	Model name	Part no.
Cable socket, M12, 4-pin, straight, pre-wired with PROFIBUS cable for voltage supply, 4-core, 4 x 0.25 mm ² , suitable for drag chain, diam. 5.0 mm	5.0 m	DOL-1204-G05M	6009866
Cable socket, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	5.0 m	DOL-12PR-G05M	6026006
	10.0 m	DOL-12PR-G10M	6026007
Cable connector, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	5.0 m	STL-12PR-G05M	6026005
	10.0 m	STL-12PR-G10M	6026008
Cable socket for voltage supply, M12, 4-pin, straight, suitable for cable diameter 3 - 6.5 mm	-	DOS-1204-G	6007302
Cable socket, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	PR-DOS-1205-G	6021353
Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	PR-STE-1205-G	6021354
PROFIBUS cable by the meter 2 x 0.25 mm ² with shielding, suitable for drag chain, diam. 8.0 mm	-	LTG-2102-MW	6021355

- DeviceNet interface

Description	Cable length	Model name	Part no.
Cable socket for DeviceNet, M12, 5-pin, straight, shielded, suitable for cable diameter 6 - 8 mm	-	DOS-1205-G	6027534
Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1205-G	6027533

- SSI interface

Description	Cable length	Model name	Part no.
Cable socket, M23, 12-pin, straight, pre-wired with 12-core SSI cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , shielded, suitable for drag chain, cable diameter 7.8 mm	1.5 m	DOL-2312-G1M5MA1	2029200
	3.0 m	DOL-2312-G03MMA1	2029201
	5.0 m	DOL-2312-G05MMA1	2029202
	10.0 m	DOL-2312-G10MMA1	2029203
	20.0 m	DOL-2312-G20MMA1	2029204
	30.0 m	2DOL-2312-G30MMA1	2029205

- TTL / HTL interface

Description	Cable length	Model name	Part no.
Data cable by the meter 4 x 2 x 0.15 mm ² with shielding, diam. 5.6 mm	-	LTG-2308-MWENC	6027529
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² with shielding, diam. 7.5 mm	-	LTG-2411-MW	6027530
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, diam. 7.8 mm	-	LTG-2512-MW	6027531
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, UV and salt water resistant, diam. 7.8 mm	-	LTG-2612-MW	6028516
Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	STE-2312-G	6027537
Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	DOS-2312-G	6027538

→ For additional accessories, please see page H-399



Absolute non-contact measurement – with SICK linear encoders



Linear encoders consist of a read head (sensor) and a reference scale (measuring element). These non-contact sensors detect absolute position information along the reference scale via a unique code pattern and transfer this directly to the evaluation electronics. As a result, there is no need for a reference run. These compact systems feature high resolutions and can be used in applications up to 1,700 m long.

Your benefits

- Excellent reliability – less product wear and maintenance
- Maximum precision – resolution of up to 1 mm
- Large selection of measured lengths from < 0.5 m to 1,700 m is ideal for a broad range of applications
- **TTK70:**
Small size, light weight and high measurement speed make it ideal for a variety of applications
- **KH53:**
Reliable position determination under harsh conditions (dirt, dust, fog, shock, vibration) reduces downtime due to environmental factors



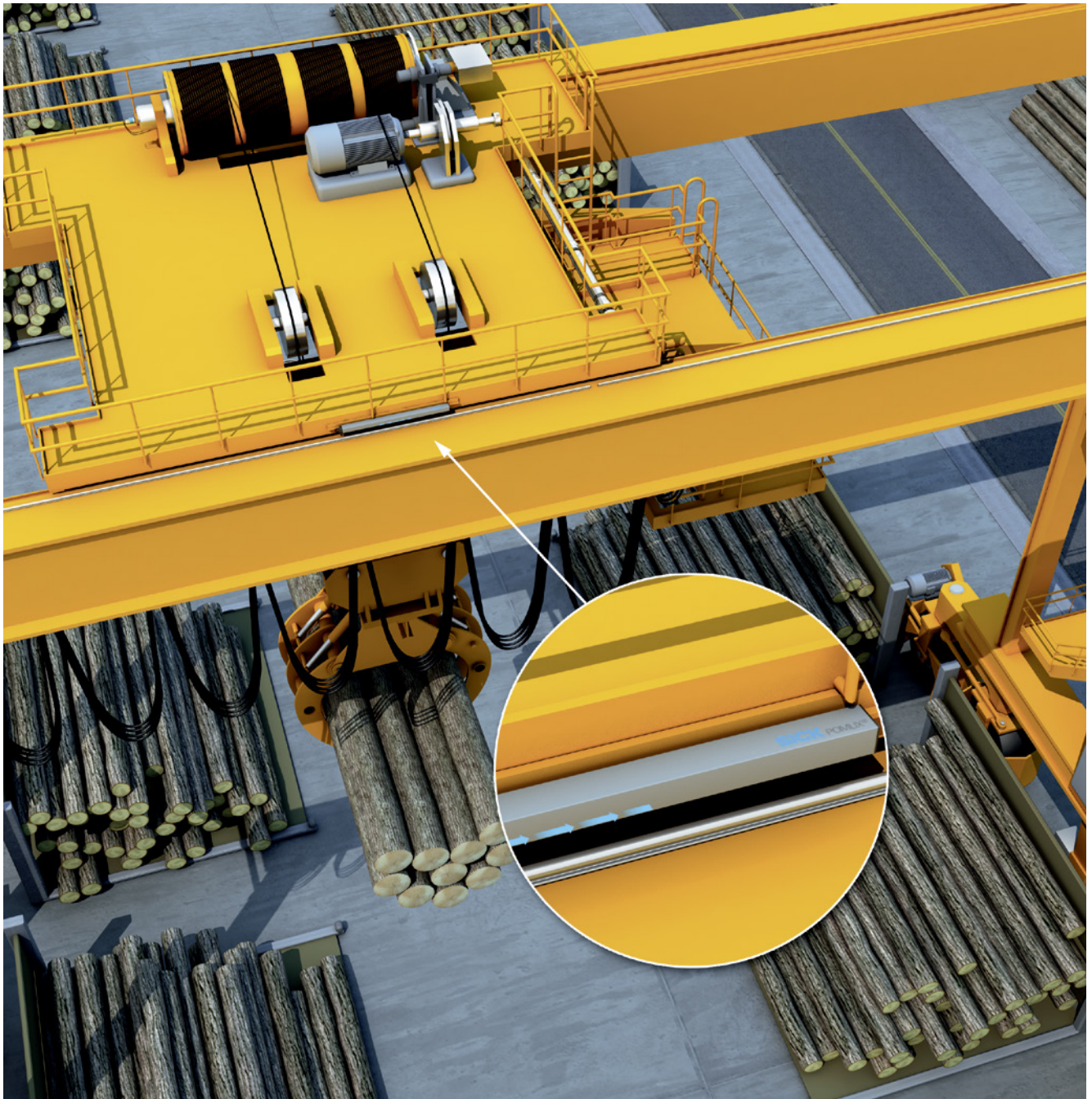
Linear encoders

ApplicationsG-374
Product family overviewG-377
 KH53 For the harshest conditions – the heavy-duty linear encoder	.G-378
 TTK70 Compact linear encoder with a high-resolution	.G-392



Typical linear encoders applications

Cranes – positioning of the crab and track



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The field of application for cranes encompasses nearly all areas of logistics from indoor to outdoor. So fine dust in cement factories or seawater from ship-to-shore cranes for example can quickly become a problem. Dirt, shock, vibration and salt water are therefore the basic requirements of a crane positioning system.

The KH53 linear encoder was designed specifically for such environmental conditions. It is used to position the crab on the crane and to position the track system of the crane itself. Due to its excellent repeatability, the largest possible reading distances and a measured length of up to 1.7 km, the KH53 linear encoder has been successfully used in these circumstances for years.

Print finishing – positioning cutting tools






High precision is required in the printing industry. After the printing process, the printed documents must be trimmed to the desired size. For this, the cutting blades have to be moved into their respective positions and then lowered. The linear encoder can reliably carry out this precise task.

With its high resolution and reproducibility, the non-contact TTK70 linear encoder is particularly well suited to this application. It has both an incremental and an absolute track and can thus calculate the absolute position and speed. The wide range of interface designs, including SSI, PROFIBUS, CANopen or DeviceNet, comprehensively meet all the current requirements in both the standard and fieldbus area.





Product family overview



	 <p style="text-align: center;">KH53</p>	 <p style="text-align: center;">TTK70</p>
	<p style="text-align: center;">For the harshest conditions – the heavy-duty linear encoder</p>	<p style="text-align: center;">Compact linear encoder with a high-resolution</p>
<p>Technical data overview</p>		
<p>Measuring length</p>	<p style="text-align: center;">< 0.5 m to 1,700 m</p>	<p style="text-align: center;">Up to 4 m</p>
<p>Resolution</p>	<p style="text-align: center;">0.1 mm</p>	<p style="text-align: center;">1 µm</p>
<p>Repeat accuracy</p>	<p style="text-align: center;">0.3 mm (Standard), 1.0 mm (Advanced)</p>	<p style="text-align: center;">≤ ± 2 µm</p>
<p>Electrical interface</p>	<p style="text-align: center;">SSI, PROFIBUS</p>	<p style="text-align: center;">SSI</p>
<p>Connection type</p>	<p style="text-align: center;">Connector Cable</p>	<p style="text-align: center;">Connector</p>
<p>Enclosure rating</p>	<p style="text-align: center;">Up to IP 67 (IEC 60529)</p>	<p style="text-align: center;">IP 65 (EN 60529)</p>
<p>At a glance</p>		
	<ul style="list-style-type: none"> • Non-contact length measurement – maintenance-free, rugged, long lifetime • 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 harsh environments • High movement speeds of up to 6.6 m/s • Distance tolerance between read head and measuring element: up to 55 mm ± 20 mm possible 	<ul style="list-style-type: none"> • Non-contact determination of absolute position • Small, compact read head • Standard SSI interface, combined with Sin/Cos output • Measuring lengths of up to 4 m • High level of accuracy (± 10 µm) • High resolution (1 µm) • High movement speed of up to 10 m/s
<p>Detailed information</p>	<p style="text-align: center;">→ G-378</p>	<p style="text-align: center;">→ G-392</p>


For the harshest conditions –
the heavy-duty linear encoder









Additional information

Detailed technical dataG-379

Ordering informationG-381

Dimensional drawingsG-385

PIN and wire allocationG-386

ImplementationG-388

Switch settingsG-389

GeneralG-389

Position tolerancesG-390

Recommended accessoriesG-391

Product description

The POMUX KH53 non-contact linear encoder measures lengths up to 1,700 m. The encoder consists of two main components: Omega Profile sections and a read head. The non-contact read head determines the absolute position using a series of measuring elements attached along the measurement path, with each measuring element consisting of a number of permanent magnets. Since the distances between the magnets are unique, they can be used to develop an

absolute measuring code. No reference run is required due to determination of the absolute position. The read head is guided above the measuring elements at a distance of 25 mm or 55 mm. With a measuring length of up to 1,700 m the KH53 is ideal for use in cranes, in material handling and warehouse systems and for railed vehicles. Due to the non-contact technology, these encoders have a long lifetime that withstands harsh conditions.

At a glance

- Non-contact length measurement – maintenance-free, rugged, long lifetime
- 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 harsh environments
- High movement speeds of up to 6.6 m/s
- Distance tolerance between read head and measuring element: up to 55 mm ± 20 mm possible

Your benefits

- After installation, the system is immediately available and completely maintenance-free, which leads to time and cost savings.
- Reliable determination of position under harshest environmental conditions such as influences of dirt, dust, fog, shocks and vibrations
- High efficiency and productivity
- Savings on time – no reference run necessary on initial operation due to absolute position measurement
- accurate positioning even with high mounting tolerances

→ www.mysick.com/en/KH53

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.



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Detailed technical data

Performance

	KH53	KH53 Advanced
Measuring length	0 m ... 1,700 m	0 m ... 548 m
Measuring range	38 m, 107 m, 354 m, 1,700 m	54 m, 548 m
Interfaces	SSI and PROFIBUS	
Resolution	0.1 mm	
Repeatability	0.3 mm	1 mm
Movement speed max. ¹⁾	6.6 m/s	
Measurement accuracy ²⁾	$\pm 1000 + ME (Tu - 25 \text{ }^\circ\text{C}) Tk \text{ } \mu\text{m}$	$\pm 2000 + ME (Tu - 25 \text{ }^\circ\text{C}) Tk \text{ } \mu\text{m}$

¹⁾ If the max. movement speed is exceeded or the read head cannot detect a measuring element, an error message is produced (with SSI FF FF FE hex).

²⁾ If the read head and measuring element are mounted within ± 1 mm of the nominal mounting distance in the N and Y directions. The figures quoted related to the accuracy within a measuring element with reference to the start of that measuring element. ME = length measuring element Tu = Ambient temperature $^\circ\text{C}$ see graphic on page G-390.

Electrical data

Initialization time	2 s					
Position forming time	SSI	0.8 ms				
	PROFIBUS	1.1 ms				
Supply voltage	10 ... 32 V					
Electrical connection	SSI	Cable Connector M23				
	PROFIBUS	3 x connector M12				
SSI						
RS422 interface for parameterizing	Four wire transmission, asynchrony, full duplex Data format: 1 start bit, 8 data bits, 1 stop bit, no parity Data protocol: ASCII, Baud rate 9600					
Interface digital, serial	SSI 24 bit format					
Default setting SSI standard	RS 422 OFF					
Operating current SSI	250 mA					
PROFIBUS DP						
Electrical interface	RS485 (acc. EN 50 170-2 (DIN 19245 part 1-3) DC isolated via opto-couplers)					
Address setting (node number)	0 ... 127 (Hex switches or Protocol)					
Protocol	PROFIBUS DP basic functions					
Bus termination	Via external switches					
SET (electronic adjustment)	Via Protocol					
Encoder profile	Profile for Encoders (07hex) – Class 2					
Data transmission rate (baud rate)	9.6 kBaud ... 12 Mbaud (autodetect)					
Status information	Operation (LED green), bus activity (LED red)					
Operating power consumption PROFIBUS	2.5 W					
MTTFd: mean time to dangerous failure	SSI	Measuring range up to 38 m:	45 years ¹⁾	Measuring range up to 54 m:	34 years ¹⁾	
		Measuring range up to 107 m:	40 years ¹⁾		Measuring range up to 548 m:	22 years ¹⁾
		Measuring range up to 354 m:	31 years ¹⁾			
		Measuring range up to 1,700 m:	21 years ¹⁾			
	PROFIBUS	Measuring range up to 38 m:	40 years ¹⁾	Measuring range up to 54 m:	30 years ¹⁾	
		Measuring range up to 107 m:	35 years ¹⁾		Measuring range up to 548 m:	20 years ¹⁾
		Measuring range up to 354 m:	28 years ¹⁾			
		Measuring range up to 1,700 m:	20 years ¹⁾			

¹⁾ Acc. to EN ISO13849. This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 $^\circ\text{C}$, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Mechanical data

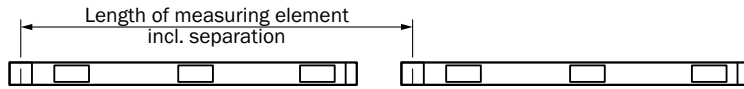
	KH53	KH53 Advanced
Mass		
Read Head 38	2.4 kg	-
Read Head 107	2.7 kg	-
Read Head 354	3.6 kg	-
Read Head 1700	5.2 kg	-
Read Head 54	-	4.4 kg
Read Head 548	-	6.7 kg
Measuring element	0.5 kg/m	0.65 kg/m
Length of measuring element	See table on page G-381 and page G-383	
Coefficient of thermal expansion	28 $\mu\text{m}/^\circ\text{C}/\text{m}$	
Position tolerance (see graphic on page G-390)	$\pm 10 \text{ mm}$	$\pm 20 \text{ mm}$
Material Read Head	AlMgSiPbF28	
Material Measuring element	AlMgSiO,5F22	

Ambient data

EMC ¹⁾	Acc. to EN 61000-6-2 and EN 61000-6-4	
Enclosure rating		
Read head SSI with cable outlet	IP 66	
Read head SSI with screw-in connector system	IP 65 (with mating connectors fitted)	
Read head with PROFIBUS connectors	IP 67 (with mating connectors fitted)	
Working temperature range	-20 ... +60 °C	-30 ... +70 °C
Storage temperature range (read head)	-40 ... +85 °C	
Resistance to shocks	Acc. DIN EN 61000-2-27	
Read Head	30/10 g/ms	
Measuring element	50/10 g/ms	
Resistance to vibration	Acc. DIN EN 61000-2-6	
Read Head	10 g / 20 ... 250 Hz	
Measuring element	30/20 ... 250 g/Hz	

¹⁾ EMC as per specified standards is guaranteed when shielded connection cables are used.

Ordering information SSI



Dimension and calculation table KH53

Measuring length up to	Read head length	Length of measuring element incl. separation	Mounting equipment per measuring element (proposed)
39.90 m	0.886 m	2.304 m Identification letters A1 ... ≤ A18	4 spacer supports or 8 fastening clamps
107.40 m	1.051 m	1.8688 m Identification letters B1 ... ≤ B58	3 spacer supports or 6 fastening clamps
351.20 m	1.376 m	2.5088 m Identification letters C1 ... ≤ C141	4 spacer supports or 8 fastening clamps
1676.40 m	2.026 m	1.9072 m Identification letters D1 ... ≤ D880	3 spacer supports or 6 fastening clamps

The dimensions given are slightly rounded.

Dimension and calculation table KH53 Advanced

Measuring length up to	Read head length	Length of measuring element incl. separation	Mounting equipment per measuring element (proposed)
53.50 m	1.58 m	1,408 m Identification letters F1 ... ≤ F39	3 spacer supports or 6 fastening clamps
546.40 m	2.506 m	2.3552 m Identification letters G1 ... ≤ G233	4 spacer supports or 8 fastening clamps

The dimensions given are slightly rounded.

Calculation example for a measuring length of 100 m

Choose the system with a max. measuring length of 107 m

Number of measuring elements required =
measuring length + read head length / length of measuring element (according to table above)

Number of measuring element = 101.051 m / 1.8688 m = 54.07

Ordering quantity is therefore **55 pcs measuring elements** and **55 * 3 = 165 spacer supports**

If **two separate measuring lengths** are required, then please order as **2 x 55 measuring elements (not 110 measuring elements)**

Caution! For valid position determination, the Read Head must not travel over the end of the last measuring element.

Length measuring systems KH53 (absolute, linear)

Measuring length up to 38 m

Description	Model name	Part no.
Read head 38, SSI, cable 1.5 m	KHK53-AXR00038	1030048
Read head 38, SSI, cable 3.0 m	KHK53-AXS00038	1030049
Read head 38, SSI, cable 5.0 m	KHK53-AXT00038	1030050
Read head 38, SSI, cable 10.0 m	KHK53-AXU00038	1030051
Read head 38, SSI, connector M23, 12-pin	KHK53-AXB00038	1030052
Measuring element up to 38 m, coded ¹⁾	KHT53-XXX00038	1030055
Measuring element up to 38 m, universal, configurable ²⁾	KHU53-XXX00038	1030056
Mounting gauge 38	KHM53-XXX00038	1030057

¹⁾ When placing a repeat order for particular defective measuring elements, please indicate the corresponding code number of the measuring element.

²⁾ For temporary replacement of damaged measuring elements.



Measuring length up to 107 m

Description	Model name	Part no.
Read head 107, SSI, cable 1.5 m	KHK53-AXR00107	1030058
Read head 107, SSI, cable 3.0 m	KHK53-AXS00107	1030059
Read head 107, SSI, cable 5.0 m	KHK53-AXT00107	1030060
Read head 107, SSI, cable 10.0 m	KHK53-AXU00107	1030061
Read head 107, SSI, connector M23, 12-pin	KHK53-AXB00107	1030062
Measuring element up to 107 m, coded ¹⁾	KHT53-XXX00107	1030065
Measuring element up to 107 m, universal, configurable ²⁾	KHU53-XXX00107	1030066
Mounting gauge 107	KHM53-XXX00107	1030067

¹⁾ When placing a repeat order for particular defective measuring elements, please indicate the corresponding code number of the measuring element.

²⁾ For temporary replacement of damaged measuring elements.

Measuring length up to 354 m

Description	Model name	Part no.
Read head 354, SSI, cable 1.5 m	KHK53-AXR00354	1030068
Read head 354, SSI, cable 3.0 m	KHK53-AXS00354	1030069
Read head 354, SSI, cable 5.0 m	KHK53-AXT00354	1030070
Read head 354, SSI, cable 10.0 m	KHK53-AXU00354	1030071
Read head 354, SSI, connector M23, 12-pin	KHK53-AXB00354	1030072
Measuring element up to 354 m, coded ¹⁾	KHT53-XXX00354	1030075
Measuring element up to 354 m, universal, configurable ²⁾	KHU53-XXX00354	1030076
Mounting gauge 354	KHM53-XXX00354	1030077

¹⁾ When placing a repeat order for particular defective measuring elements, please indicate the corresponding code number of the measuring element.

²⁾ For temporary replacement of damaged measuring elements.

Measuring length up to 1700 m

Description	Model name	Part no.
Read head 1700, SSI, cable 1.5 m	KHK53-AXR01700	1030078
Read head 1700, SSI, cable 3.0 m	KHK53-AXS01700	1030079
Read head 1700, SSI, cable 5.0 m	KHK53-AXT01700	1030080
Read head 1700, SSI, cable 10.0 m	KHK53-AXU01700	1030081
Read head 1700, SSI, connector M23, 12-pin	KHK53-AXB01700	1030082
Measuring element up to 1700 m, coded ¹⁾	KHT53-XXX01700	1030085
Measuring element up to 1700 m, universal, configurable ²⁾	KHU53-XXX01700	1030086
Mounting gauge 1700	KHM53-XXX01700	1030087

¹⁾ When placing a repeat order for particular defective measuring elements, please indicate the corresponding code number of the measuring element.

²⁾ For temporary replacement of damaged measuring elements.

Length measuring systems KH53 Advanced (absolute, linear)**Measuring length up to 54 m**

Description	Model name	Part no.
Read head 54, SSI, cable 5.0 m	KHK53-AXT00054	1035442
Read head 54, SSI, connector M23, 12-pin	KHK53-AXB00054	1035443
Measuring element up to 54 m, coded ¹⁾	KHT53-XXX00054	1035445
Measuring element up to 54 m, universal, configurable ²⁾	KHU53-XXX00054	1035446
Mounting gauge 54	KHM53-XXX00054	1035447

¹⁾ When placing a repeat order for particular defective measuring elements, please indicate the corresponding code number of the measuring element.

²⁾ For temporary replacement of damaged measuring elements.



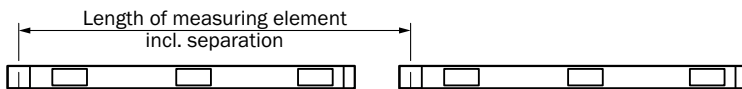
Measuring length up to 548 m

Description	Model name	Part no.
Read head 548, SSI, cable 5.0 m	KHK53-AXT00548	1035448
Read head 548, SSI, connector M23, 12-pin	KHK53-AXB00548	1035449
Measuring element up to 548 m, coded ¹⁾	KHT53-XXX00548	1035451
Measuring element up to 548 m, universal, configurable ²⁾	KHU53-XXX00548	1035452
Mounting gauge 548	KHM53-XXX00548	1035453

¹⁾ When placing a repeat order for particular defective measuring elements, please indicate the corresponding code number of the measuring element.

²⁾ For temporary replacement of damaged measuring elements.

Ordering information PROFIBUS



Dimension and calculation table KH53

Measuring length up to	Read head length	Length of measuring element incl. separation	Mounting equipment per measuring element (proposed)
39.90 m	0.905 m	2.304 m Identification letters A1 ... ≤ A18	4 spacer supports or 8 fastening clamps
107.40 m	1.070 m	1.8688 m Identification letters B1 ... ≤ B58	3 spacer supports or 6 fastening clamps
351.20 m	1.395 m	2.5088 m Identification letters C1 ... ≤ C141	4 spacer supports or 8 fastening clamps
1676.40 m	2.045 m	1.9072 m Identification letters D1 ... ≤ D880	3 spacer supports or 6 fastening clamps

The dimensions given are slightly rounded.

Dimension and calculation table KH53 Advanced

Measuring length up to	Read head length	Length of measuring element incl. separation	Mounting equipment per measuring element (proposed)
53.50 m	1.599 m	1.408 m Identification letters F1 ... ≤ F39	3 spacer supports or 6 fastening clamps
546.40 m	2.525 m	2.3552 m Identification letters G1 ... ≤ G233	4 spacer supports or 8 fastening clamps

The dimensions given are slightly rounded.

Calculation example for a measuring length of 100 m

Choose the system with a max. measuring length of 107 m

Number of measuring elements required = measuring length + read head length / length of measuring element (according to table above)
Number of measuring element = 101.070 m / 1.8688 m = 54.08
Ordering quantity is therefore 55 pcs measuring elements and 55 * 3 = 165 spacer supports
If two separate measuring lengths are required, then please order as 2 x 55 measuring elements (not 110 measuring elements)

Caution! For valid position determination, the Read Head must not travel over the end of the last measuring element.



Length measuring systems KH53 (absolute, linear)

Measuring length up to 38 m

Description	Model name	Part no.
Read head 38, PROFIBUS DP	KHK53-PXF00038	1036163
Measuring element up to 38 m, coded ¹⁾	KHT53-XXX00038	1030055
Measuring element up to 38 m, universal, configurable ²⁾	KHU53-XXX00038	1030056
Mounting gauge 38	KHM53-XXX00038	1030057

¹⁾ When placing a repeat order for particular defective measuring elements, please indicate the corresponding code number of the measuring element.

²⁾ For temporary replacement of damaged measuring elements.

Measuring length up to 107 m

Description	Model name	Part no.
Read head 107, PROFIBUS DP	KHK53-PXF00107	1036164
Measuring element up to 107 m, coded ¹⁾	KHT53-XXX00107	1030065
Measuring element up to 107 m, universal, configurable ²⁾	KHU53-XXX00107	1030066
Mounting gauge 107	KHM53-XXX00107	1030067

¹⁾ When placing a repeat order for particular defective measuring elements, please indicate the corresponding code number of the measuring element.

²⁾ For temporary replacement of damaged measuring elements.

Measuring length up to 354 m

Description	Model name	Part no.
Read head 354, PROFIBUS DP	KHK53-PXF00354	1036165
Measuring element up to 354 m, coded ¹⁾	KHT53-XXX00354	1030075
Measuring element up to 354 m, universal, configurable ²⁾	KHU53-XXX00354	1030076
Mounting gauge 354	KHM53-XXX00354	1030077

¹⁾ When placing a repeat order for particular defective measuring elements, please indicate the corresponding code number of the measuring element.

²⁾ For temporary replacement of damaged measuring elements.

Measuring length up to 1700 m

Description	Model name	Part no.
Read head 1700, PROFIBUS DP	KHK53-PXF01700	1036166
Measuring element up to 1700 m, coded ¹⁾	KHT53-XXX01700	1030085
Measuring element up to 1700 m, universal, configurable ²⁾	KHU53-XXX01700	1030086
Mounting gauge 1700	KHM53-XXX01700	1030087

¹⁾ When placing a repeat order for particular defective measuring elements, please indicate the corresponding code number of the measuring element.

²⁾ For temporary replacement of damaged measuring elements.

Length measuring systems KH53 Advanced (absolute, linear) – PROFIBUS

Measuring length up to 54 m

Description	Model name	Part no.
Read head 54, PROFIBUS DP	KHK53-PXF00054	1036167
Measuring element up to 54 m, coded ¹⁾	KHT53-XXX00054	1035445
Measuring element up to 54 m, universal, configurable ²⁾	KHU53-XXX00054	1035446
Mounting gauge 54	KHM53-XXX00054	1035447

¹⁾ When placing a repeat order for particular defective measuring elements, please indicate the corresponding code number of the measuring element.

²⁾ For temporary replacement of damaged measuring elements.



Measuring length up to 548 m

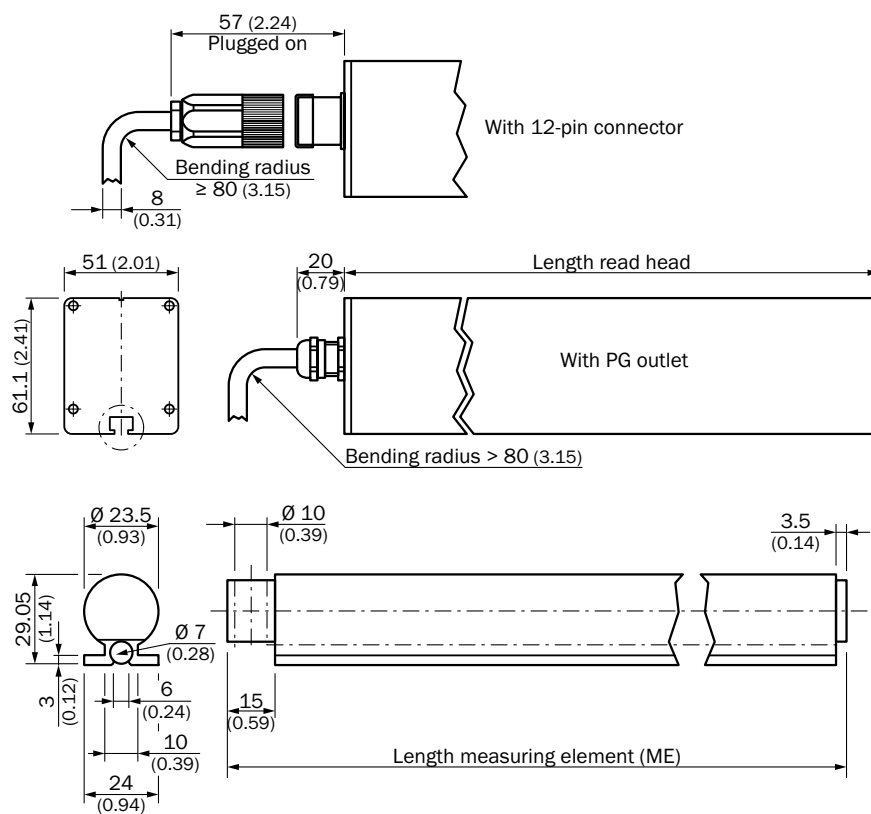
Description	Model name	Part no.
Read head 548, PROFIBUS DP	KHK53-PXF00548	1036168
Measuring element up to 548 m, coded ¹⁾	KHT53-XXX00548	1035451
Measuring element up to 548 m, universal, configurable ²⁾	KHU53-XXX00548	1035452
Mounting gauge 548	KHM53-XXX00548	1035453

¹⁾ When placing a repeat order for particular defective measuring elements, please indicate the corresponding code number of the measuring element.

²⁾ For temporary replacement of damaged measuring elements.

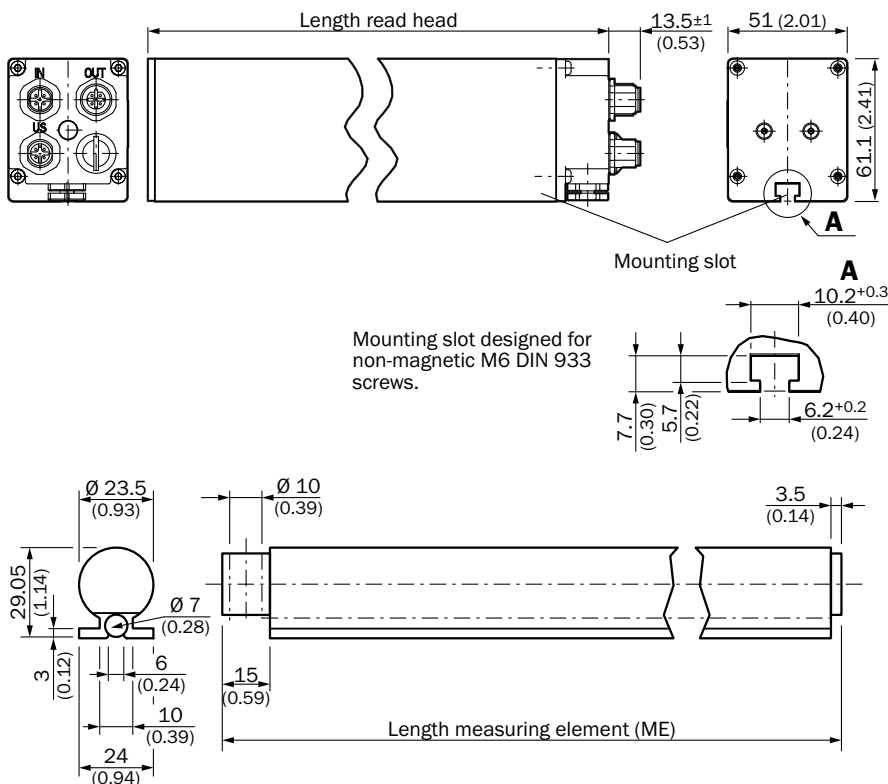
Dimensional drawing SSI

dimensions in mm (inch)



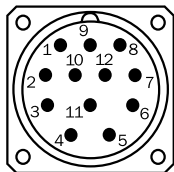
Dimensional drawing PROFIBUS

dimensions in mm (inch)



PIN and wire allocation SSI interface

View of the connector M23 fitted to the encoder body SSI

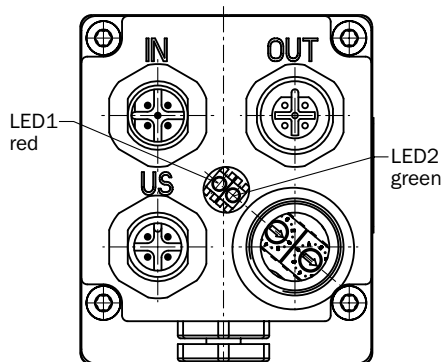


PIN	Signal	Color of wires (cable outlet)	Description
1	GND	Blue	Earth (ground) connection
2	Data +	White	Interface signal
3	Clock +	Yellow	Interface signal
4	R x D +	Grey	RS-422 programming lines
5	R x D -	Green	RS-422 programming lines
6	T x D +	Pink	RS-422 programming lines
7	T x D -	Black	RS-422 programming lines
8	+ U _s	Red	Supply voltage
9	N. C.	Orange	Not connected
10	Data -	Brown	Interface signal
11	Clock	Violet	Interface signal
12	N. C.	-	Not connected

Other Interfaces on request.

G

PIN and wire allocation PROFIBUS interface



Connect. 4-pin (male)	Connect. 5-pin (male)	Connect. 5-pin (female)	Signal	Description
1	-	-	U _s (24 V)	Supply voltage 10 ... 32 V
3	-	-	0 V (GND)	Ground (0 V)
-	-	4	B	B-cable PROFIBUS DP (out)
-	-	2	A	A-cable PROFIBUS DP (out)
-	4	-	B	B-cable PROFIBUS DP (in)
-	2	-	A	A-cable PROFIBUS DP (in)
-	-	1	2P5 ¹⁾	+ 5 V (potential free)
-	-	3	2M ¹⁾	0 V (potential free)
-	-	-	RTS ²⁾	Request to Send
4	1	-	Not connected	-
2	3	-	Not connected	-
-	5	5	Screen	Housing potential

¹⁾ For the connection of external bus termination or to supply the transmitter/receiver of a fibre optic data transfer system.

²⁾ This signal is optional for the direction acknowledgement for a fibre optic connection.

Implementation

DP Functionalities

In acc. with the PROFIBUS DP basic functions.

DP services

- Data interchange (Write_Read_Data)
- Address allocation (Set_Slave_Address)
- Control commands (Global_Control)
- Read the inputs (Read_Inputs)
- Read the outputs (Read_Outputs)
- Read diagnostic data (Slave_Diagnosis)
- Send configuration data (Set_Param)
- Check configuration data (Chk_Config)

Communication

- Cyclic Master-Slave Data transfer

Protective mechanisms

- Data transfer with HD = 4
- Time monitoring of the data traffic

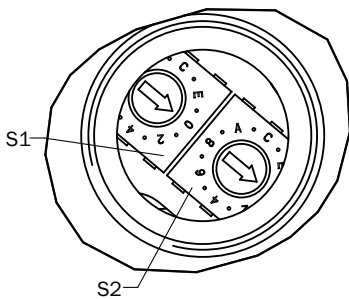
Configuration

Settings in accordance with encoder profile

- Counting direction (CW, CCW)
- Class-2 functionality (ON, OFF)
- Scaling function (ON, OFF)
- "Activation of SSA-service" ²⁾
- Selection of the station address ²⁾

¹⁾ As per Encoder Profile.

²⁾ Manufacturer-specific function.



G

Setting: – Counting direction

- By hardware via Hex switch S2
- By software via telegram

Counting direction increasing:

When the encoder travels in the direction of measuring element n to measuring element n+1.

Configuration

Setting the formats (IN/OUT) for the cyclicdata interchange via one configuration byte (K-1).

2 words IN/OUT data (I-1/O-1) ¹⁾

4 words IN/OUT data (I-1, I-2, I-3/O-1) ²⁾

Data interchange: – Input Data (IN)

I-1 Position value ¹⁾ 4 bytes

I-2 Speed (0..1 m/min) ²⁾ 2 bytes

I-3 Time stamp ²⁾ 2 bytes

Data interchange: – Output data (OUT)

O-1 PRESET Value ¹⁾ 4 bytes

Diagnostic information

- Station-related diagnosis (63 bytes in accordance with Encoder Profil Class-2)

Setting: – PRESET value

The PRESET function is used for commissioning, and to allocate a specific position value to the current physical position.

The following settings are possible:

- By software: – (see Output data).

Setting: – Station Address

- By hardware via Hex switch S1/S2
- By software via telegram

The setting by software is carried out only if the "SSA-service" has been previously activated.

Device specific file (*.GS_)

For the purpose of automatic commissioning of the encoder, use is made of the *.GS_-file. All the characteristic features of the device are defined in it.

STEG05F6.GSD German

STEG05F6.GSE English

Switch settings

The following settings are possible via Hex switch:

S1/S2 Address setting (0 ... 127)
S2 Counting direction (CW/CCW)

Access is provided via a screw cap on the connector side of the read head.

Status Information via LEDs

LED-1 Bus activity (red)
LED-2 Operating voltage (green)

General

The KH53 PROFIBUS is an absolute length measuring system with a resolution of 100 µm. The Bus coupling is realised within the encoder and is a PROFIBUS DP slave in accordance with EN 50170 Vol. 2. The realisation of the PROFIBUS interface is performed by the PROFIBUS ASIC SPC3 from Siemens.

The KH53 PROFIBUS encompasses all Class 2 functions in accordance with Encoder Profile (1.1)

The encoder is implemented as a DP slave with general DP functions.

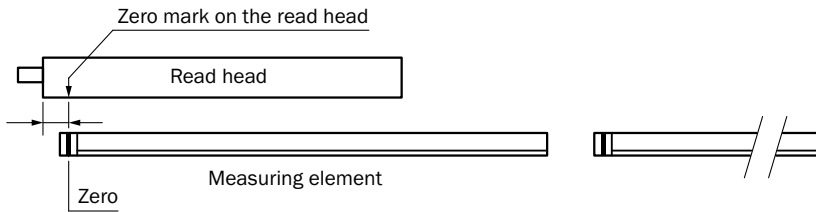
The conformance of the encoder with PROFIBUS DP was verified by the PNO certified test centre.

The following options are available:

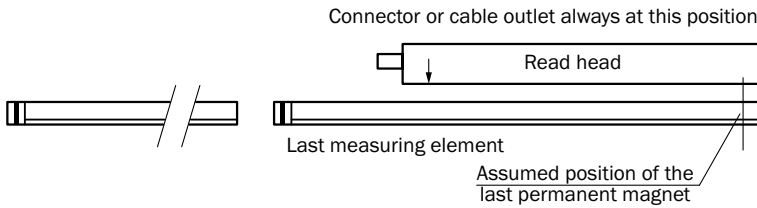
- Screw-in connector system M12

Position tolerances

Start of measuring path

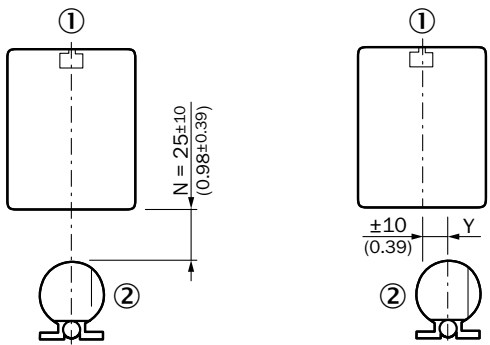


End of measurement path



The reliability and accuracy of the measuring system are dependent upon maintaining the mounting tolerances! Magnetic and materials that can be magnetized, are not allowed within a radius of 80 mm of the measuring elements and the sensing face of the encoder.

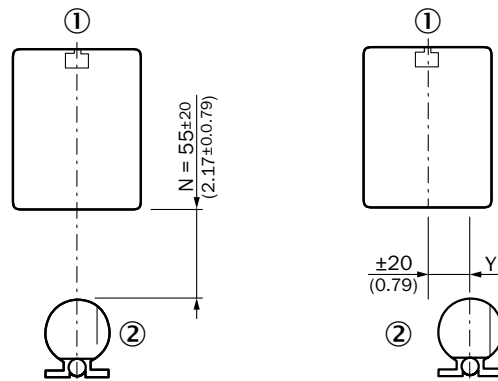
KH53



All dimensions in mm (inch)

- ① Read head
- ② Measuring element

KH53 Advanced



All dimensions in mm (inch)

- ① Read head
- ② Measuring element



Montage Lesekopf + Maßverkörperung: Mindestabstand zu ferromagnetischen Materialien einhalten!

Read head + measuring element mounting: Observe the min. distance to ferromagnetic materials!

Do not use ferromagnetic material as a mounting base for the read head. A distance of 80 mm to ferromagnetic (e.g. iron) is to be maintained.

Recommended accessories

Mounting brackets/plates

Brief description	Model name	Part no.
Mounting bracket for KH53 standards, screws not included	BEF-WK-KHT53	2029159

Terminal and alignment brackets

Brief description	Model name	Part no.
Spacer for KH53 material measures	BEF-KHA-KHT53	2042468

Others

Brief description	Model name	Part no.
Programming tool for ATM60, ATM90 and KH53 SSI	PGT-01-S	1030111

Plug connectors and cables

- SSI

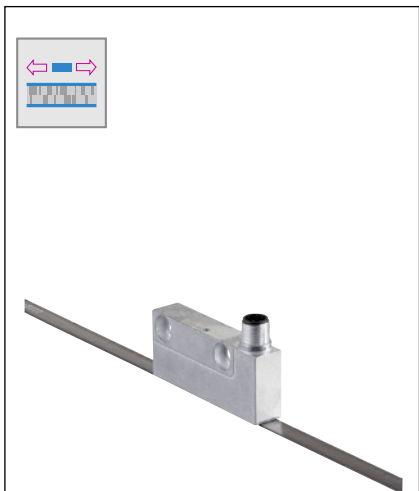
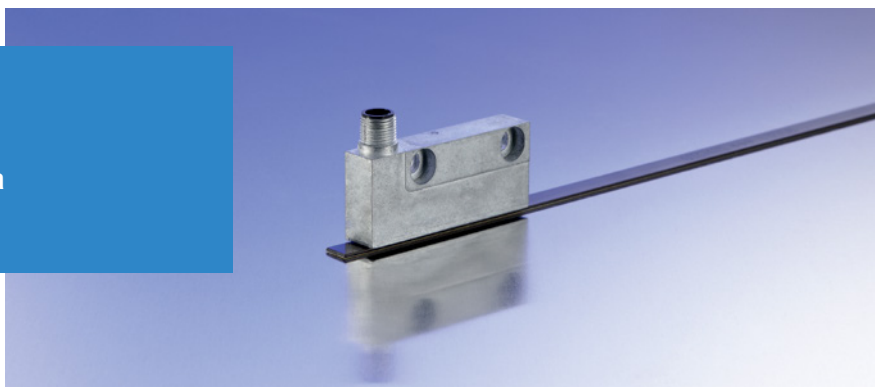
Brief description	Length	Model name	Part no.
Cable socket, M23, 12-pin, straight, pre-wired with 12-core SSI cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , shielded, suitable for drag chain, cable diameter 7.8 mm	1.5 m	DOL-2312-G1M5MA1	2029200
	3.0 m	DOL-2312-G03MMA1	2029201
	5.0 m	DOL-2312-G05MMA1	2029202
	10.0 m	DOL-2312-G10MMA1	2029203
	20.0 m	DOL-2312-G20MMA1	2029204
	30.0 m	DOL-2312-G30MMA1	2029205
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, diam. 7.8 mm	Sold by the meter	LTG-2512-MW	6027531
Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, UV and salt water resistant, diam. 7.8 mm	Sold by the meter	LTG-2612-MW	6028516
Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	DOS-2312-G	6027538
Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	STE-2312-G	6027537

- PROFIBUS DP

Brief description	Length	Model name	Part no.
Cable socket, M12, 4-pin, straight, pre-wired with PROFIBUS cable for voltage supply, 4-core, 4 x 0.25 mm ² , suitable for drag chain, diam. 5.0 mm	5.0 m	DOL-1204-G05M	6009866
Cable socket, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	5.0 m	DOL-1205-G05MQ	6026006
	10.0 m	DOL-1205-G10MQ	6026008
Cable connector, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	5.0 m	STL-1205-G05MQ	6026005
	10.0 m	STL-1205-G10MQ	6026007
PROFIBUS cable by the meter 2 x 0.25 mm ² with shielding, suitable for drag chain, diam. 8.0 mm	Sold by the meter	LTG-2102-MW	6021355
Cable socket for voltage supply, M12, 4-pin, straight, suitable for cable diameter 3 - 6.5 mm	-	DOS-1204-G	6007302
Cable socket, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	PR-DOS-1205-G	6021353
Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	PR-STE-1205-G	6021354
PROFIBUS terminator M12, 5-pin	-	PR-STE-END	6021156

→ For additional accessories, please see page H-399

Compact linear encoder with a high-resolution



Product description

The TTK70 non-contact linear encoder consists of a compact read head and magnetic tape. The magnetic tape is equipped with a magnetic partition and acts as the measuring element. The partition consists of an incremental and absolute track (two-track tape).

To calculate the absolute position value, the read head detects both the absolute and incremental component. The TTK70 has an SSI output for absolute positioning and an incremental Sin/Cos output for real-time speed determination.

At a glance

- Non-contact determination of absolute position
- Small, compact read head
- Standard SSI interface, combined with SinCos output
- Measuring lengths of up to 4 m
- High level of accuracy ($\pm 10 \mu\text{m}$)
- High resolution ($1 \mu\text{m}$)
- High movement speed of up to 10 m/s

Your benefits

- Easy to integrate into existing systems
- Small size, light weight and high measurement speed make it ideal for a variety of applications
- After installation, the system is immediately available and completely maintenance-free, which leads to time and cost savings
- Immune to environmental factors like contamination and condensation, ensuring increased reliability
- Real-time speed determination plus absolute positioning due to Sin/Cos and SSI output



Additional information

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- Ordering informationG-394
- Dimensional drawingsG-395
- Position tolerancesG-395
- PIN and wire allocationG-396
- Recommended accessoriesG-396

→ www.mysick.com/en/TTK70

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.



G

Detailed technical data

Performance

Measuring length	Max. 4,000 mm
Magnetic strip length	Measuring length + 80 mm
Electrical interface	SSI
Connection type	Connector, M12, 12-pin
Length of period	1 mm
Resolution	1 μ m
Travelling speed dynamic operation	< 10 m/s
Travelling speed static operation	< 2 m/s
Repeatability	Max. $\pm 2 \mu$ m
System accuracy	$\pm 10 \mu$ m

Mechanical data

Dimensions	See dimensional drawing	
Mass	Read Head	0.08 kg
	Magnetic strip	0.18 kg/m
Material	Read Head	Die-cast zinc
	Magnetic strip	17410 Hard ferrite 9/28 P
	Mounting tape	Stainless steel

Electrical data

Interface signals ¹⁾	24 bit
Sin/cos-output	Speed-proportional signal output for real-time requirements
Operating power consumption (no load)	55 mA
Supply voltage	4.5 V ... 30 V
Code type	Gray
MTTFd: mean time to dangerous failure ²⁾	65 years (EN ISO 13849)

¹⁾ If the maximum distance between the TTK70 SSI and the magnetic tape is exceeded, bit 25 is set in the SSI data stream. The output position value is invalid! When exceeding or going below the temperature range of the sensor (< -30 °C or > +85 °C), bit 26 is set in the SSI data stream. The bits are reset as soon as the error condition no longer exists. To be able to use these additional bits, the control(ler) must be able to read in at least 26 bits of data.

²⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Ambient data

Working temperature range	
Read Head	-30 °C ... +80 °C
Magnetic strip	-20 °C ... +70 °C
Storage temperature range	
Read Head	-40 °C ... +85 °C
Magnetic strip	-30 °C ... +80 °C
Permissible relative humidity / condensation	100 %, condensation permitted
Resistance to shocks	30 g / 6 ms (EN 60068-2-27)
Resistance to vibration	20 g / 10 Hz ... 2,000 Hz (EN 60068-2-6)
EMC	EN 61000-6-2, EN 61000-6-3
Enclosure rating	IP 67, with mating connectors fitted
Temperature coefficient of magnetic tape	(11 ± 1) µm/K/m
Maximum permitted ambient field strength¹⁾	< 3 ... 4 kA /m (3.8 ... 5 mT); to guarantee compliance with the quoted accuracy values
Maximum permitted field strength	< 150 kA /m (< 190 mT); to ensure that the magnetic tape is not permanently damaged

¹⁾ The maximum permitted external field influence is reached when the position value deviates from the original value (without external field influence) by more than 5 µm. This value is reached when, at the sensor location, a field strength of 3 to 4 kA/m (3.8 to 5 mT) occurs in addition to the field strength of the magnetic tape.

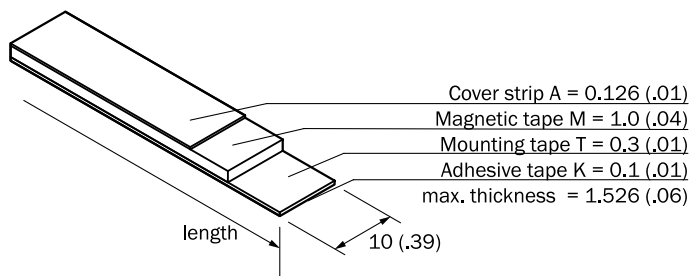
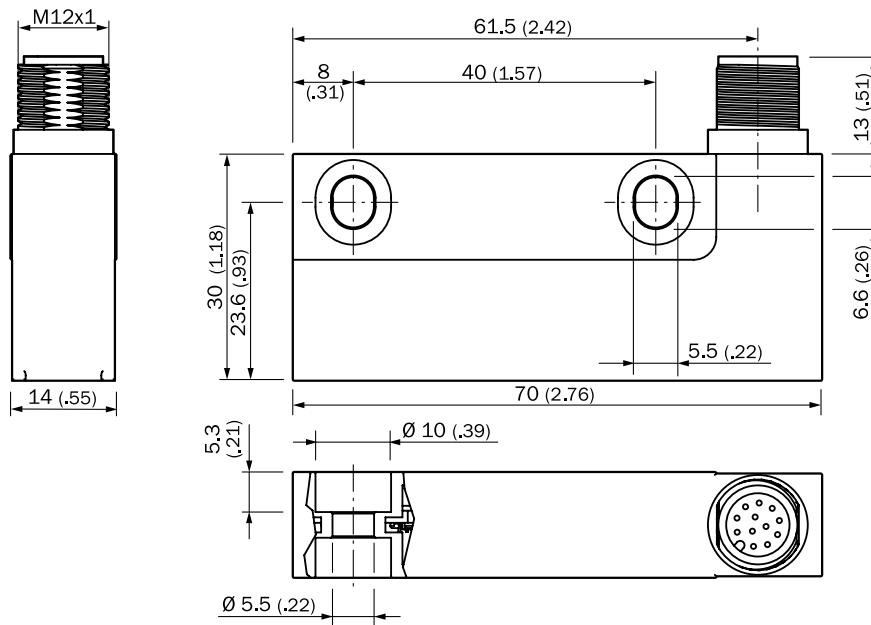
Ordering information

Description	Magnetic tape	Model name	Part no.
Read head	-	TTK70-AXA0-K02	1038033
Magnetic tape with adhesive tape and cover band incl.	0.5 m	MVM-0M5-2MC-MKLB	6037415
	1.0 m	MVM-01M-2MC-MKLB	6037417
	1.5 m	MVM-1M5-2MC-MKLB	6037418
	2.0 m	MVM-02M-2MC-MKLB	6037419
	2.5 m	MVM-2M5-2MC-MKLB	6037420
	3.0 m	MVM-03M-2MC-MKLB	6037421
	3.5 m	MVM-3M5-2MC-MKLB	6037422
	4.0 m	MVM-04M-2MC-MKLB	6037423

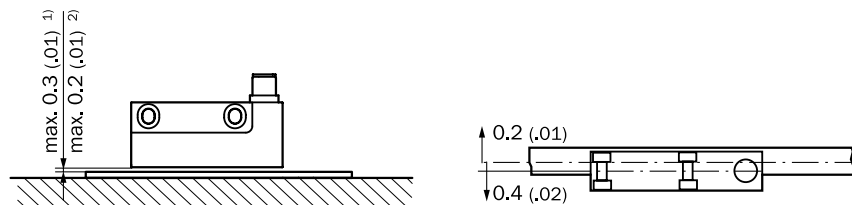


Dimensional drawings

dimensions in mm (inch)



Position tolerances



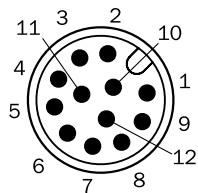
¹⁾ Without cover strip.

²⁾ With cover strip.

General tolerances acc. to DIN ISO 2768-mk.



PIN and wire allocation



PIN	Color	Signal	Description
1	Orange-black	Balancing	-
2	White	SSI Data +	Signal line
3	Brown	SSI Data -	Signal line
4	Violet	SSI Clock -	Signal line
5	Red	+US	Supply voltage
6	Gray	/Sin	Signal line
7	Green	Sin	Signal line
8	Pink	/Cos	Signal line
9	Black	Cos	Signal line
10	Orange	Config	-
11	Yellow	SSI Clock +	Signal line
12	Blue	GND	Ground connection

Recommended accessories

Plug connectors and cables

Brief description	Length	Model name	Part no.
Cable socket, M12, 12-pin, angled, pre-wired with SSI cable, 12-core, 12 x 0.14 mm ² , suitable for drag chain, diam. 8.5 mm	2 m	DOL-1212-W02MAC1	6039824
	5 m	DOL-1212-W05MAC1	6039825
	10 m	DOL-1212-W10MAC1	6039826
	20 m	DOL-1212-W20MAC1	6039827

→ For additional accessories, please see page H-399







SICK connects – original connection and mounting system for encoder

A perfectly configured connection and mounting system is essential for the optimal integration of encoders. Only reliable mechanical installation and signal transmission guarantee the best possible measurement results. Furthermore, high-quality components with a long service life help reduce costs in the long term.



Accessories



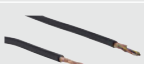

Incremental encodersH-400
Absolute encodersH-409
Wire draw encodersH-429
Linear encoders.H-437
Dimensional drawingsH-439





Incremental encoders

Connectivity




Cables by the meter (by interface)

Figure	Dimensional drawing see page	Description	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	-	Data cable by the meter 4 x 2 x 0.15 mm² with shielding, diam. 5.6 mm	LTG-2308-MWENC	6027529	●	●	●	●	●	●
	-	Data cable by the meter 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm² with shielding, diam. 7.5 mm	LTG-2411-MW	6027530	●	●	●	●	●	●
	-	Data cable by the meter 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm² with shielding, suitable for drag chain, diam. 7.8 mm	LTG-2512-MW	6027531	●	●	●	●	●	●
	-	Data cable by the meter 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm² with shielding, suitable for drag chain, UV and salt water resistant, diam. 7.8 mm	LTG-2612-MW	6028516	●	●	●	●	●	●

Cables including seal for incremental encoder with universal cable outlet







Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	H-449	Cables including seal, 4 x 2 x 0.15 mm² for incremental encoder with universal cable outlet, with shielding, diam. 5.6 mm	0.5 m	DOL-0J08-G0M5AA3	2046873	-	-	-	●	-	●
			1.5 m	DOL-0J08-G1M5AA3	2046874	-	-	-	●	-	●
			3.0 m	DOL-0J08-G03MAA3	2046875	-	-	-	●	-	●
			5.0 m	DOL-0J08-G05MAA3	2046876	-	-	-	●	-	●
			10.0 m	DOL-0J08-G10MAA3	2046877	-	-	-	●	-	●
	H-449	M23 cable connector, 12-pin, straight, 8-core cable, including seal, 4 x 2 x 0.15 mm², with shielding, cable diameter 5.6 mm	0.35 m	STL-2312-GM35AA3	2061621	-	-	-	●	-	●
			1.0 m	STL-2312-G01MAA3	2061622	-	-	-	●	-	●
			2.0 m	STL-2312-G02MAA3	2061504	-	-	-	●	-	●

M12 screw-in system

Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	H-440	Cable socket, 8-pin, straight, pre-wired with 8-core cable, 4 x 2 x 0.25 mm², shielded, cable diameter 7.0 mm	2.0 m	DOL-1208-G02MAC1	6032866	●	●	●	●	●	●
			5.0 m	DOL-1208-G05MAC1	6032867	●	●	●	●	●	●
			10.0 m	DOL-1208-G10MAC1	6032868	●	●	●	●	●	●
			20.0 m	DOL-1208-G20MAC1	6032869	●	●	●	●	●	●
	H-442	Cable socket, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	DOS-1208-GA01	6045001	●	●	-	●	-	●
	H-446	Cable connector, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1208-GA01	6044892	●	●	-	●	-	●



M23 screw-in system







Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60	
	H-448	Cable socket, M23, 12-pin, straight, pre-wired with 11-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, cable diameter 7.8 mm ¹⁾	2 m	DOL-2312-G02MLA3	2030682	●	●	●	●	●	●	
			7 m	DOL-2312-G07MLA3	2030685	●	●	●	●	●	●	●
			10 m	DOL-2312-G10MLA3	2030688	●	●	●	●	●	●	●
			15 m	DOL-2312-G15MLA3	2030692	●	●	●	●	●	●	●
			20 m	DOL-2312-G20MLA3	2030695	●	●	●	●	●	●	●
			25 m	DOL-2312-G25MLA3	2030699	●	●	●	●	●	●	●
			30 m	DOL-2312-G30MLA3	2030702	●	●	●	●	●	●	●
	H-448	Cable socket, M23, 12-pin, straight, 11-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, cable diameter 7.8 mm ¹⁾	1.5 m	DOL-2312-G1M5MA3	2029212	●	●	●	●	●	●	
			3.0 m	DOL-2312-G03MMA3	2029213	●	●	●	●	●	●	●
			5.0 m	DOL-2312-G05MMA3	2029214	●	●	●	●	●	●	●
			10.0 m	DOL-2312-G10MMA3	2029215	●	●	●	●	●	●	●
			20.0 m	DOL-2312-G20MMA3	2029216	●	●	●	●	●	●	●
30.0 m	DOL-2312-G30MMA3	2029217	●	●	●	●	●	●	●			
	H-448	Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	DOS-2312-G	6027538	●	●	●	●	●	●	
	H-448	Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	STE-2312-G	6027537	●	●	●	●	●	●	
	H-448	Cable socket, M23, 12-pin, straight, 11-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, cable diameter 7.8 mm ²⁾	2.0 m	DOL-2312-G02MLD1	2062202	-	-	-	●	-	-	
			7.0 m	DOL-2312-G07MLD1	2062203	-	-	-	●	-	-	
			10.0 m	DOL-2312-G10MLD1	2062204	-	-	-	●	-	-	
			15.0 m	DOL-2312-G15MLD1	2062205	-	-	-	●	-	-	
			20.0 m	DOL-2312-G20MLD1	2062206	-	-	-	●	-	-	
			25.0 m	DOL-2312-G25MLD1	2062207	-	-	-	●	-	-	
			30.0 m	DOL-2312-G30MLD1	2062208	-	-	-	●	-	-	
	H-448	Cable socket, M23, 12-pin, straight, pre-wired with 12-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, cable diameter 7.8 mm, suitable for drag chain ²⁾	1.5 m	DOL-2312-G1M5MD1	2062240	-	-	-	●	-	-	
			3.0 m	DOL-2312-G03MMD1	2062243	-	-	-	●	-	-	
			5.0 m	DOL-2312-G05MMD1	2062244	-	-	-	●	-	-	
			10.0 m	DOL-2312-G10MMD1	2062245	-	-	-	●	-	-	
			20.0 m	DOL-2312-G20MMD1	2062246	-	-	-	●	-	-	
			30.0 m	DOL-2312-G30MMD1	2062247	-	-	-	●	-	-	

¹⁾ NB: Only in combination with electrical interfaces A, C, E and P.


²⁾ NB: Only in combination with electrical interfaces U, V, W and M.

Mounting systems



Torque supports

Figure	Dimensional drawing see page	Description	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	H-450	Standard torque support	BEF-DS00XFX	2056812	-	-	-	●	-	-
	H-450	Torque support, one-sided, 81 mm long with slot	BEF-DS01DFS/VFS	2047428	-	-	-	●	-	-
	H-451	Torque support, one-sided, 179 mm long with slots	BEF-DS02DFS/VFS	2047430	-	-	-	●	-	-
	H-452	Torque support, one-sided, 248 mm long with slots	BEF-DS03DFS/VFS	2047431	-	-	-	●	-	-
	H-453	Torque support, 16.5 mm high	BEF-DS05XFX	2057423	-	-	-	●	-	-
	H-453	Torque support with hole circle diameter 63 mm	BEF-DS07XFX	2059368	-	-	-	●	-	-

Spring arm for DFV60

Figure	Dimensional drawing see page	Description	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	-	Spring arm / mounting arm for DFV60	DFV60 MOUNTING SUPPORT SPRING ASSEMBLY	2056155	-	-	-	-	-	●

Bearing blocks

Figure	Dimensional drawing see page	Description	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	H-454	Bearing block for hollow shaft encoder	BEF-FA-B12-010	2042728	-	-	-	●	-	-
	H-455	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591	-	-	-	●	-	-
-	-	Mounting kit for servo flange encoder on bearing block	BEF-MK-LB	5320872	-	-	-	-	-	-

Mechanical adapters

















Figure	Dimensional drawing see page	Description	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	H-455	Flange adapter, adapts face mount flange with 20 mm centering collar to 33 mm servo flange	BEF-FA-020-033	2066312	●	-	-	-	-	-
	H-459	Mounting bracket for encoder with 20 mm centering collar	BEF-WF-20	2066393	●	-	-	-	-	-
	-	Flange adapter, adapts face mount flange with 25 mm centering collar to size 60 face mount flange with 36 mm centering collar	BEF-FA-025-036	2034226	-	-	●	-	-	-
	H-456	Flange adapter, adapts face mount flange with 25 mm centering collar to 50 mm servo flange	BEF-FA-025-050	2032622	-	-	●	-	-	-
 Illustration may differ	H-456	Flange adapter, adapts face mount flange with 25 mm centering collar to 60 mm square mounting plate	BEF-FA-025-060RCA	2032623	-	-	●	-	-	-
	H-456	Flange adapter, adapts face mount flange with 25 mm centering collar to 60 mm square mounting plate with shock absorber	BEF-FA-025-060RSA	2032624	-	-	●	-	-	-
 Illustration may differ	-	Flange adapter, adapts face mount flange with 25 mm centering collar to 63 mm square mounting plate	BEF-FA-025-063REC	2033631	-	-	●	-	-	-
	H-459	Mounting bracket for encoder with 25 mm centering collar	BEF-WF-25	2032621	-	-	●	-	-	-

Figure	Dimensional drawing see page	Description	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	H-457	Flange adapter, adapts face mount flange with 36 mm centering collar to 50 mm servo flange	BEF-FA-036-050	2029160	-	-	-	●	-	-
	H-457	Flange adapter (adapts size 60 face mount flange encoder to bearing block with art. no. 2044591)	BEF-FA-036-050-019	2063378	-	-	-	●	-	-
	-	Flange adapter, adapts face mount flange with 36 mm centering collar to 100 mm servo flange with 60 mm centering collar	BEF-FA-036-100	2029161	-	-	-	●	-	-
	H-458	Flange adapter, adapts face mount flange with 36 mm centering collar to 60 mm square mounting plate	BEF-FA-036-060REC	2029162	-	-	-	●	-	-
	H-458	Flange adapter, adapts face mount flange with 36 mm centering collar to 58 mm square mounting plate with shock absorber	BEF-FA-036-060RSA	2029163	-	-	-	●	-	-
	H-458	Flange adapter, adapts face mount flange with 36 mm centering collar to 63 mm square mounting plate	BEF-FA-036-063REC	2034225	-	-	-	●	-	-
	H-458	Mounting bell for servo flange encoder with 50 mm centering collar incl. mounting kit	BEF-MG-50	5312987	-	-	-	●	-	-
	H-460	Mounting bracket for encoder with 36 mm centering collar	BEF-WF-36	2029164	-	-	-	●	-	-
	H-459	Mounting bracket for encoder with 30 mm centering collar	BEF-WF-30	2066391	-	●	-	-	-	-

Measuring wheels





Figure	Dimensional drawing see page	Description	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	H-460	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988	-	-	-	●	-	-
	H-460	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678	-	-	-	●	-	-




Figure	Dimensional drawing see page	Description	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	H-460	Measuring wheel with smooth plastic surface (Hytre) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989	-	-	-	●	-	-
	H-461	Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222	●	-	-	●	-	-
	H-461	Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634	●	-	-	●	-	-
	H-461	Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224	-	-	-	●	-	-
	H-461	Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278	-	-	-	●	-	●
	H-461	Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227	-	-	-	●	-	-

O-rings (spare parts for measuring wheels)

Figure	Dimensional drawing see page	Description	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
-	-	Replacement O-ring set (set of 2) for measuring wheels (circumference 200 mm) with O-ring	BEF-OR-053-040	2064061	●	●	-	●	-	-
		Replacement O-ring set (set of 2) for measuring wheels (circumference 300 mm) with O-ring	BEF-OR-083-050	2064076	●	●	-	●	-	●
		Replacement O-ring set (set of 2) for measuring wheels (circumference 500 mm) with O-ring	BEF-OR-145-050	2064074	-	-	-	●	-	-
		O-ring set for DKV60 encoder	O-RING SET DKV60	6032709	-	-	-	-	●	-

Insulated shaft connection




Figure	Dimensional drawing see page	Outer diameter	Inner diameter ¹⁾	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	H-462	12 mm	10 mm	ISOLIERHUELSE PEEK	2064571	-	-	-	●	-	-
	H-462	15 mm	12.7 mm (1/2")	ISOLIERHUELSE PEEK	2064572	-	-	-	●	-	-
	H-462	14 mm	12 mm	ISOLIERHUELSE PEEK	2064573	-	-	-	●	-	-
	H-462	10 mm	8 mm	ISOLIERHUELSE PEEK	2065642	-	-	-	●	-	-

¹⁾ The diameter of the shaft provided by the customer must be in fit j7.

Collets for encoder with hollow shaft

Figure	Dimensional drawing see page	Description	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	H-462	Collet for blind hollow shaft with 5 mm diameter	SPZ-005-AD-A	2066991	●	-	-	-	-	-
	H-463	Collet for blind hollow shaft with 6 mm diameter	SPZ-006-DD36-A	2056390	●	-	-	-	-	-

Servo clamps for encoder with servo or servo face mount flange

Figure	Dimensional drawing see page	Description	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	H-463	Servo clamp half-shells (set of 2) for 50 mm centering collar	BEF-WG-SF050	2029165	-	-	-	●	-	-
	H-464	Servo clamps (set of 3), large	BEF-WK-SF	2029166	-	-	-	●	-	-
	H-464	Servo clamps (set of 3), small	BEF-WK-RESOL	2039082	●	●	-	-	-	-

Shaft couplings










Figure	Dimensional drawing see page	Description	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	H-464	Bellows coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981	●	-	-	●	-	-
		Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982	●	-	-	●	-	-
		Bellows coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983	-	-	-	●	-	-
		Bellows coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984	-	-	-	●	-	-
	H-464	Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985	●	-	-	●	-	-
		Spring washer coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 2.5^\circ$, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986	-	-	-	●	-	-



Figure	Dimensional drawing see page	Description	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	H-464	Stator coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0606-S	2056406	-	-	-	●	-	-
		Stator coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0610-S	2056407	-	-	-	●	-	-
		Stator coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-1010-S	2056408	-	-	-	●	-	-
	H-465	Stator coupling with hole diameter combination 8 mm x 8 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0808-S	5314177	-	-	●	-	-	-
		Stator coupling with hole diameter combination 6 mm x 8 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0608-S	5314179	-	-	●	●	-	-
	H-465	Double loop coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 2.5 mm, axial ± 3 mm, angle $\pm 10^\circ$, torsion spring stiffness 25 Nm/rad, material: polyurethane, galvanized steel flange	KUP-0610-D	5326697	●	-	-	●	-	-
		Double loop coupling with hole diameter combination 8 mm x 10 mm, maximum shaft offset, radial ± 2.5 mm, axial ± 3 mm, angle $\pm 10^\circ$, torsion spring stiffness 25 Nm/rad, material: polyurethane, galvanized steel flange	KUP-0810-D	5326704	-	●	●	●	-	-
		Double loop coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 2.5 mm, axial ± 3 mm, angle $\pm 10^\circ$, torsion spring stiffness 25 Nm/rad, material: polyurethane, galvanized steel flange	KUP-1010-D	5326703	-	-	-	●	-	-
		Double loop coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 2.5 mm, axial ± 3 mm, angle $\pm 10^\circ$, torsion spring stiffness 25 Nm/rad, material: polyurethane, galvanized steel flange	KUP-1012-D	5326702	-	-	-	●	-	-

Programming tools







Programming tools

Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	DBS36	DBS50	DKS40	DFS60	DKV60	DFV60
	-	Adapter cable for incremental programming tool with SUB-D 9-pin cable connector, shielded, suitable for incremental encoder with cable outlet	0.5 m	DSL-0D08-G0M5AC3	2061739	-	-	-	●	-	●
	-	Adapter cable for incremental programming tool with SUB-D 9-pin cable connector and M12 8-pin cable socket, pre-wired with 8-core cable, 4 x 2 x 0.08 mm ² , shielded, suitable for incremental encoder with M12 plug connector	0.5 m	DSL-2D08-G0M5AC3	2046579	-	-	-	●	-	●
	-	Adapter cable for incremental programming tool with SUB-D 9-pin cable connector and M23 12-pin cable socket, pre-wired with 8-core cable, 4 x 2 x 0.08 mm ² , shielded, suitable for incremental encoder with M23 plug connector	0.5 m	DSL-3D08-G0M5AC3	2046580	-	-	-	●	-	●
	-	Programming tool for connection to standard PC or notebook via USB port	-	PGT-08-S	1036616	-	-	-	●	-	●
	-	The PGT-10-S is an intuitively operated standalone programming device for SICK incremental encoders. Its low weight and compact dimensions make it portable and usable everywhere.	-	PGT-10-S	1052967	-	-	-	●	-	●


Absolute encoders

Connectivity

Cables by the meter (by interface)

Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	-	Data cable by the meter 4 x 2 x 0.15 mm ² with shielding, diam. 5.6 mm	LTG-2308-MWENC	6027529	●	●	-	-	-	●	-	-	●	-	-	-
	-	Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, UV and salt water resistant, diam. 7.8 mm	LTG-2612-MW	6028516	●	●	-	-	-	●	-	-	●	-	-	-
	-	Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² with shielding, diam. 7.5 mm	LTG-2411-MW	6027530	●	●	-	-	-	●	-	-	-	-	-	-
	-	Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, diam. 7.8 mm	LTG-2512-MW	6027531	●	●	-	-	-	●	-	-	-	-	-	-
	-	PROFIBUS cable by the meter 2 x 0.25 mm ² with shielding, suitable for drag chain, diam. 8.0 mm	LTG-2102-MW	6021355	-	-	-	-	●	-	●	●	-	-	-	-
	-	Parallel cable by the meter 20 x 0.14 mm ² + 2 x 0.25 mm ² with shielding, diam. 7.8 mm	LTG-2622-MW	6027532	●	-	-	-	-	-	-	-	-	-	-	-

Cables including seal for absolute encoder with universal cable outlet

Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT	
	H-449	Cables including seal, 4 x 2 x 0.15 mm ² for absolute encoder with universal cable outlet, with shielding, diam. 5.6 mm	DOL-OJ08-G0M5AA6	2048589	-	-	-	-	-	-	-	-	●	-	-	-	
			DOL-OJ08-G1M5AA6	2048590	-	-	-	-	-	-	-	-	-	●	-	-	-
			DOL-OJ08-G3M0AA6	2048591	-	-	-	-	-	-	-	-	-	●	-	-	-
			DOL-OJ08-G5M0AA6	2048593	-	-	-	-	-	-	-	-	-	●	-	-	-
			DOL-OJ08-G10MAA6	2048594	-	-	-	-	-	-	-	-	-	●	-	-	-

M12 screw-in system




Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT	
	H-439	Cable socket, M12, 5-pin, angled, pre-wired for voltage supply, 3-core, 3 x 0.34 mm ² , shielded, diam. 4.2 mm	5.0 m	DOL-1202-W05MC	6042067	-	-	-	-	-	-	-	●	-	-	-	-	
			10.0 m	DOL-1202-W10MC	6042068	-	-	-	-	-	-	-	-	●	-	-	-	-
	H-439	Cable socket, M12, 4-pin, straight, pre-wired with PROFIBUS cable for voltage supply, 4-core, 4 x 0.25 mm ² , suitable for drag chain, diam. 5.0 mm	5.0 m	DOL-1204-G05M	6009866	-	-	-	-	●	-	-	-	-	-	-	-	
	H-439	Cable socket, M12, 4-pin, straight, pre-wired for voltage supply, 4-core, 4 x 0.34 mm ² , shielded, diam. 4.7 mm	2.0 m	DOL-1204-G02MC	6025900	-	-	-	-	-	-	-	-	-	●	●	●	
			5.0 m	DOL-1204-G05MC	6025901	-	-	-	-	-	-	-	-	-	-	●	●	●
			10.0 m	DOL-1204-G10MC	6025902	-	-	-	-	-	-	-	-	-	-	●	●	●
			25.0 m	DOL-1204-G25MC	6034751	-	-	-	-	-	-	-	-	-	-	●	●	●






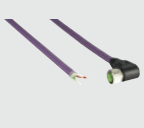

Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT	
	H-439	Cable socket, M12, 5-pin, straight, pre-wired for voltage supply, 5-core, 5 x 0.34 mm², shielded, suitable for drag chain, diam. 5.9 mm	2.0 m	DOL-1204-W02MC	6025903	-	-	-	-	-	-	-	-	●	●	●		
			5.0 m	DOL-1204-W05MC	6025904	-	-	-	-	-	-	-	-	-	●	●	●	
			10.0 m	DOL-1204-W10MC	6025905	-	-	-	-	-	-	-	-	-	●	●	●	
			25.0 m	DOL-1204-W25MC	6034754	-	-	-	-	-	-	-	-	-	●	●	●	
	H-439	Cable socket, M12, 5-pin, straight, pre-wired for voltage supply, 5-core, 5 x 0.34 mm², shielded, suitable for drag chain, diam. 5.9 mm	5.0 m	DOL-1205-G05MAC	6036384	-	-	-	-	-	-	●	-	-	-	-		
			10.0 m	DOL-1205-G10MAC	6036385	-	-	-	-	-	-	●	-	-	-	-	-	
			20.0 m	DOL-1205-G20MAC	6036386	-	-	-	-	-	-	●	-	-	-	-	-	
	H-439	Cable socket, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm², shielded, suitable for drag chain, cable diameter 8.0 mm	5.0 m	DOL-1205-G05MQ	6026006	-	-	-	-	●	-	●	●	-	-	-		
			10.0 m	DOL-1205-G10MQ	6026008	-	-	-	-	●	-	●	●	-	-	-	-	
			12.0 m	DOL-1205-G12MQ	6032636	-	-	-	-	●	-	●	●	-	-	-	-	
			15.0 m	DOL-1205-G15MQ	6032637	-	-	-	-	●	-	●	●	-	-	-	-	
			20.0 m	DOL-1205-G20MQ	6032638	-	-	-	-	●	-	●	●	-	-	-	-	
			30.0 m	DOL-1205-G30MQ	6032639	-	-	-	-	●	-	●	●	-	-	-	-	
			50.0 m	DOL-1205-G50MQ	6032861	-	-	-	-	●	-	●	●	-	-	-	-	
	H-440	Cable socket, M12, 5-pin, angled, pre-wired with PROFIBUS cable, 2-core, 2 x 0.64 mm², suitable for drag chain, diam. 7.8 mm	5.0 m	DOL-1205-W05MQ	6041423	-	-	-	-	-	-	●	-	-	-	-		
			10.0 m	DOL-1205-W10MQ	6041425	-	-	-	-	-	-	-	●	-	-	-	-	
	H-440	Cable socket, 8-pin, straight, pre-wired with 8-core cable, 4 x 2 x 0.25 mm², shielded, cable diameter 7.0 mm	2.0 m	DOL-1208-G02MAC1	6032866	-	-	-	-	-	-	-	●	-	-	-		
			5.0 m	DOL-1208-G05MAC1	6032867	-	-	-	-	-	-	-	-	●	-	-	-	
			10.0 m	DOL-1208-G10MAC1	6032868	-	-	-	-	-	-	-	-	-	●	-	-	-
			20.0 m	DOL-1208-G20MAC1	6032869	-	-	-	-	-	-	-	-	-	●	-	-	-










Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-440	Cable socket for voltage supply, M12, 4-pin, straight, suitable for cable diameter 3 - 6.5 mm	-	DOS-1204-G	6007302	-	-	-	-	●	-	●	●	-	-	-	-
	H-440	Cable socket, M12, 4-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	DOS-1204-GE	6048153	-	-	-	-	-	-	-	-	-	●	-	-
		Cable socket, M12, 4-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	DOS-1204-GZ	6048263	-	-	-	-	-	-	-	-	-	-	●	●
	H-441	Cable socket for voltage supply, M12, 4-pin, angled, suitable for cable diameter 4 - 6 mm	-	DOS-1204-W	6007303	-	-	-	-	-	-	-	●	-	●	●	●
	H-441	Cable socket, M12, 4-pin, angled, shielded, suitable for cable diameter 4 - 8 mm	-	DOS-1204-WE	6048154	-	-	-	-	-	-	-	-	-	●	-	-
		Cable socket, M12, 4-pin, angled, shielded, suitable for cable diameter 4 - 8 mm	-	DOS-1204-WZ	6048264	-	-	-	-	-	-	-	-	-	-	●	●
	H-441	Cable socket for DeviceNet, M12, 5-pin, straight, shielded, suitable for cable diameter 6 - 8 mm	-	DOS-1205-GA	6027534	-	-	-	●	-	-	-	-	-	-	-	-









Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT	
	H-441	Cable socket, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	DOS-1205-GQ	6021353	-	-	-	-	●	-	●	●	-	-	-	-	
	H-442	Cable socket, M12, 5-pin, angled, shielded, B-coded, suitable for cable diameter 4 - 8 mm	-	DOS-1205-WQ	6041429	-	-	-	-	-	-	-	●	-	-	-	-	
	H-442	Cable socket, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	DOS-1208-GA01	6045001	-	-	-	-	-	-	-	-	●	-	-	-	
-	-	A3M60 sales set comprising: Cable socket supply voltage M12 angled (6007303) Cable socket M12 angled (6041429) Cable connector M12 angled (6041428)	-	DOS-3XM12-W	2058177	-	-	-	-	-	-	-	●	-	-	-	-	
	H-442	Switch cabinet feedthrough M12 cable socket, 4-pin, D-coded to RJ45 cable socket, 90 degree bush input	-	PASSAGE JACK ETHERNET RJ45	6048180	-	-	-	-	-	-	-	-	-	●	●	●	
	H-443	Cable connector, M12, 4-pin, straight to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-G02ME90	6045222	-	-	-	-	-	-	-	-	-	●	-	-	
			5.0 m	SSL-1204-G05ME90	6045277	-	-	-	-	-	-	-	-	-	-	●	-	-
			10.0 m	SSL-1204-G10ME90	6045279	-	-	-	-	-	-	-	-	-	-	●	-	-
	H-442	Cable connector, M12, 4-pin, angled to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-H02ME90	6047908	-	-	-	-	-	-	-	-	-	●	-	-	
			5.0 m	SSL-1204-H05ME90	6047909	-	-	-	-	-	-	-	-	-	-	●	-	-
			10.0 m	SSL-1204-H10ME90	6047910	-	-	-	-	-	-	-	-	-	-	●	-	-











Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT	
	H-443	Cable connector, M12, 4-pin, straight to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-G02ME60	6047916	-	-	-	-	-	-	-	-	-	●	-	-	
			5.0 m	SSL-2J04-G05ME60	6047917	-	-	-	-	-	-	-	-	-	-	●	-	-
			10.0 m	SSL-2J04-G10ME60	6047918	-	-	-	-	-	-	-	-	-	-	●	-	-
	H-444	Cable connector, M12, 4-pin, angled to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-H02ME	6047911	-	-	-	-	-	-	-	-	-	●	-	-	
			5.0 m	SSL-2J04-H05ME	6045287	-	-	-	-	-	-	-	-	-	-	●	-	-
			10.0 m	SSL-2J04-H10ME	6045288	-	-	-	-	-	-	-	-	-	-	●	-	-
	H-442	Cable connector, M12, 4-pin, angled to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-F02MZ90	6048250	-	-	-	-	-	-	-	-	-	-	●	●	
			5.0 m	SSL-1204-F05MZ90	6048251	-	-	-	-	-	-	-	-	-	-	-	●	●
			10.0 m	SSL-1204-F10MZ90	6048252	-	-	-	-	-	-	-	-	-	-	-	●	●
	H-443	Cable connector, M12, 4-pin, straight to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-G02MZ90	6048241	-	-	-	-	-	-	-	-	-	-	●	●	
			5.0 m	SSL-1204-G05MZ90	6048242	-	-	-	-	-	-	-	-	-	-	-	●	●
			10.0 m	SSL-1204-G10MZ90	6048243	-	-	-	-	-	-	-	-	-	-	-	●	●
	H-443	Cable connector, M12, 4-pin, angled to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-F02MZ	6048253	-	-	-	-	-	-	-	-	-	-	●	●	
			5.0 m	SSL-2J04-F05MZ	6048254	-	-	-	-	-	-	-	-	-	-	-	●	●
			10.0 m	SSL-2J04-F10MZ	6048255	-	-	-	-	-	-	-	-	-	-	-	●	●
	-	Cable connector, M12, 4-pin, straight to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-G02MZ60	6048244	-	-	-	-	-	-	-	-	-	-	●	●	
			5.0 m	SSL-2J04-G05MZ60	6048245	-	-	-	-	-	-	-	-	-	-	-	●	●
			10.0 m	SSL-2J04-G10MZ60	6048246	-	-	-	-	-	-	-	-	-	-	-	●	●
	H-444	Cable connector, RJ45, suitable for cable diameter 4.5 - 8 mm	-	STE-0J04-GZ	6048260	-	-	-	-	-	-	-	-	-	-	●	●	
	H-444	Cable connector, RJ45, suitable for cable diameter 4.5 - 8 mm	-	STE-0J08-GE	6048150	-	-	-	-	-	-	-	-	-	●	-	-	



















Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-444	Cable connector, M12, 4-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1204-GE01	6048151	-	-	-	-	-	-	-	-	-	●	-	-
		Cable connector, M12, 4-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1204-GZ	6048261	-	-	-	-	-	-	-	-	-	-	-	●
	H-445	Cable connector, M12, 4-pin, angled, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1204-WE	6048152	-	-	-	-	-	-	-	-	-	●	-	-
		Cable connector, M12, 4-pin, angled, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1204-WZ	6048262	-	-	-	-	-	-	-	-	-	-	-	●
	H-445	Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1205-GA	6027533	-	-	-	●	-	-	-	-	-	-	-	-
	H-445	Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	STE-1205-GQ	6021354	-	-	-	-	●	-	●	●	-	-	-	-
	H-445	Cable connector, M12, 5-pin, angled, B-coded, suitable for cable diameter 4 - 8 mm	-	STE-1205-WQ	6041428	-	-	-	-	-	-	-	●	-	-	-	-





Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT	
	H-446	Cable connector, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1208-GA01	6044892	-	-	-	-	-	-	-	-	●	-	-	-	
	H-446	PROFIBUS terminator M12, 5-pin	-	STE-END-Q	6021156	-	-	-	-	●	-	-	●	-	-	-	-	
	H-446	Cable connector, M12, 4-pin, straight, to open end, shielded	2.0 m	STL-1204-G02ME90	6045284	-	-	-	-	-	-	-	-	-	●	-	-	
			5.0 m	STL-1204-G05ME90	6045285	-	-	-	-	-	-	-	-	-	-	●	-	-
			10.0 m	STL-1204-G10ME90	6045286	-	-	-	-	-	-	-	-	-	-	●	-	-
	H-446	Cable connector, M12, 4-pin, angled, to open end, shielded	2.0 m	STL-1204-W02ME90	6047912	-	-	-	-	-	-	-	-	-	●	-	-	
			5.0 m	STL-1204-W05ME90	6047913	-	-	-	-	-	-	-	-	-	-	●	-	-
			10.0 m	STL-1204-W10ME90	6047914	-	-	-	-	-	-	-	-	-	-	●	-	-
			25.0 m	STL-1204-W25ME90	6047915	-	-	-	-	-	-	-	-	-	-	●	-	-
	H-446	Cable connector, M12, 4-pin, straight, to open end, shielded	2.0 m	STL-1204-G02MZ90	6048247	-	-	-	-	-	-	-	-	-	-	●	●	
			5.0 m	STL-1204-G05MZ90	6048248	-	-	-	-	-	-	-	-	-	-	-	●	●
			10.0 m	STL-1204-G10MZ90	6048249	-	-	-	-	-	-	-	-	-	-	-	●	●
	H-446	Cable connector, M12, 4-pin, angled, to open end, shielded	2.0 m	STL-1204-W02MZ90	6048256	-	-	-	-	-	-	-	-	-	-	●	●	
			5.0 m	STL-1204-W05MZ90	6048257	-	-	-	-	-	-	-	-	-	-	-	●	●
			10.0 m	STL-1204-W10MZ90	6048258	-	-	-	-	-	-	-	-	-	-	-	●	●
			25.0 m	STL-1204-W25MZ90	6048259	-	-	-	-	-	-	-	-	-	-	-	●	●
	H-447	Cable connector, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm², shielded, suitable for drag chain, cable diameter 8.0 mm	5.0 m	STL-1205-G05MQ	6026005	-	-	-	-	●	-	●	●	-	-	-	-	
			10.0 m	STL-1205-G10MQ	6026007	-	-	-	-	●	-	●	●	-	-	-	-	-
			12.0 m	STL-1205-G12MQ	6032635	-	-	-	-	●	-	●	●	-	-	-	-	-
	H-447	Cable socket, M12, 5-pin, angled, pre-wired with 2-core cable, 2 x 0.64 mm², shielded, B-coded, cable diameter 7.8 mm	5.0 m	STL-1205-W05MQ	6041426	-	-	-	-	-	-	-	●	-	-	-	-	
			10.0 m	STL-1205-W10MQ	6041427	-	-	-	-	-	-	-	-	●	-	-	-	-







M14 screw-in system

Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-447	Cable socket, M14, 7-pin, straight, shielded	DOS-1507-G	6027536	-	-	-	-	-	-	●	-	-	-	-	-
	H-447	Sales set comprising: 2 x cable connector M14, 7-pin (6027535) 1 x cable socket M14, 7-pin (6027536)	DSC-1507-G SET 2*ST	2029199	-	-	-	-	-	-	●	-	-	-	-	-
	H-447	Cable connector, M14, 7-pin, straight, shielded	STE-1507-G	6027535	-	-	-	-	-	-	●	-	-	-	-	-

M23 screw-in system



Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT	
	H-448	Cable socket, M23, 12-pin, straight, pre-wired with 8-core cable, 4 x 2 x 0.15 mm ² , shielded, cable diameter 5.6 mm	0.5 m	DOL-2308-G0M5AA6	2048595	-	-	-	-	-	-	-	-	●	-	-	-	
			1.5 m	DOL-2308-G1M5AA6	2048596	-	-	-	-	-	-	-	-	-	●	-	-	-
			3.0 m	DOL-2308-G3M0AA6	2048597	-	-	-	-	-	-	-	-	-	●	-	-	-
			5.0 m	DOL-2308-G5M0AA6	2048598	-	-	-	-	-	-	-	-	-	●	-	-	-
			10.0 m	DOL-2308-G10MAA6	2048599	-	-	-	-	-	-	-	-	-	● ¹⁾	-	-	-
	H-448	Cable socket, M23, 12-pin, straight, pre-wired with 12-core SSI cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , shielded, suitable for drag chain, cable diameter 7.8 mm	1.5 m	DOL-2312-G1M5MA1	2029200	-	●	-	-	-	●	-	-	-	-	-	-	
			3.0 m	DOL-2312-G03MMA1	2029201	-	●	-	-	-	●	-	-	-	-	-	-	-
			5.0 m	DOL-2312-G05MMA1	2029202	-	●	-	-	-	●	-	-	-	-	-	-	-
			10.0 m	DOL-2312-G10MMA1	2029203	-	●	-	-	-	●	-	-	-	-	-	-	-
			20.0 m	DOL-2312-G20MMA1	2029204	-	●	-	-	-	●	-	-	-	-	-	-	-
			30.0 m	DOL-2312-G30MMA1	2029205	-	●	-	-	-	●	-	-	-	-	-	-	-

¹⁾ Difference between SSI and combi interfaces.

Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT		
	H-448	Cable socket, M23, 12-pin, straight, pre-wired with 12-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , shielded, suitable for drag chain, cable diameter 7.8 mm, suitable for ARS60 SSI	1.5 m	DOL-2312-G1M5MA2	2029206	●	-	-	-	-	-	-	-	-	-	-	-		
			3.0 m	DOL-2312-G03MMA2	2029207	●	-	-	-	-	-	-	-	-	-	-	-	-	
			5.0 m	DOL-2312-G05MMA2	2029208	●	-	-	-	-	-	-	-	-	-	-	-	-	-
			10.0 m	DOL-2312-G10MMA2	2029209	●	-	-	-	-	-	-	-	-	-	-	-	-	-
			20.0 m	DOL-2312-G20MMA2	2029210	●	-	-	-	-	-	-	-	-	-	-	-	-	-
			30.0 m	DOL-2312-G30MMA2	2029211	●	-	-	-	-	-	-	-	-	-	-	-	-	-
	H-448	Cable socket, M23, 12-pin, straight, pre-wired with 12-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , shielded, suitable for drag chain, cable diameter 7.8 mm, suitable for AFM60 SSI + incremental and AFM60 SSI + sin/cos interface	1.5 m	DOL-2312-G1M5MD2	2062284	-	-	-	-	-	-	-	-	● ¹⁾	-	-	-		
			3.0 m	DOL-2312-G03MMD2	2062300	-	-	-	-	-	-	-	-	-	●	-	-	-	
			5.0 m	DOL-2312-G05MMD2	2062301	-	-	-	-	-	-	-	-	-	●	-	-	-	
			10.0 m	DOL-2312-G10MMD2	2062302	-	-	-	-	-	-	-	-	-	●	-	-	-	
			20.0 m	DOL-2312-G20MMD2	2062303	-	-	-	-	-	-	-	-	-	●	-	-	-	
			30.0 m	DOL-2312-G30MMD2	2062304	-	-	-	-	-	-	-	-	-	●	-	-	-	
	H-448	Cable socket, M23, 21-pin, straight, pre-wired with 22-core cable, 20 x 0.14 mm ² + 2 x 0.25 mm ² , shielded, cable diameter 7.8 mm, suitable for ARS60 parallel	1.5 m	DOL-2321-G1M5PA4	2029218	●	-	-	-	-	-	-	-	-	-	-	-		
			3.0 m	DOL-2321-G03MPA4	2029219	●	-	-	-	-	-	-	-	-	-	-	-	-	
			5.0 m	DOL-2321-G05MPA4	2029220	●	-	-	-	-	-	-	-	-	-	-	-	-	
			10.0 m	DOL-2321-G10MPA4	2029221	●	-	-	-	-	-	-	-	-	-	-	-	-	
			20.0 m	DOL-2321-G20MPA4	2029222	●	-	-	-	-	-	-	-	-	-	-	-	-	
	H-448	Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	DOS-2312-G	6027538	●	●	-	-	-	●	-	●	-	-	-			



¹⁾ Difference between SSI and combi interfaces.



Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-448	Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	STE-2312-G	6027537	●	●	-	-	-	●	-	-	●	-	-	-
	H-448	Cable socket, M23, 21-pin, straight, shielded, suitable for cable diameter 5.5 - 12 mm	-	DOS-2321-G	6027539	●	●	-	-	-	●	-	-	-	-	-	-

¹⁾ Difference between SSI and combi interfaces.

SUB-D plug connector system for SSI parallel adapters

Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CanOpen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 Profibus	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-449	Cable socket, SUB-D, 37-pin, straight (shielded)	DOS-0D37-G	2029224	●	-	-	-	-	-	-	-	-	-	-	-
	H-449	Cable connector, SUB-D, 15-pin, straight (shielded)	STE-0D15-G	2029223	●	-	-	-	-	-	-	-	-	-	-	-

Mounting systems

Torque supports









Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-450	Standard torque support	BEF-DS00XFX	2056812	-	-	-	-	-	-	-	-	●	●	●	●
	H-450	Torque support, one-sided, 81 mm long with slot	BEF-DS01DFS/VFS	2047428	-	-	-	-	-	-	-	-	●	●	●	●

Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-451	Torque support, one-sided, 179 mm long with slots	BEF-DS02DFS/VFS	2047430	-	-	-	-	-	-	-	-	●	●	●	●
	H-452	Torque support, one-sided, 248 mm long with slots	BEF-DS03DFS/VFS	2047431	-	-	-	-	-	-	-	-	●	●	●	●
	H-453	Torque support, 16.5 mm high	BEF-DS05XFX	2057423	-	-	-	-	-	-	-	-	●	●	●	●
	H-453	Torque support with hole circle diameter 63 mm	BEF-DS07XFX	2059368	-	-	-	-	-	-	-	-	●	●	●	●

Bearing blocks

Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-454	Bearing block for hollow shaft encoder	BEF-FA-B12-010	2042728	●	●	●	●	●	-	-	●	●	●	●	●
	H-455	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591	●	●	●	●	●	-	-	●	●	●	●	●
-	-	Mounting kit for servo flange encoder on bearing block	BEF-MK-LB	5320872	●	●	●	●	●	-	-	●	●	●	●	●

Mechanical adapters







Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-457	Flange adapter, adapts face mount flange with 36 mm centering collar to 50 mm servo flange	BEF-FA-036-050	2029160	●	●	●	●	●	-	-	●	●	●	●	●



Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-458	Flange adapter, adapts face mount flange with 36 mm centering collar to 60 mm square mounting plate	BEF-FA-036-060REC	2029162	●	●	●	●	●	-	-	●	●	●	●	●
	H-458	Flange adapter, adapts face mount flange with 36 mm centering collar to 58 mm square mounting plate with shock absorber	BEF-FA-036-060RSA	2029163	●	●	●	●	●	-	-	●	●	●	●	●
	H-458	Flange adapter, adapts face mount flange with 36 mm centering collar to 63 mm square mounting plate	BEF-FA-036-063REC	2034225	●	●	●	●	●	-	-	●	●	●	●	●
	-	Flange adapter, adapts face mount flange with 36 mm centering collar to 100 mm servo flange with 60 mm centering collar	BEF-FA-036-100	2029161	●	●	●	●	●	-	-	●	●	●	●	●
	H-458	Mounting bell for servo flange encoder with 50 mm centering collar incl. mounting kit	BEF-MG-50	5312987	●	●	●	●	●	-	-	●	●	●	●	●
	H-460	Mounting bracket for encoder with 36 mm centering collar	BEF-WF-36	2029164	●	●	●	●	●	-	-	●	●	●	●	●

Measuring wheels







Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-460	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988	●	●	●	●	●	-	-	●	●	●	●	●
	H-460	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678	●	●	●	●	●	-	-	●	●	●	●	●
	H-460	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989	●	●	●	●	●	-	-	●	●	●	●	●


Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-461	Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222	●	●	●	●	●	-	-	●	●	●	●	●
	H-461	Measuring wheel with O-ring surface (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634	●	●	●	●	●	-	-	●	●	●	●	●
	H-461	Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224	●	●	●	●	●	-	-	●	●	●	●	●
	H-461	Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278	●	●	●	●	●	-	-	●	●	●	●	●
	H-461	Measuring wheel with O-ring surface (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227	●	●	●	●	●	-	-	●	●	●	●	●

Servo clamps for encoder with servo or servo face mount flange

Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-463	Servo clamp half-shells (set of 2) for 50 mm centering collar	BEF-WG-SF050	2029165	●	●	●	●	●	-	-	●	●	●	●	●
	H-464	Servo clamps (set of 3), large	BEF-WK-SF	2029166	●	●	●	●	●	-	-	●	●	●	●	●



Collets for encoder with hollow shaft

Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT	
 <p>Illustration may differ</p>	H-462	Collet D6 mm for blind hollow shaft	SPZ-006-AD-A	2029174	●	●	●	●	●	-	-	-	-	-	-	-	
		Collet D8 mm for blind hollow shaft	SPZ-008-AD-A	2029176	●	●	●	●	●	-	-	-	-	-	-	-	-
		Collet D10 mm for blind hollow shaft	SPZ-010-AD-A	2029178	●	●	●	●	●	-	-	-	-	-	-	-	-
		Collet D12 mm for blind hollow shaft	SPZ-012-AD-A	2029179	●	●	●	●	●	-	-	-	-	-	-	-	-
	H-463	Collet D14 mm for blind hollow shaft	SPZ-014-AD-A	2048863	●	●	●	●	●	-	-	-	-	-	-	-	-
	H-462	Collet D1/4" for blind hollow shaft	SPZ-1E4-AD-A	2029175	●	●	●	●	●	-	-	-	-	-	-	-	-
		Collet D3/8" for blind hollow shaft	SPZ-3E8-AD-A	2029177	●	●	●	●	●	-	-	-	-	-	-	-	-
		Collet D1/2" for blind hollow shaft	SPZ-1E2-AD-A	2029180	●	●	●	●	●	-	-	-	-	-	-	-	-
	H-463	Collet D6 mm for through hollow shaft	SPZ-006-AD-D	2029192	●	-	-	-	-	-	-	-	-	-	-	-	-
	-	Collet D8 mm for through hollow shaft	SPZ-008-AD-D	2029194	●	-	-	-	-	-	-	-	-	-	-	-	-
		Collet D10 mm for through hollow shaft	SPZ-010-AD-D	2029196	●	-	-	-	-	-	-	-	-	-	-	-	-
		Collet D12 mm for through hollow shaft	SPZ-012-AD-D	2029197	●	-	-	-	-	-	-	-	-	-	-	-	-
		Collet D1/4" for through hollow shaft	SPZ-1E4-AD-D	2029193	●	-	-	-	-	-	-	-	-	-	-	-	-
		Collet D3/8" for through hollow shaft	SPZ-3E8-AD-D	2029195	●	-	-	-	-	-	-	-	-	-	-	-	-
		Collet D1/2" for through hollow shaft	SPZ-1E2-AD-D	2029198	●	-	-	-	-	-	-	-	-	-	-	-	-



Shaft couplings

Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT	
	H-464	Bellows coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad, material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981	●	●	●	●	●	-	-	●	●	●	●	●	
		Bellows coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982	●	●	●	●	●	-	-	●	●	●	●	●	●
		Bellows coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983	●	●	●	●	●	-	-	●	●	●	●	●	●
		Bellows coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle $\pm 4^\circ$, torsion spring stiffness 130 Nm/rad; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984	●	●	●	●	●	-	-	●	●	●	●	●	●




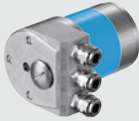
Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFINET	ATM90 SSI	ATM90 PROFINET	A3M60 PROFINET	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	H-464	Stator coupling with hole diameter combination 6 mm x 6 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0606-S	2056406	●	●	●	●	●	-	-	●	●	●	●	●
	H-465	Stator coupling with hole diameter combination 6 mm x 8 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0608-S	5314179	●	●	●	●	●	-	-	●	●	●	●	●
	H-464	Stator coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0610-S	2056407	●	●	●	●	●	-	-	●	●	●	●	●
	H-465	Stator coupling with hole diameter combination 8 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-0810-S	5314178	●	●	●	●	●	-	-	●	●	●	●	●
	H-464	Stator coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$, torsion spring stiffness 38 Nm/rad, material: glass-fiber reinforced polyamide, aluminum hub	KUP-1010-S	2056408	●	●	●	●	●	-	-	●	●	●	●	●

Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT	
	H-465	Double loop coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 2.5 mm, axial ± 3 mm, angle ± 10°, torsion spring stiffness 25 Nm/rad, material: polyurethane, galvanized steel flange	KUP-0610-D	5326697	●	●	●	●	●	-	-	●	●	●	●	●	
		Double loop coupling with hole diameter combination 8 mm x 10 mm, maximum shaft offset, radial ± 2.5 mm, axial ± 3 mm, angle ± 10°, torsion spring stiffness 25 Nm/rad, material: polyurethane, galvanized steel flange	KUP-0810-D	5326704	●	●	●	●	●	-	-	●	●	●	●	●	●
		Double loop coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 2.5 mm, axial ± 3 mm, angle ± 10°, torsion spring stiffness 25 Nm/rad, material: polyurethane, galvanized steel flange	KUP-1010-D	5326703	●	●	●	●	●	-	-	●	●	●	●	●	●
		Double loop coupling with hole diameter combination 10 mm x 12 mm, maximum shaft offset, radial ± 2.5 mm, axial ± 3 mm, angle ± 10°, torsion spring stiffness 25 Nm/rad, material: polyurethane, galvanized steel flange	KUP-1012-D	5326702	●	●	●	●	●	-	-	●	●	●	●	●	●
	H-464	Spring washer coupling with hole diameter combination 6 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle ± 2.5°, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985	●	●	●	●	●	-	-	●	●	●	●	●	
		Spring washer coupling with hole diameter combination 10 mm x 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle ± 2.5°, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986	●	●	●	●	●	-	-	●	●	●	●	●	●

H

Bus connection adapters

Connection adapters for fieldbuses

Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT	
 <p>Illustration may differ</p>	H-466	CANopen connection adapter KR1, 1 x PG	AD-ATM60-KR1CO	2029230	-	-	●	-	-	-	-	-	-	-	-	-	
		CANopen connection adapter KR2, 2 x PG	AD-ATM60-KR2CO	2029231	-	-	●	-	-	-	-	-	-	-	-	-	-
		CANopen connection adapter KR3, 3 x PG	AD-ATM60-KR3CO	2029232	-	-	●	-	-	-	-	-	-	-	-	-	-
	H-466	CANopen connection adapter SR1, 1 x M12, 5-pin	AD-ATM60-SR1CO	2031686	-	-	●	-	-	-	-	-	-	-	-	-	-
	H-466	CANopen connection adapter SR2, 2 x M12, 5-pin	AD-ATM60-SR2CO	2020935	-	-	●	-	-	-	-	-	-	-	-	-	-
	H-466	DeviceNet connection adapter KR1, 1 x PG	AD-ATM60-KR1DN	2029228	-	-	-	●	-	-	-	-	-	-	-	-	-
	H-466	DeviceNet connection adapter KR2, 2 x PG	AD-ATM60-KR2DN	2029229	-	-	-	●	-	-	-	-	-	-	-	-	-
	H-466	DeviceNet connection adapter SR1, 1 x M12, 5-pin	AD-ATM60-SR1DN	2029226	-	-	-	●	-	-	-	-	-	-	-	-	-
	H-466	DeviceNet connection adapter SR2, 2 x M12, 5-pin	AD-ATM60-SR2DN	2029227	-	-	-	●	-	-	-	-	-	-	-	-	-
	H-466	PROFIBUS connection adapter KA3, 3 x PG	AD-ATM60-KA3PR	2029225	-	-	-	-	●	-	-	-	-	-	-	-	-
H-466	PROFIBUS connection adapter SR3, 1 x M12, 4-pin, 2 x M12, 5-pin	AD-ATM60-SR3PR	2031985	-	-	-	-	●	-	-	-	-	-	-	-	-	

Programming tools

Programming tools






Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	-	Adapter cable for absolute programming tool with SUB-D 9-pin cable connector and M12 8-pin cable socket, pre-wired with 8-core cable, 4 x 2 x 0.08 mm ² , shielded, suitable for SSI encoder with M12 plug connector	DSL-2D08-G0M5AC2	2048439	-	-	-	-	-	-	-	-	●	-	-	-

Figure	Dimensional drawing see page	Description	Model name	Part no.	ARS60 SSI/Parallel	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM60 PROFIBUS	ATM90 SSI	ATM90 PROFIBUS	A3M60 PROFIBUS	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT
	-	Adapter cable for absolute programming tool (SSI) with SUB-D 9-pin cable connector and M23 12-pin cable socket, pre-wired with 8-core cable, 4 x 2 x 0.15 mm², shielded, suitable for SSI encoder with M23 plug connector	DSL-3D08-G0M5AC2	2048440	-	-	-	-	-	-	-	-	●	-	-	-
	-	Adapter cable for absolute programming tool with SUB-D 9-pin cable connector and M23 12-pin cable socket, pre-wired with 8-core cable, 4 x 2 x 0.15 mm², shielded, suitable for SSI + incremental and SSI + sin/cos encoder with M23 plug connector	DSL-3D08-G0M5AC4	2059270	-	-	-	-	-	-	-	-	●	-	-	-
	-	Programming tool for connection to standard PC or notebook via USB port	PGT-08-S	1036616	-	-	-	-	-	-	-	-	●	-	-	-
	-	Programming tool for ATM60, ATM90 and KH53 SSI	PGT-01-S	1030111	-	●	-	-	-	●	-	-	-	-	-	-



Wire draw encoders

Wire draw mechanism

Wire draw mechanism for face mount flange encoder



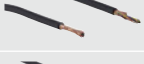



Figure	Dimensional drawing see page	Description	Measuring length	Model name	Part no.	EcoLine	CompactLine	HighLine
	-	HighLine wire draw mechanism for 60 series face mount flange with 10 mm shaft	2 m	MRA-F080-402D2	6029788	-	-	●
	-	HighLine wire draw mechanism for 60 series face mount flange with 10 mm shaft	5 m	MRA-F130-405D2	6029789	-	-	●
			10 m	MRA-F130-410D2	6029790	-	-	●
			20 m	MRA-F130-420D1	6029791	-	-	●
			30 m	MRA-F130-430D1	6029792	-	-	●
			50 m	MRA-F190-450D2	6029793	-	-	●

Wire draw mechanism for servo flange encoder







Figure	Dimensional drawing see page	Description	Measuring length	Model name	Part no.	EcoLine	CompactLine	HighLine
	-	HighLine wire draw mechanism for 60's servo flange with 6 mm shaft	2 m	MRA-F080-102D2	6028625	-	-	●
			3 m	MRA-F080-103D2	6030125	-	-	●
			5 m	MRA-F130-105D2	6028626	-	-	●
			10 m	MRA-F130-110D2	6028627	-	-	●
			20 m	MRA-F130-120D1	6028628	-	-	●
			30 m	MRA-F130-130D1	6028629	-	-	●
			50 m	MRA-F190-150D2	6028630	-	-	●
	-	Ecoline wire draw mechanism for 36 series face mount flange with 6 mm shaft	1.25 m	MRA-G055-101D4	5324019	●	-	-
	-	Ecoline wire draw mechanism for 60 series face mount flange with 6 mm shaft	3 m	MRA-G080-103D3	5322778	●	-	-
			5 m	MRA-G130-105D3	5322779	●	-	-
			10 m	MRA-G190-110D3	5326242	●	-	-

Connectivity

Cables by the meter (by interface)

Figure	Dimensional drawing see page	Description	Model name	Part no.	EcoLine	CompactLine	HighLine
	-	Data cable by the meter 4 x 2 x 0.15 mm ² with shielding, diam. 5.6 mm	LTG-2308-MWENC	6027529	●	●	●
	-	Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² with shielding, diam. 7.5 mm	LTG-2411-MW	6027530	●	●	●
	-	Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, diam. 7.8 mm	LTG-2512-MW	6027531	●	●	●
	-	Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, UV and salt water resistant, diam. 7.8 mm	LTG-2612-MW	6028516	●	●	●
	-	PROFIBUS cable by the meter 2 x 0.25 mm ² with shielding, suitable for drag chain, diam. 8.0 mm	LTG-2102-MW	6021355	●	-	●
	-	Hiperface cable by the meter 4 x 2 x 0.25 mm ² , shielded, suitable for drag chain, cable diameter 7.0 mm	LTG-3208-MW	6032870	-	●	-

M12 screw-in system

Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	EcoLine	CompactLine	HighLine
	H-439	Cable socket, M12, 5-pin, angled, pre-wired for voltage supply, 3-core, 3 x 0.34 mm ² , shielded, diam. 4.2 mm	5.0 m	DOL-1202-W05MC	6042067	●	-	●
			10.0 m	DOL-1202-W10MC	6042068	●	-	●
	H-439	Cable socket, M12, 4-pin, straight, pre-wired with PROFIBUS cable for voltage supply, 4-core, 4 x 0.25 mm ² , suitable for drag chain, diam. 5.0 mm	5.0 m	DOL-1204-G05M	6009866	-	-	●
			2.0 m	DOL-1204-G02MC	6025900	●	-	●
	H-439	Cable socket, M12, 4-pin, straight, pre-wired for voltage supply, 4-core, 4 x 0.34 mm ² , shielded, diam. 4.7 mm	5.0 m	DOL-1204-G05MC	6025901	●	-	●
			10.0 m	DOL-1204-G10MC	6025902	●	-	●
			25.0 m	DOL-1204-G25MC	6034751	●	-	●
	H-439	Cable socket, M12, 5-pin, straight, pre-wired for voltage supply, 5-core, 5 x 0.34 mm ² , shielded, suitable for drag chain, diam. 5.9 mm	2.0 m	DOL-1204-W02MC	6025903	●	-	●
			5.0 m	DOL-1204-W05MC	6025904	●	-	●
			10.0 m	DOL-1204-W10MC	6025905	●	-	●
	H-439	Cable socket, M12, 5-pin, straight, pre-wired for voltage supply, 5-core, 5 x 0.34 mm ² , shielded, suitable for drag chain, diam. 5.9 mm	25.0 m	DOL-1204-W25MC	6034754	●	-	●
			5.0 m	DOL-1205-G05MAC	6036384	●	-	●
			10.0 m	DOL-1205-G10MAC	6036385	●	-	●
	H-447	Cable socket, M12, 5-pin, straight, pre-wired with 5-core cable, 5 x 0.34 mm ² , shielded, cable diameter 5.9 mm	20.0 m	DOL-1205-G20MAC	6036386	●	-	●
			1.5 m	DOL-1205-G1M5ACSCO	6049451	●	-	●
			3.0 m	DOL-1205-G03MACSCO	6049452	●	-	●
			5.0 m	DOL-1205-G05MACSCO	6049453	●	-	●
			10.0 m	DOL-1205-G10MACSCO	6049454	●	-	●

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Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	EcoLine	CompactLine	HighLine
	H-439	Cable socket, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	5.0 m	DOL-1205-G05MQ	6026006	●	-	●
			10.0 m	DOL-1205-G10MQ	6026008	●	-	●
			12.0 m	DOL-1205-G12MQ	6032636	●	-	●
			15.0 m	DOL-1205-G15MQ	6032637	●	-	●
			20.0 m	DOL-1205-G20MQ	6032638	●	-	●
			30.0 m	DOL-1205-G30MQ	6032639	●	-	●
			50.0 m	DOL-1205-G50MQ	6032861	●	-	●
	H-448	Cable socket, M12, 5-pin, angled, pre-wired with 5-core cable, 5 x 0.34 mm ² , shielded, cable diameter 5.9 mm	1.5 m	DOL-1205-W1M5ACSCO	6049455	●	-	●
			3.0 m	DOL-1205-W03MACSCO	6049456	●	-	●
			5.0 m	DOL-1205-W05MACSCO	6049457	●	-	●
			10.0 m	DOL-1205-W10MACSCO	6049458	●	-	●
	H-440	Cable socket, M12, 5-pin, angled, pre-wired with PROFIBUS cable, 2-core, 2 x 0.64 mm ² , suitable for drag chain, diam. 7.8 mm	5.0 m	DOL-1205-W05MQ	6041423	●	-	●
			10.0 m	DOL-1205-W10MQ	6041425	●	-	●
	H-440	Cable socket, 8-pin, straight, pre-wired with 8-core cable, 4 x 2 x 0.25 mm ² , shielded, cable diameter 7.0 mm	2.0 m	DOL-1208-G02MAC1	6032866	●	●	-
			5.0 m	DOL-1208-G05MAC1	6032867	●	●	-
			10.0 m	DOL-1208-G10MAC1	6032868	●	●	-
			20.0 m	DOL-1208-G20MAC1	6032869	●	●	-
	H-440	Cable socket for voltage supply, M12, 4-pin, straight, suitable for cable diameter 3 - 6.5 mm	-	DOS-1204-G	6007302	●	-	●
	H-440	Cable socket, M12, 4-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	DOS-1204-GE	6048153	●	-	●
		Cable socket, M12, 4-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	DOS-1204-GZ	6048263	●	-	●
	H-441	Cable socket for voltage supply, M12, 4-pin, angled, suitable for cable diameter 4 - 6 mm	-	DOS-1204-W	6007303	●	-	●
	H-441	Cable socket, M12, 4-pin, angled, shielded, suitable for cable diameter 4 - 8 mm	-	DOS-1204-WE	6048154	●	-	●
		Cable socket, M12, 4-pin, angled, shielded, suitable for cable diameter 4 - 8 mm	-	DOS-1204-WZ	6048264	●	-	●
	H-446	Cable socket, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 6 mm	-	DOS-1205-G	6009719	●	-	●
	H-441	Cable socket for DeviceNet, M12, 5-pin, straight, shielded, suitable for cable diameter 6 - 8 mm	-	DOS-1205-GA	6027534	●	-	●
	H-441	Cable socket, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	DOS-1205-GQ	6021353	●	-	●









Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	EcoLine	CompactLine	HighLine
	H-442	Cable socket, M12, 5-pin, angled, shielded, B-coded, suitable for cable diameter 4 - 8 mm	-	DOS-1205-WQ	6041429	●	-	●
	H-442	Hiperface cable socket, M12, 8-pin, straight, shielded, can be wired	-	DOS-1208-GA	6028369	-	●	-
	H-442	Cable socket, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	DOS-1208-GA01	6045001	●	-	-
-	-	A3M60 sales set comprising: Cable socket supply voltage M12 angled (6007303) Cable socket M12 angled (6041429) Cable connector M12 angled (6041428)	-	DOS-3XM12-W	2058177	●	-	●
	H-442	Switch cabinet feedthrough M12 cable socket, 4-pin, D-coded to RJ45 cable socket, 90 degree bush input	-	PASSAGE JACK ETHERNET RJ45	6048180	●	-	●
	H-443	Cable connector, M12, 4-pin, straight to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-G02ME90	6045222	●	-	●
			5.0 m	SSL-1204-G05ME90	6045277	●	-	●
			10.0 m	SSL-1204-G10ME90	6045279	●	-	●
	H-442	Cable connector, M12, 4-pin, angled to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-F02MZ90	6048250	●	-	●
			5.0 m	SSL-1204-F05MZ90	6048251	●	-	●
			10.0 m	SSL-1204-F10MZ90	6048252	●	-	●
	H-443	Cable connector, M12, 4-pin, straight to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-G02MZ90	6048241	●	-	●
			5.0 m	SSL-1204-G05MZ90	6048242	●	-	●
			10.0 m	SSL-1204-G10MZ90	6048243	●	-	●
	H-442	Cable connector, M12, 4-pin, angled to M12 cable connector, 4-pin, straight, shielded	2.0 m	SSL-1204-H02ME90	6047908	●	-	●
			5.0 m	SSL-1204-H05ME90	6047909	●	-	●
			10.0 m	SSL-1204-H10ME90	6047910	●	-	●
	H-443	Cable connector, M12, 4-pin, angled to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-F02MZ	6048253	●	-	●
			5.0 m	SSL-2J04-F05MZ	6048254	●	-	●
			10.0 m	SSL-2J04-F10MZ	6048255	●	-	●
	H-443	Cable connector, M12, 4-pin, straight to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-G02ME60	6047916	●	-	●
			5.0 m	SSL-2J04-G05ME60	6047917	●	-	●
			10.0 m	SSL-2J04-G10ME60	6047918	●	-	●
	-	Cable connector, M12, 4-pin, straight to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-G02MZ60	6048244	●	-	●
			5.0 m	SSL-2J04-G05MZ60	6048245	●	-	●
			10.0 m	SSL-2J04-G10MZ60	6048246	●	-	●
	H-444	Cable connector, M12, 4-pin, angled to RJ45 cable connector, straight, shielded	2.0 m	SSL-2J04-H02ME	6047911	●	-	●
			5.0 m	SSL-2J04-H05ME	6045287	●	-	●
			10.0 m	SSL-2J04-H10ME	6045288	●	-	●
	H-444	Cable connector, RJ45, suitable for cable diameter 4.5 - 8 mm	-	STE-0J04-GZ	6048260	●	-	●
	H-444	Cable connector, RJ45, suitable for cable diameter 4.5 - 8 mm	-	STE-0J08-GE	6048150	●	-	●
	H-444	Cable connector, M12, 4-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1204-GE01	6048151	●	-	●
		Cable connector, M12, 4-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1204-GZ	6048261	●	-	●

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Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	EcoLine	CompactLine	HighLine
	H-445	Cable connector, M12, 4-pin, angled, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1204-WE	6048152	●	-	●
		Cable connector, M12, 4-pin, angled, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1204-WZ	6048262	●	-	●
	H-445	Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 6 mm	-	STE-1205-G	6022083	●	-	●
	H-445	Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1205-GA	6027533	●	-	●
	H-445	Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	STE-1205-GQ	6021354	●	-	●
	H-445	Cable connector, M12, 5-pin, angled, B-coded, suitable for cable diameter 4 - 8 mm	-	STE-1205-WQ	6041428	●	-	●
	H-446	Cable connector, M12, 8-pin, straight, shielded, suitable for cable diameter 4 - 8 mm	-	STE-1208-GA01	6044892	●	-	-
	H-446	PROFIBUS terminator M12, 5-pin	-	STE-END-Q	6021156	●	-	●
	H-446	Cable connector, M12, 4-pin, straight, to open end, shielded	2.0 m	STL-1204-G02ME90	6045284	●	-	●
			5.0 m	STL-1204-G05ME90	6045285	●	-	●
			10.0 m	STL-1204-G10ME90	6045286	●	-	●
	H-446	Cable connector, M12, 4-pin, straight, to open end, shielded	2.0 m	STL-1204-G02MZ90	6048247	●	-	●
			5.0 m	STL-1204-G05MZ90	6048248	●	-	●
			10.0 m	STL-1204-G10MZ90	6048249	●	-	●
	H-446	Cable connector, M12, 4-pin, angled, to open end, shielded	2.0 m	STL-1204-W02ME90	6047912	●	-	●
			5.0 m	STL-1204-W05ME90	6047913	●	-	●
			10.0 m	STL-1204-W10ME90	6047914	●	-	●
			25.0 m	STL-1204-W25ME90	6047915	●	-	●
	H-446	Cable connector, M12, 4-pin, angled, to open end, shielded	2.0 m	STL-1204-W02MZ90	6048256	●	-	●
			5.0 m	STL-1204-W05MZ90	6048257	●	-	●
			10.0 m	STL-1204-W10MZ90	6048258	●	-	●
			25.0 m	STL-1204-W25MZ90	6048259	●	-	●
	H-447	Cable connector, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	5.0 m	STL-1205-G05MQ	6026005	●	-	●
			10.0 m	STL-1205-G10MQ	6026007	●	-	●
			12.0 m	STL-1205-G12MQ	6032635	●	-	●
	H-447	Cable socket, M12, 5-pin, angled, pre-wired with 2-core cable, 2 x 0.64 mm ² , shielded, B-coded, cable diameter 7.8 mm	5.0 m	STL-1205-W05MQ	6041426	●	-	●
			10.0 m	STL-1205-W10MQ	6041427	●	-	●




M23 screw-in system

Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	EcoLine	CompactLine	HighLine
	H-448	Cable socket, M23, 12-pin, straight, pre-wired with 8-core cable, 4 x 2 x 0.15 mm ² , shielded, cable diameter 5.6 mm	0.5 m	DOL-2308-G0M5AA6	2048595	●	-	-
			1.5 m	DOL-2308-G1M5AA6	2048596	●	-	-
			3.0 m	DOL-2308-G3M0AA6	2048597	●	-	-
			5.0 m	DOL-2308-G5M0AA6	2048598	●	-	-
			10.0 m	DOL-2308-G10MAA6	2048599	●	-	-
	H-448	Cable socket, M23, 12-pin, straight, pre-wired with 11-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, cable diameter 7.8 mm ¹⁾	2.0 m	DOL-2312-G02MLA3	2030682	●	●	-
			7.0 m	DOL-2312-G07MLA3	2030685	●	●	-
			10.0 m	DOL-2312-G10MLA3	2030688	●	●	-
			15.0 m	DOL-2312-G15MLA3	2030692	●	●	-
			20.0 m	DOL-2312-G20MLA3	2030695	●	●	-
			25.0 m	DOL-2312-G25MLA3	2030699	●	●	-
	H-448	Cable socket, M23, 12-pin, straight, pre-wired with 12-core SSI cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , shielded, suitable for drag chain, cable diameter 7.8 mm	1.5 m	DOL-2312-G1M5MA1	2029200	-	●	●
			3.0 m	DOL-2312-G03MMA1	2029201	-	●	●
			5.0 m	DOL-2312-G05MMA1	2029202	-	●	●
			10.0 m	DOL-2312-G10MMA1	2029203	-	●	●
			20.0 m	DOL-2312-G20MMA1	2029204	-	●	●
			30.0 m	DOL-2312-G30MMA1	2029205	-	●	●
	H-448	Cable socket, M23, 12-pin, straight, pre-wired with 11-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, suitable for drag chain, cable diameter 7.8 mm, suitable for wire draw encoder BKS with SSI interface	2.0 m	DOL-2312-G02MLA5	2030680	-	●	-
			7.0 m	DOL-2312-G07MLA5	2030683	-	●	-
			10.0 m	DOL-2312-G10MLA5	2030686	-	●	-
			15.0 m	DOL-2312-G15MLA5	2030690	-	●	-
			20.0 m	DOL-2312-G20MLA5	2030693	-	●	-
			25.0 m	DOL-2312-G25MLA5	2030697	-	●	-
	H-448	Cable socket, M23, 12-pin, straight, 11-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, cable diameter 7.8 mm ¹⁾	1.5 m	DOL-2312-G1M5MA3	2029212	●	●	-
			3.0 m	DOL-2312-G03MMA3	2029213	●	●	-
			5.0 m	DOL-2312-G05MMA3	2029214	●	●	-
			10.0 m	DOL-2312-G10MMA3	2029215	●	●	-
			20.0 m	DOL-2312-G20MMA3	2029216	●	●	-
			30.0 m	DOL-2312-G30MMA3	2029217	●	●	-
	H-448	Cable socket, M23, 12-pin, straight, 11-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, cable diameter 7.8 mm ²⁾	2.0 m	DOL-2312-G02MLD1	2062202	-	-	●
			7.0 m	DOL-2312-G07MLD1	2062203	-	-	●
			10.0 m	DOL-2312-G10MLD1	2062204	-	-	●
			15.0 m	DOL-2312-G15MLD1	2062205	-	-	●
			20.0 m	DOL-2312-G20MLD1	2062206	-	-	●
			25.0 m	DOL-2312-G25MLD1	2062207	-	-	●
			30.0 m	DOL-2312-G30MLD1	2062208	-	-	●

¹⁾ NB: Only in combination with electrical interfaces A, C, E and P.

²⁾ NB: Only in combination with electrical interfaces U, V, W and M.




Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	EcoLine	CompactLine	HighLine
	H-448	Cable socket, M23, 12-pin, straight, pre-wired with 12-core cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , shielded, cable diameter 7.8 mm, suitable for drag chain ²⁾	1.5 m	DOL-2312-G1M5MD1	2062240	-	-	●
			3.0 m	DOL-2312-G03MMD1	2062243	-	-	●
			5.0 m	DOL-2312-G05MMD1	2062244	-	-	●
			10.0 m	DOL-2312-G10MMD1	2062245	-	-	●
			20.0 m	DOL-2312-G20MMD1	2062246	-	-	●
			30.0 m	DOL-2312-G30MMD1	2062247	-	-	●
	H-448	Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	DOS-2312-G	6027538	●	●	●
	H-448	Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	STE-2312-G	6027537	●	●	●

¹⁾ NB: Only in combination with electrical interfaces A, C, E and P.

²⁾ NB: Only in combination with electrical interfaces U, V, W and M.




Mounting systems

Accessories for wire draw encoders

Figure	Dimensional drawing see page	Description	Model name	Part no.	EcoLine	CompactLine	HighLine
	-	Mounting set MRA-G190 (10m EcoLine)	BEF-MK-MRA-G01	5326294	●	-	-
	-	Spare joint ball for insertion in wire end ring	GELENKKUGEL F. SEILZUG BTF/PRF/MRA	5318683	●	-	●
	-	Spare mounting set for HighLine wire draw mechanisms for fitting encoders with servo flange	MRA-F-K	6028633	-	-	●
	-	Spare mounting set for HighLine wire draw mechanisms for fitting encoders with face mount flange	MRA-F-L	6030124	-	-	●
	-	Additional brush attachment for wire draw mechanism MRA-F080 (2m and 3m from HighLine series)	MRA-F080-B	6045341	-	-	●
	-	Additional brush attachment for wire draw mechanism MRA-F130 (5m, 10m, 20m and 30m from HighLine series)	MRA-F130-B	6038562	-	-	●
	-	Wire draw deflection pulley for wire draw mechanism MRA-F080 (2m and 3m from HighLine series)	MRA-F080-R	6028632	-	-	●
	-	Wire draw deflection pulley for wire draw mechanism MRA-F130 (5m, 10m, 20m and 30m from HighLine series)	MRA-F130-R	6028631	-	-	●

Programming tools

Programming tools

Figure	Dimensional drawing see page	Description	Model name	Part no.	EcoLine	CompactLine	HighLine
	-	Adapter cable for incremental programming tool with SUB-D 9-pin cable connector and M23 12-pin cable socket, pre-wired with 8-core cable, 4 x 2 x 0.08 mm ² , shielded, suitable for incremental encoder with M23 plug connector	DSL-3D08-G0M5AC3	2046580	● 1)	-	● 1)
	-	Programming tool for connection to standard PC or notebook via USB port	PGT-08-S	1036616	● 2)	-	● 2)
	-	The PGT-10-S is an intuitively operated standalone programming device for SICK incremental encoders. Its low weight and compact dimensions make it portable and usable everywhere.	PGT-10-S	1052967	● 1)	-	● 1)




¹⁾ Only in conjunction with incremental encoder.

²⁾ Used in programmable incremental and absolute encoder in conjunction with the appropriate adapter cable.









Linear encoders

Connectivity




Cables by the meter (by interface)

Figure	Dimensional drawing see page	Description	Model name	Part no.	TK70	KH 53
	-	PROFIBUS cable by the meter 2 x 0.25 mm ² with shielding, suitable for drag chain, diam. 8.0 mm	LTG-2102-MW	6021355	-	●
	-	Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, diam. 7.8 mm	LTG-2512-MW	6027531	-	●
	-	Data cable by the meter 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² with shielding, suitable for drag chain, UV and salt water resistant, diam. 7.8 mm	LTG-2612-MW	6028516	-	●

M12 screw-in system



Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	TK70	KH 53
	H-439	Cable socket, M12, 4-pin, straight, pre-wired with PROFIBUS cable for voltage supply, 4-core, 4 x 0.25 mm ² , suitable for drag chain, diam. 5.0 mm	5.0 m	DOL-1204-G05M	6009866	-	●
	H-439	Cable socket, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	5 m	DOL-1205-G05MQ	6026006	-	●
			10 m	DOL-1205-G10MQ	6026008	-	●
			12 m	DOL-1205-G12MQ	6032636	-	●
			15 m	DOL-1205-G15MQ	6032637	-	●
			20 m	DOL-1205-G20MQ	6032638	-	●
			30 m	DOL-1205-G30MQ	6032639	-	●
			50 m	DOL-1205-G50MQ	6032861	-	●
	H-440	Cable socket for voltage supply, M12, 4-pin, straight, suitable for cable diameter 3 - 6.5 mm	-	DOS-1204-G	6007302	-	●
	H-441	Cable socket, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	DOS-1205-GQ	6021353	-	●
	H-445	Cable connector, M12, 5-pin, straight, shielded, suitable for cable diameter 4 - 9 mm	-	STE-1205-GQ	6021354	-	●
	H-446	PROFIBUS terminator M12, 5-pin	-	STE-END-Q	6021156	-	●
	H-447	Cable connector, M12, 5-pin, straight, pre-wired with PROFIBUS cable, 2-core, 2 x 0.34 mm ² , shielded, suitable for drag chain, cable diameter 8.0 mm	5 m	STL-1205-G05MQ	6026005	-	●
			10 m	STL-1205-G10MQ	6026007	-	●
			12 m	STL-1205-G12MQ	6032635	-	●
	H-440	Cable socket, M12, 12-pin, angled, pre-wired with SSI cable, 12-core, 12 x 0.14 mm ² , suitable for drag chain, diam. 8.5 mm	2.0 m	DOL-1212-W02MAC1	6039824	●	-
			5.0 m	DOL-1212-W05MAC1	6039825	●	-
			10.0 m	DOL-1212-W10MAC1	6039826	●	-
			20.0 m	DOL-1212-W20MAC1	6039827	●	-

M23 screw-in system

Figure	Dimensional drawing see page	Description	Cable length	Model name	Part no.	TTK70	KH53
	H-448	Cable socket, M23, 12-pin, straight, pre-wired with 12-core SSI cable, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , shielded, suitable for drag chain, cable diameter 7.8 mm	1.5 m	DOL-2312-G1M5MA1	2029200	-	●
			3.0 m	DOL-2312-G03MMA1	2029201	-	●
			5.0 m	DOL-2312-G05MMA1	2029202	-	●
			10.0 m	DOL-2312-G10MMA1	2029203	-	●
			20.0 m	DOL-2312-G20MMA1	2029204	-	●
			30.0 m	DOL-2312-G30MMA1	2029205	-	●
	H-448	Cable socket, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	DOS-2312-G	6027538	-	●
	H-448	Cable connector, M23, 12-pin, straight, shielded, suitable for cable diameter 5.5 - 10.5 mm	-	STE-2312-G	6027537	-	●


Mounting systems

KH53 mounting accessories

Figure	Dimensional drawing see page	Description	Model name	Part no.	TTK70	KH53
	H-454	Spacer for KH53 material measures	BEF-KHA-KHT53	2042468	-	●
	H-454	Mounting bracket for KH53 standards, screws not included	BEF-WK-KHT53	2029159	-	●

Programming tools

Programming tools

Figure	Dimensional drawing see page	Description	Model name	Part no.	TTK70	KH53
	-	Programming tool for ATM60, ATM90 and KH53 SSI	PGT-01-S	1030111	-	●



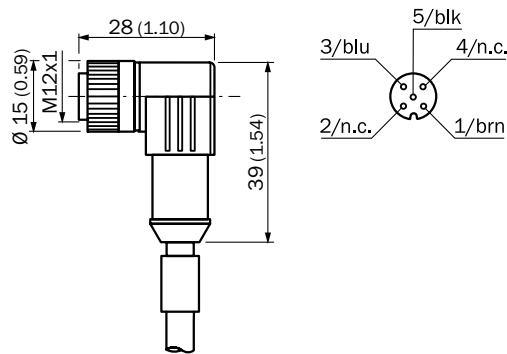
Dimensional drawings

Connectivity

dimensions in mm (inch)

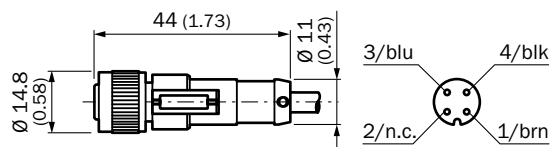
M12 screw-in system

DOL-1202-WxxMC

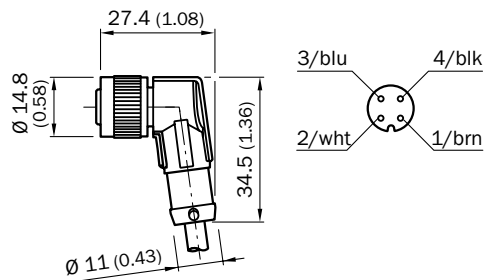


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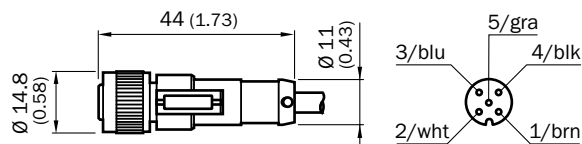
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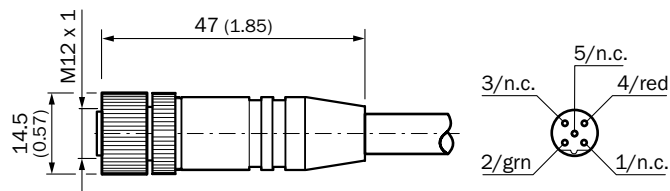
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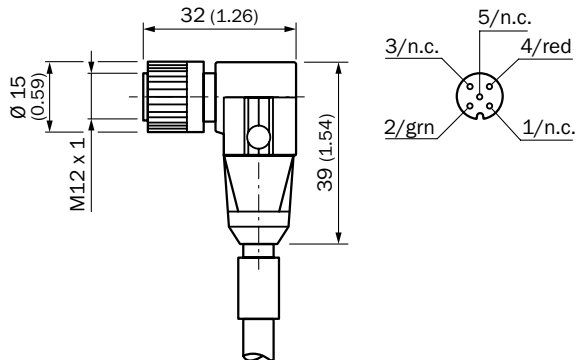
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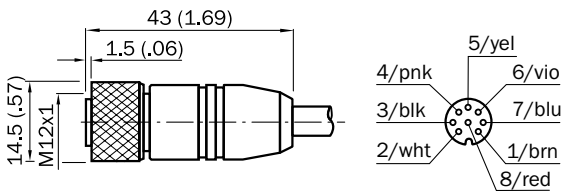
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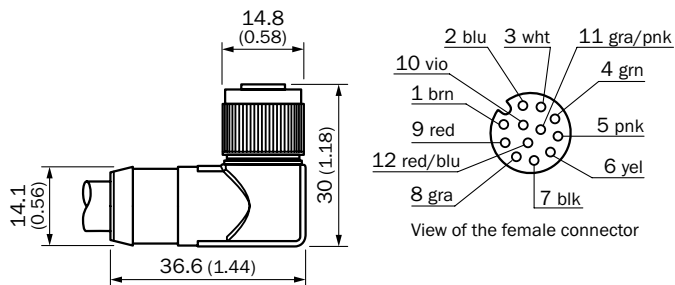
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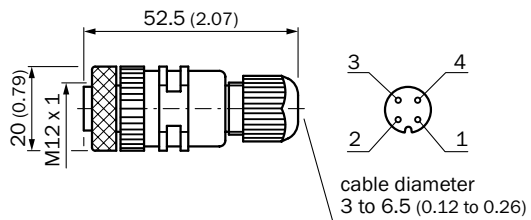
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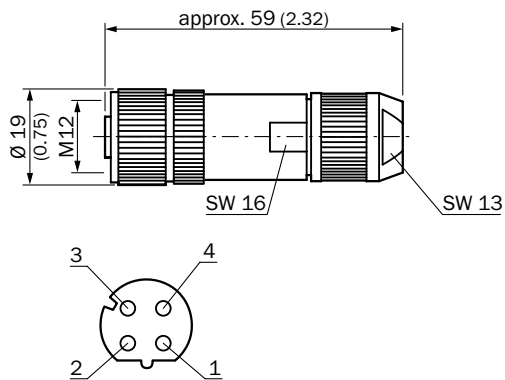


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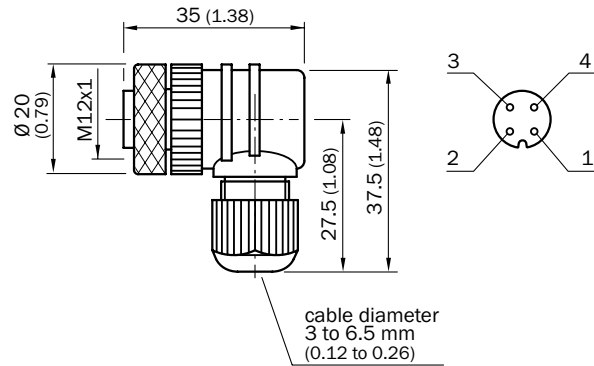


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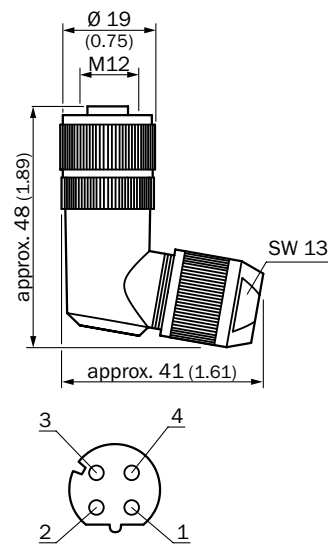
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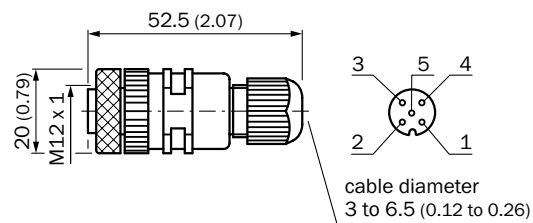
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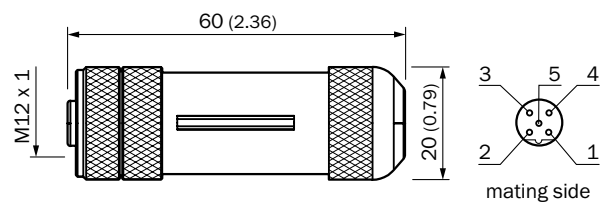
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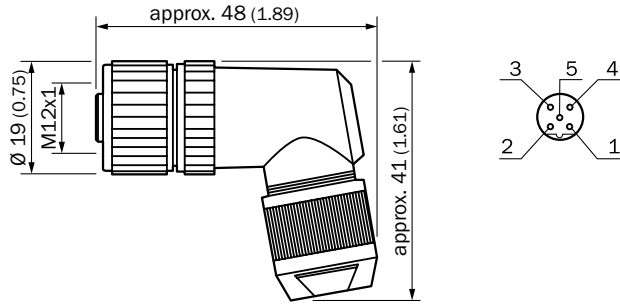
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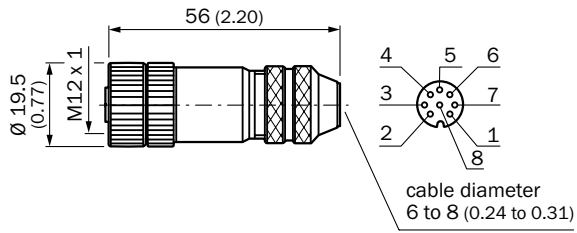
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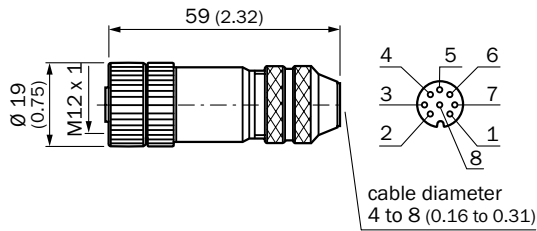
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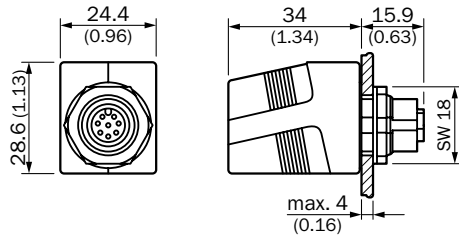
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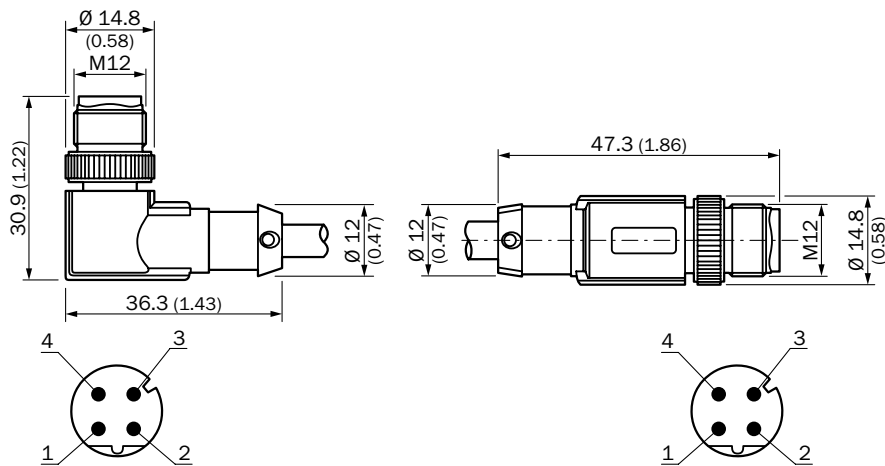


PASSAGE JACK ETHERNET RJ45

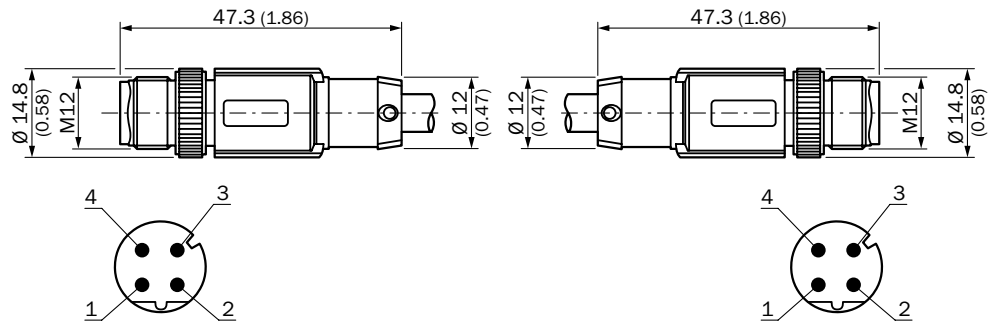


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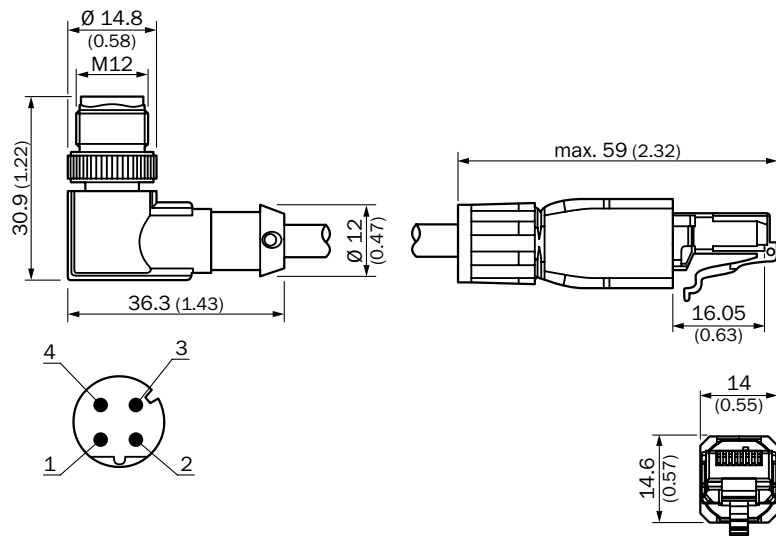
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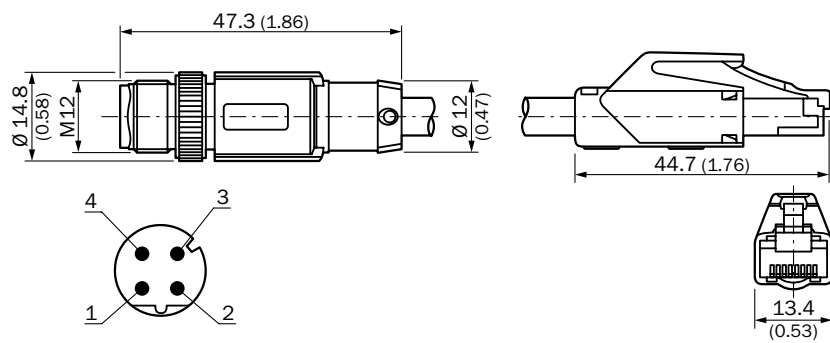


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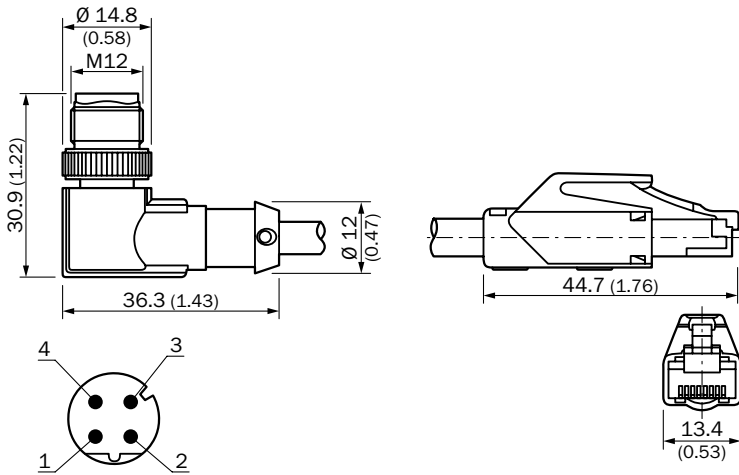


All dimensions in mm (inch)

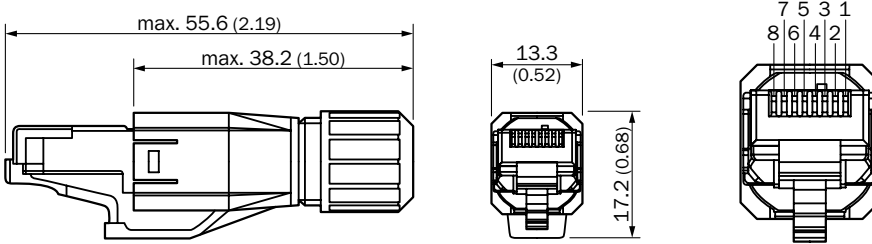
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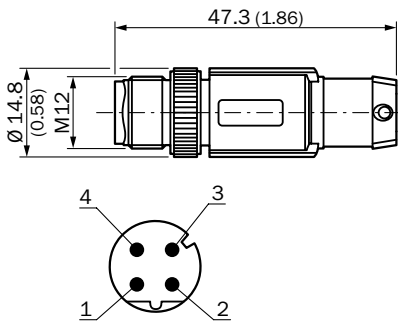
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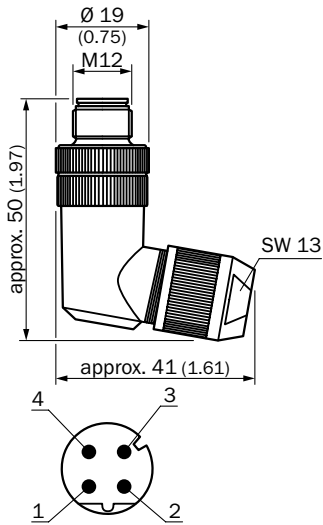
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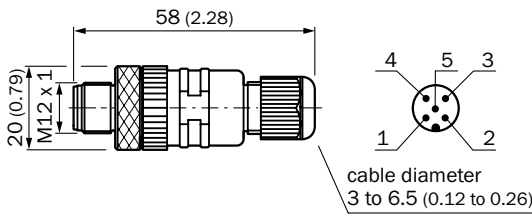
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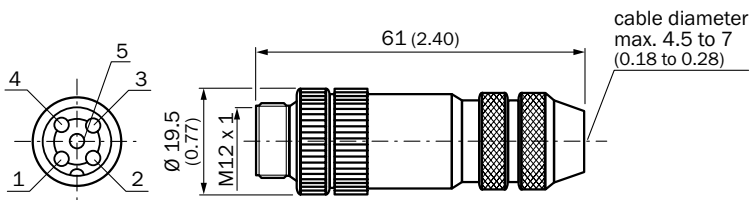
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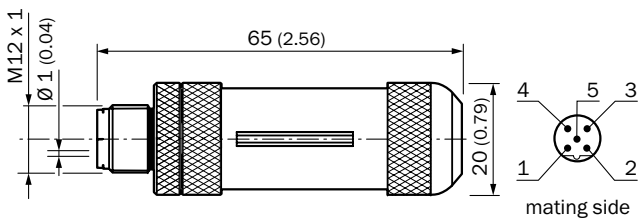
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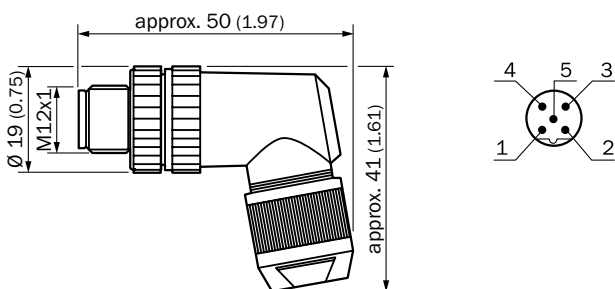
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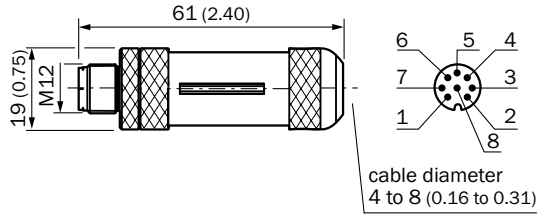
STE-1205-GQ



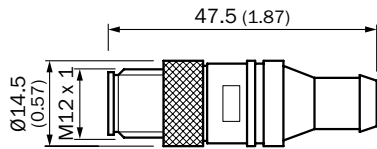
STE-1205-WQ



STE-1208-GA01

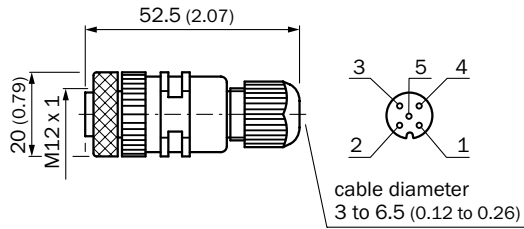


STE-END-Q



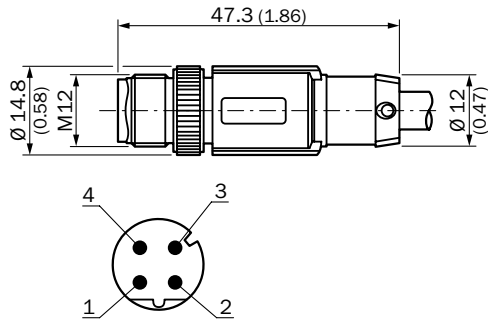
DOS-1205-G

DOS-1205-Gx



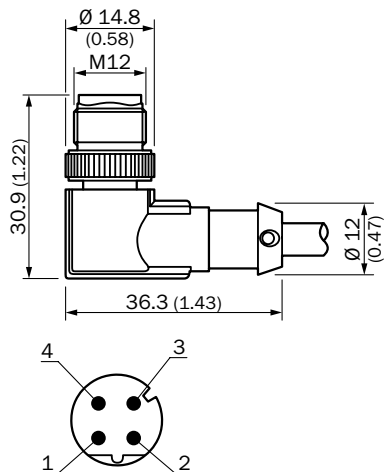
STL-1204-GxxME90

STL-1204-GxxMZ90

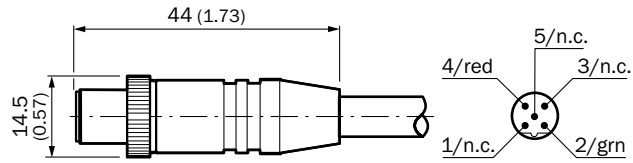


STL-1204-WxxME90

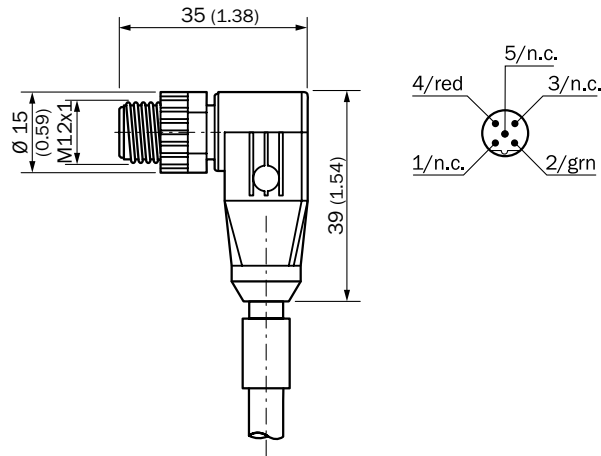
STL-1204-WxxMZ90



STL-1205-GxxMQ



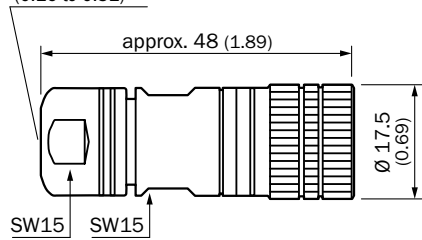
STL-1205-WxxMQ



M14 screw-in system

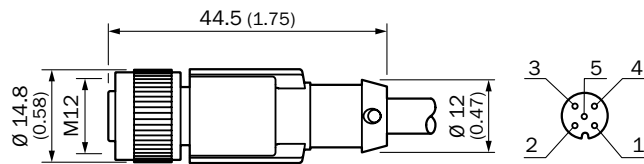
- DOS-1507-G**
- DSC-1507-G SET 2*ST 1***
- STE-1507-G**

cable diameter
4 to 8 mm
(0.16 to 0.31)

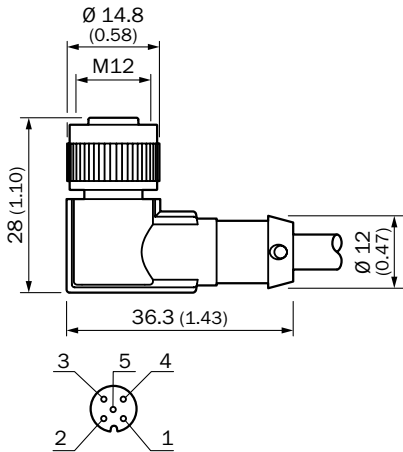


M23 screw-in system

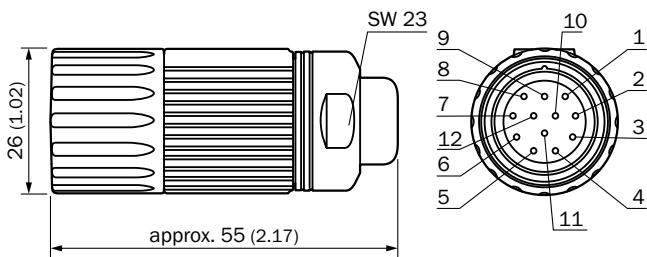
DOL-1205-GxxxACSCO



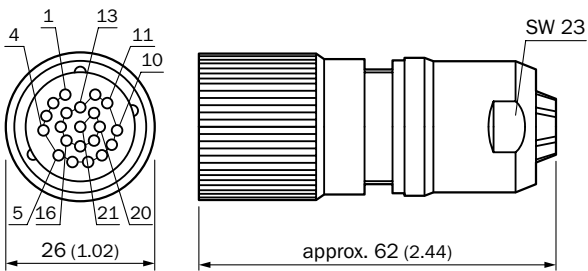
DOL-1205-WxxxACSCO



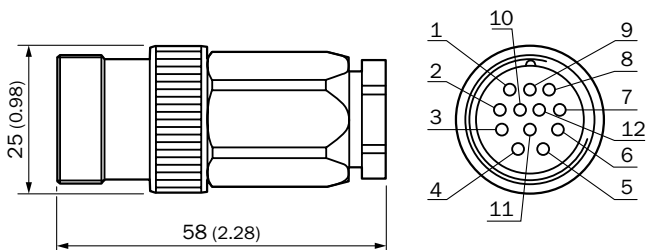
- DOL-2312-G1M5MA1**
- DOL-2312-G1M5MD2**
- DOL-2308-GxxxAA6**
- DOL-2312-G1M5Mxx**
- DOL-2312-GxxMxxx**
- DOS-2312-G**



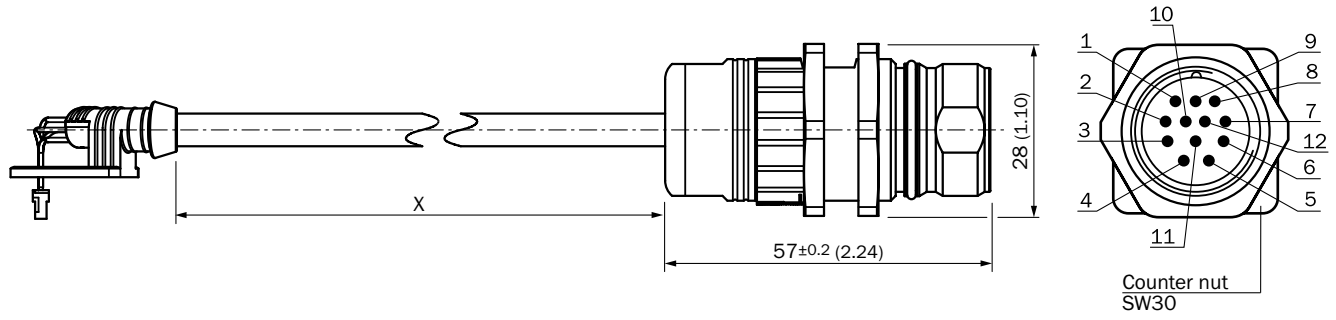
- DOL-2321-GxxxPA4**
- DOS-2321-G**



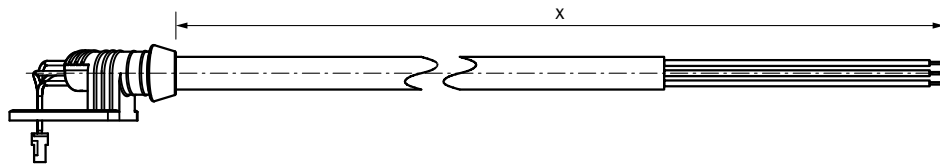
STE-2312-G



STL-2312-GxxxAA3

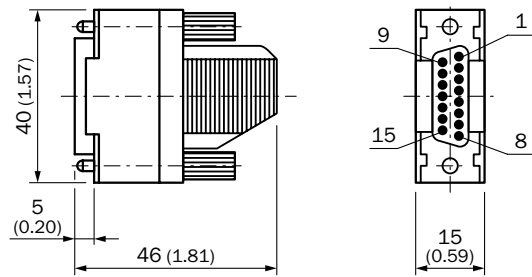


DOL-0J08-GxxxAAx



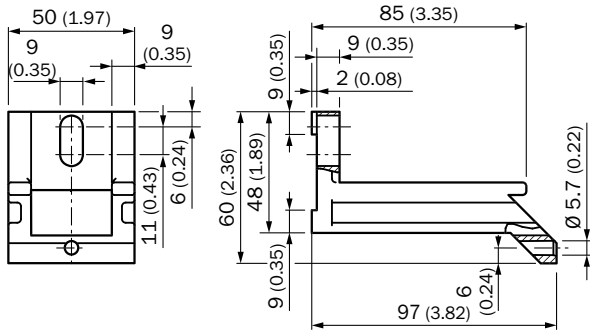
SUB-D plug connector system for SSI parallel adapters

STE-0D15-G

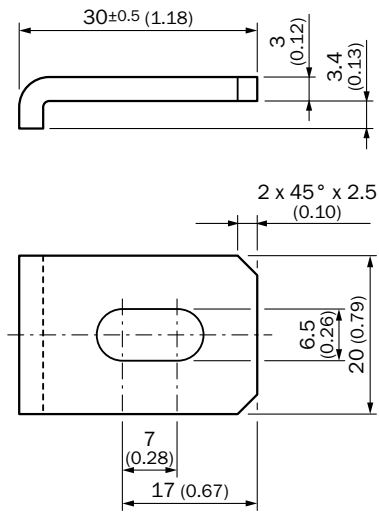


KH53 mounting accessories

BEF-KHA-KHT53

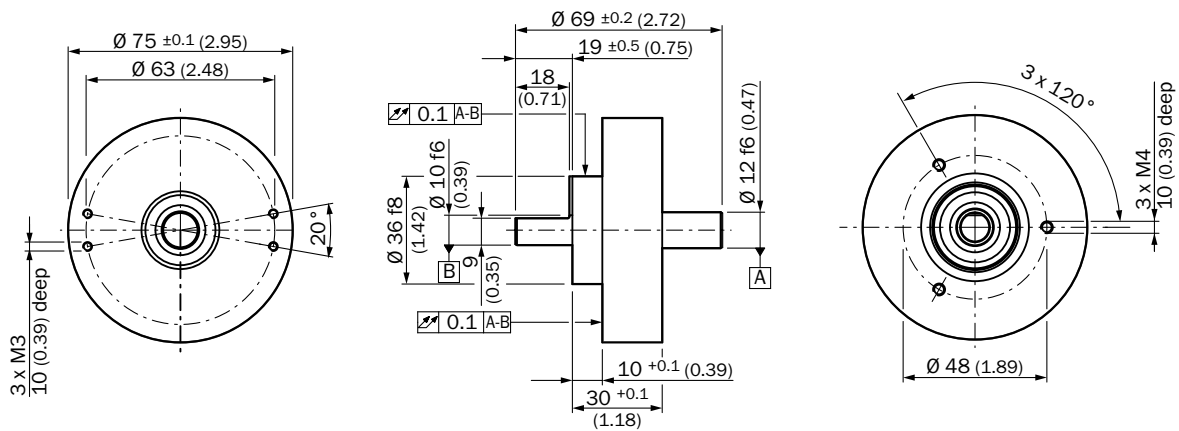


BEF-WK-KHT53

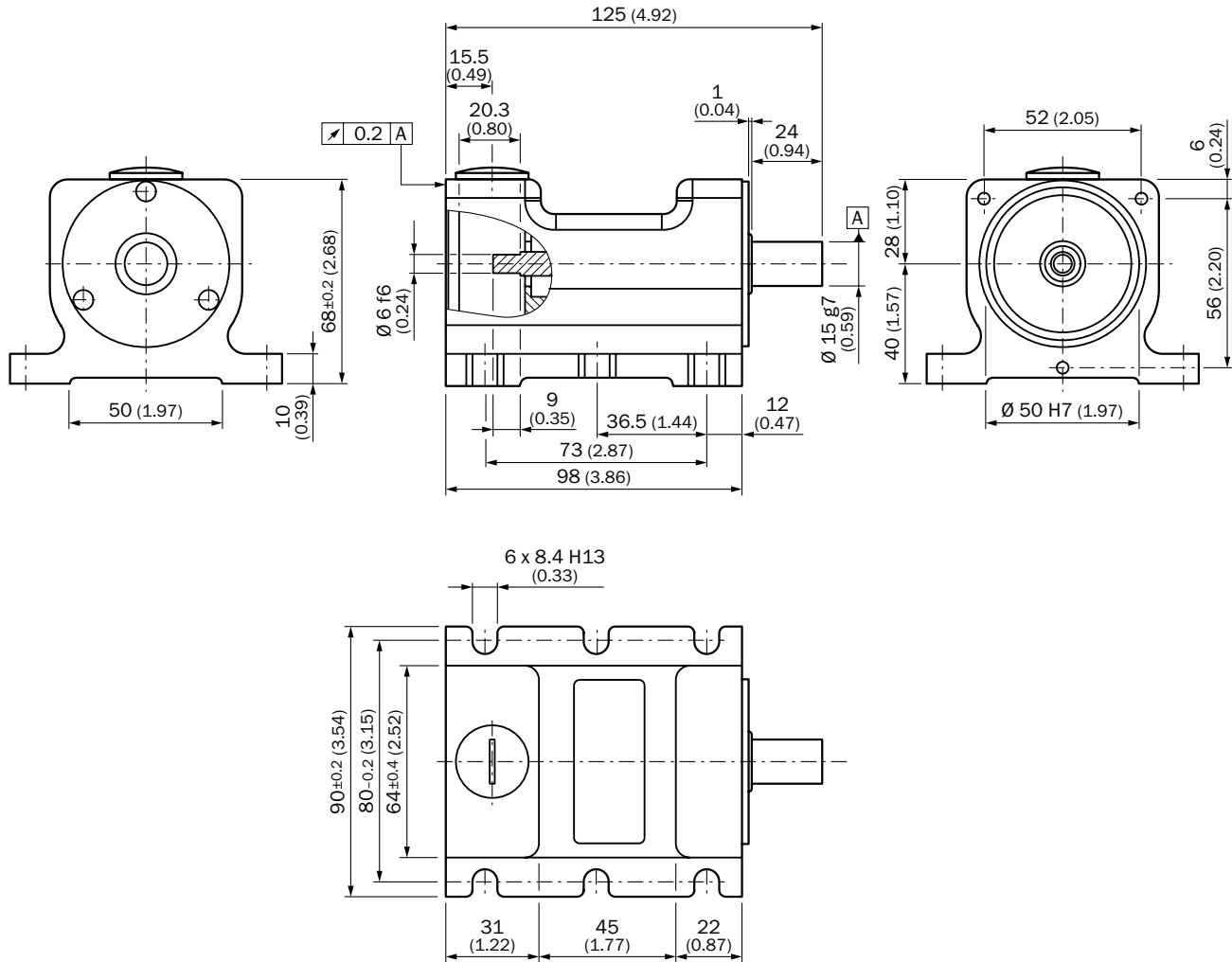


Bearing blocks

BEF-FA-B12-010

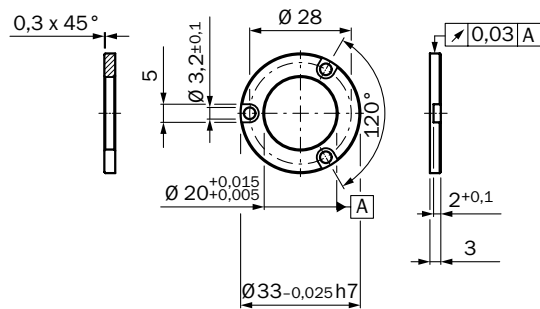


BEF-FA-LB1210

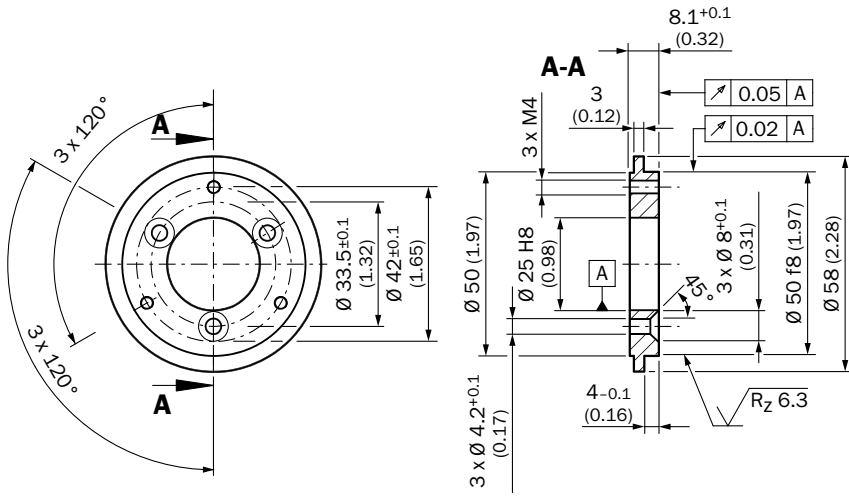


Mechanical adapters

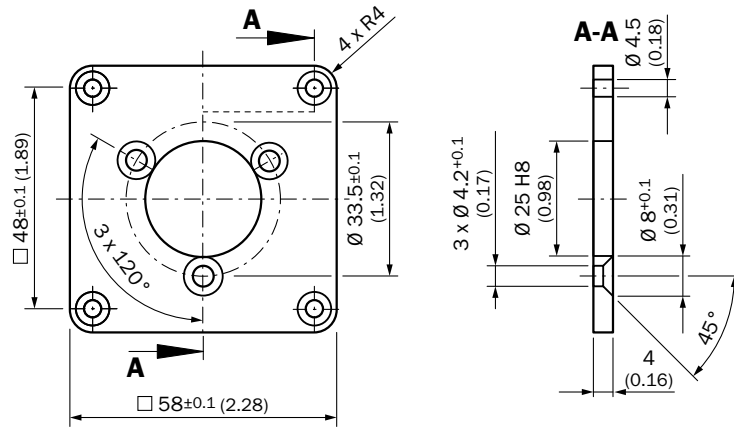
BEF-FA-020-033



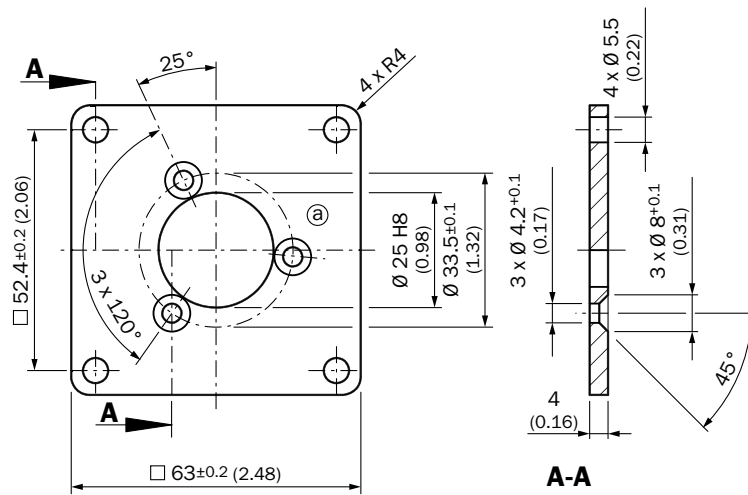
BEF-FA-025-050



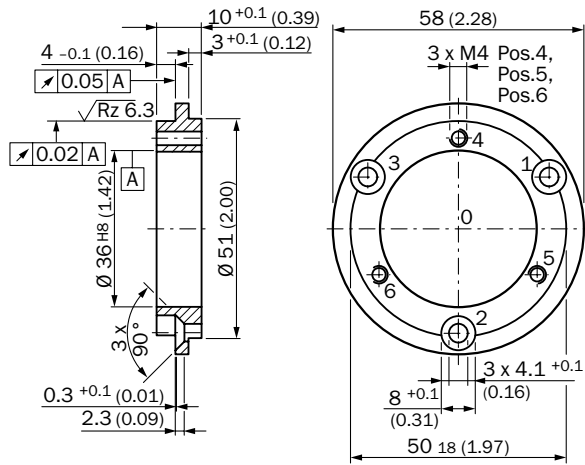
BEF-FA-025-060RCA



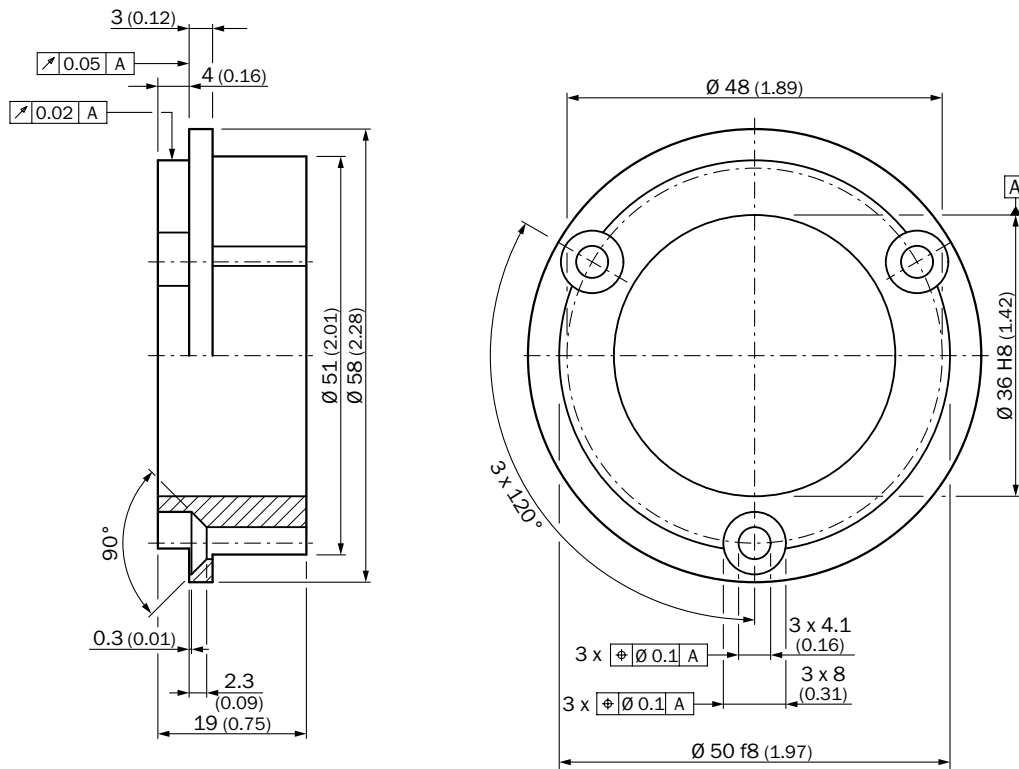
BEF-FA-025-063REC



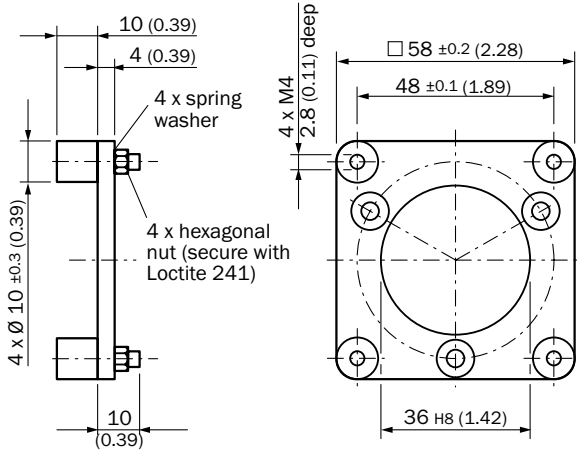
BEF-FA-036-050



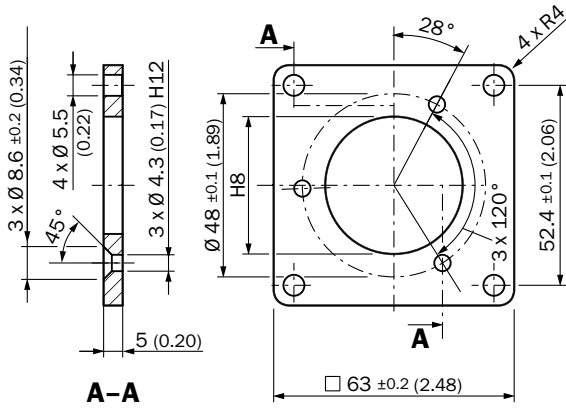
BEF-FA-036-050-019



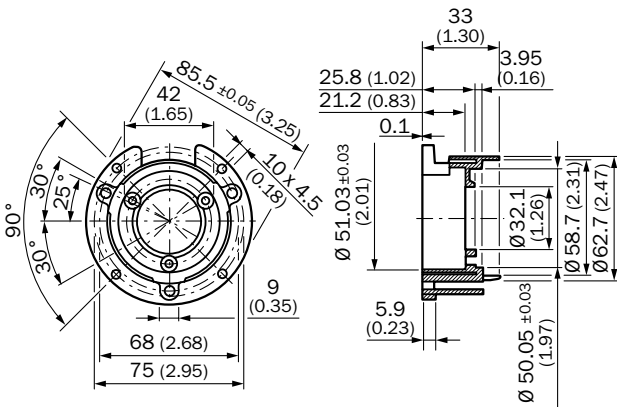
BEF-FA-036-060RSA



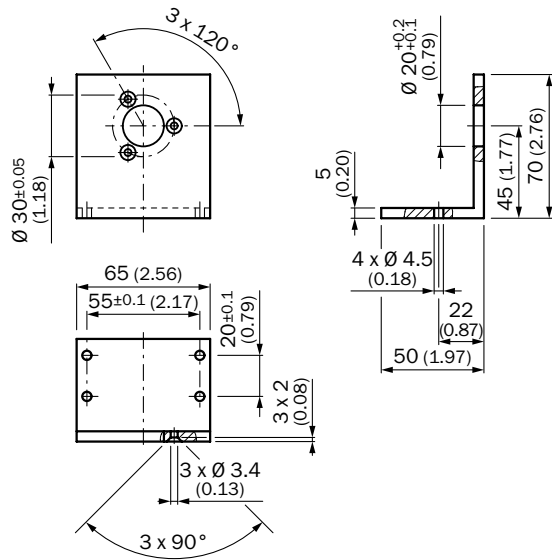
BEF-FA-036-063REC



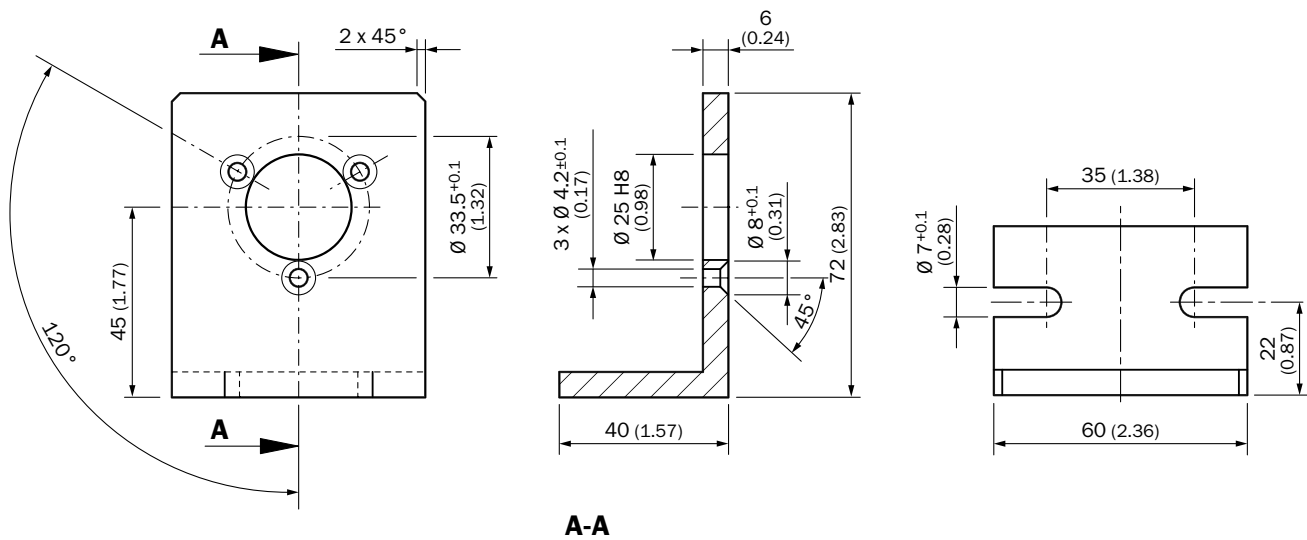
BEF-MG-50



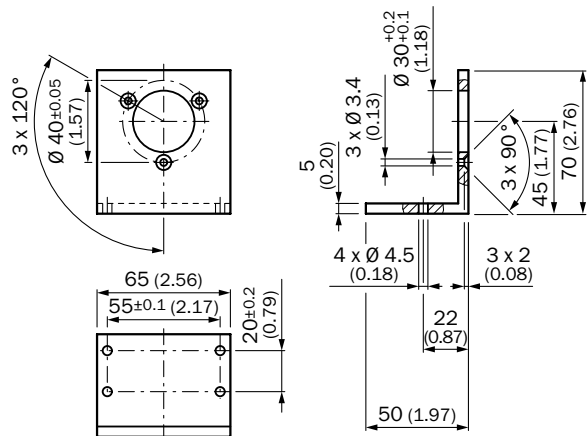
BEF-WF-20



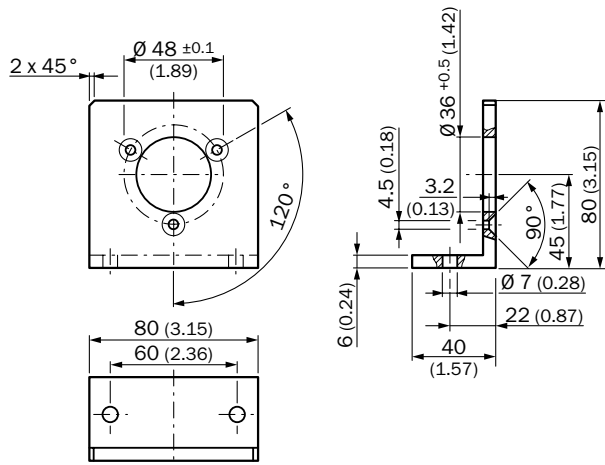
BEF-WF-25



BEF-WF-30

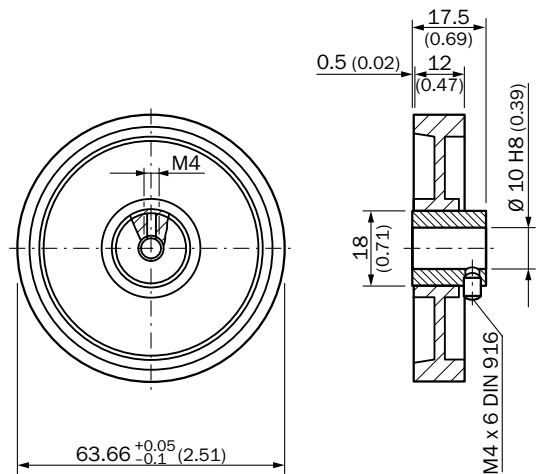


BEF-WF-36

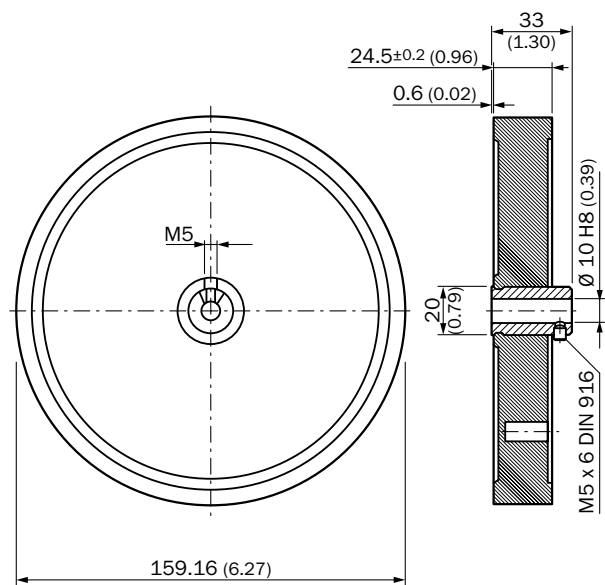


Measuring wheels

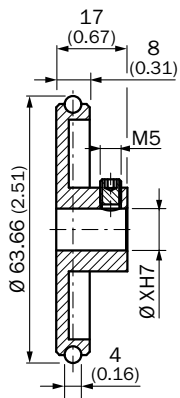
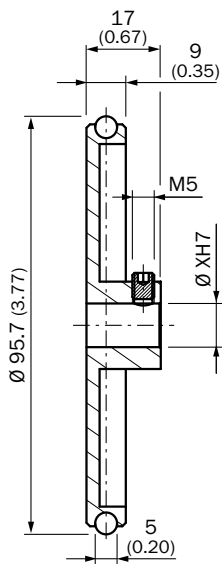
BEF-MR-010020
BEF-MR-010020G



BEF-MR-010050



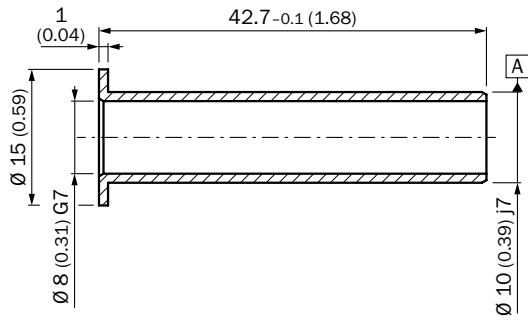
H

BEF-MR006020R
BEF-MR010020R**BEF-MR006030R**
BEF-MR010030R
BEF-MR010050R

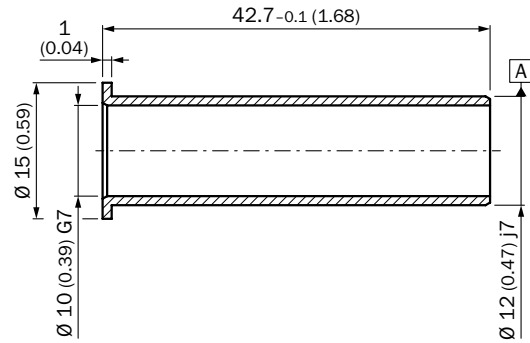
Insulated shaft connection

ISOLIERHUELSE PEEK

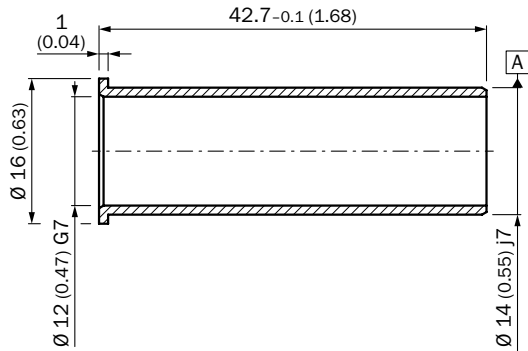
Isolierhülse 8 x 10 PEEK



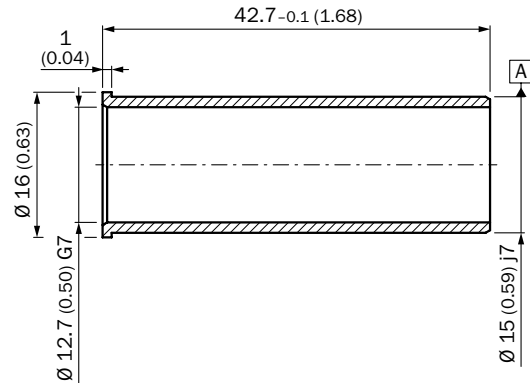
Isolierhülse 10 x 12 PEEK



Isolierhülse 12 x 14 PEEK

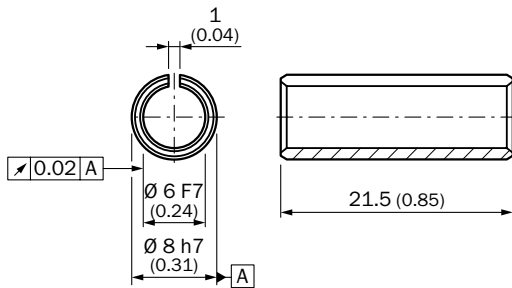


Isolierhülse 12.7 x 15 PEEK



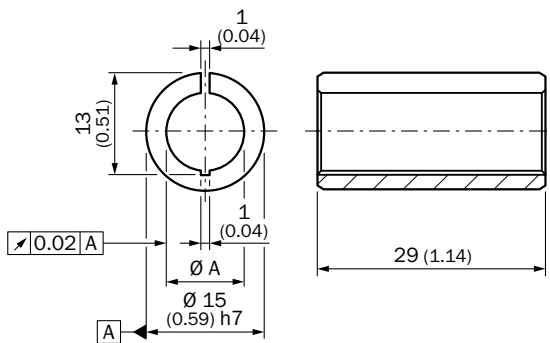
Collets for encoder with hollow shaft

SPZ-005-AD-A

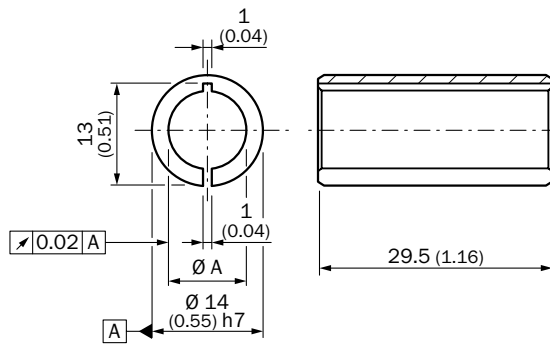


SPZ-0xx-AD-A

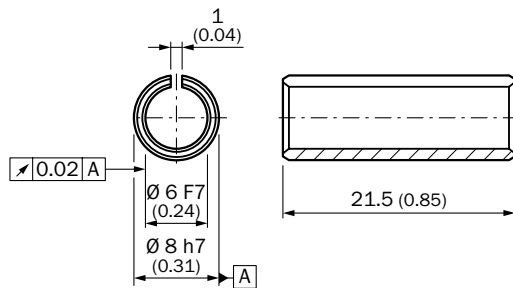
SPZ-xEx-AD-A



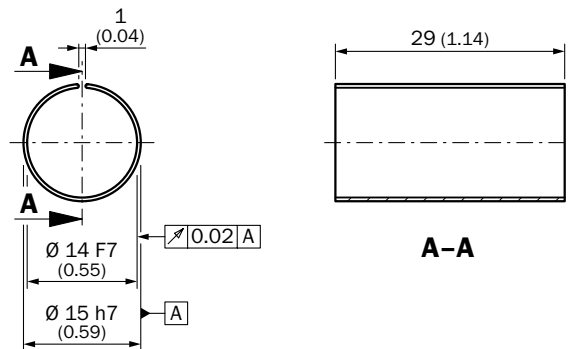
SPZ-006-AD-D
SPZ-xEx-AD-D



SPZ-006-DD36-A

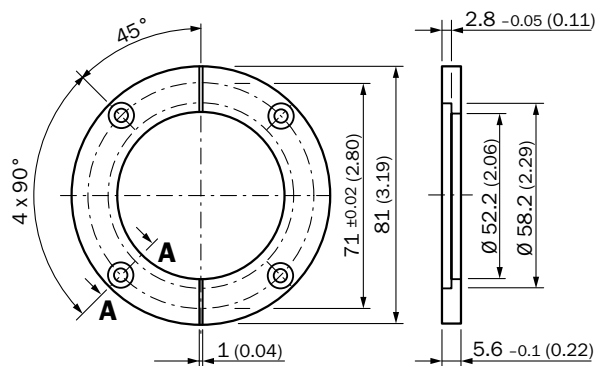


SPZ-014-AD-A

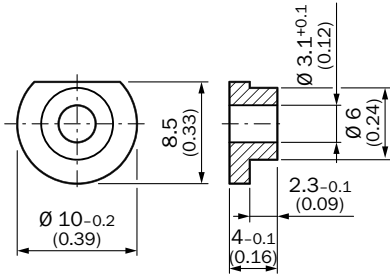


Servo clamps for encoder with servo or servo face mount flange

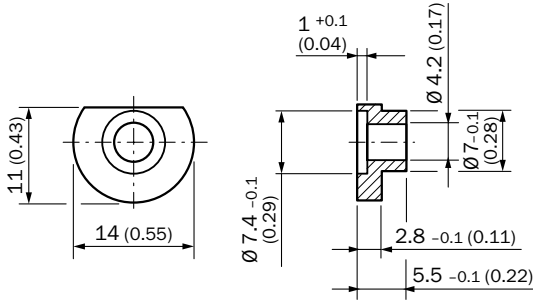
BEF-WG-SF050



BEF-WK-RESOL



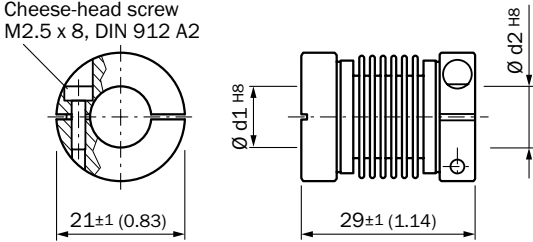
BEF-WK-SF



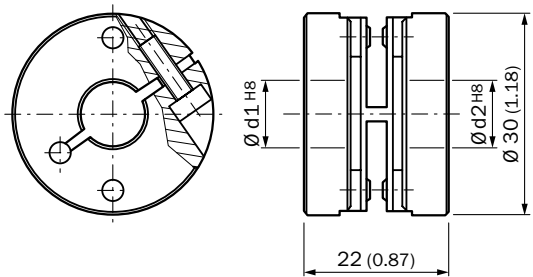
Shaft couplings

KUP-xxxx-B

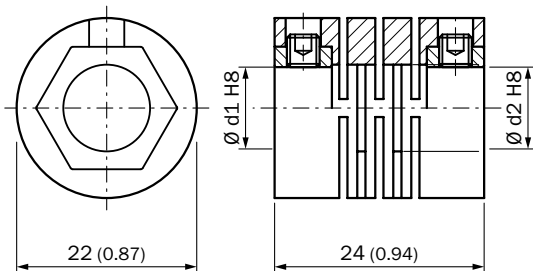
Cheese-head screw
M2.5 x 8, DIN 912 A2



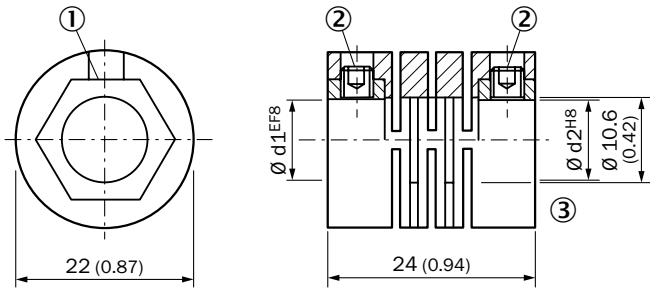
KUP-xx10-F



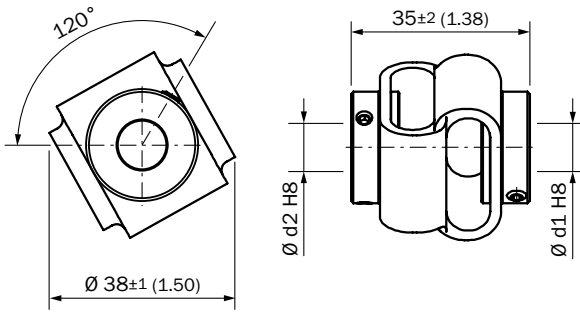
KUP-06xx-S
KUP-1010-S



KUP-0x08-S
KUP-0810-S



KUP-xxxx-D

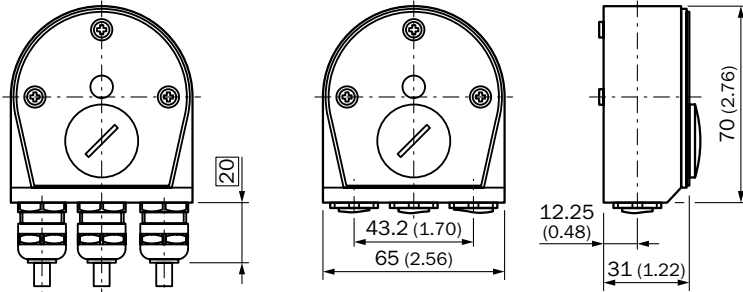


Bus connection adapters

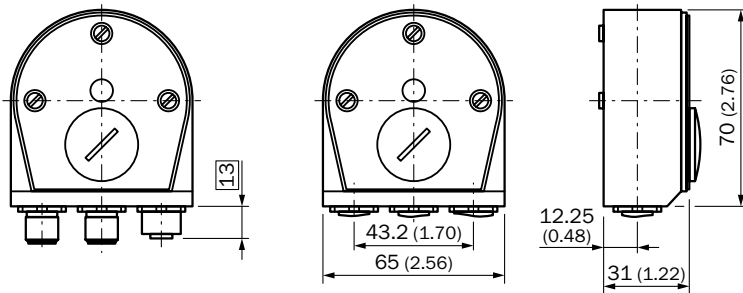
dimensions in mm (inch)

Connection adapters for fieldbuses

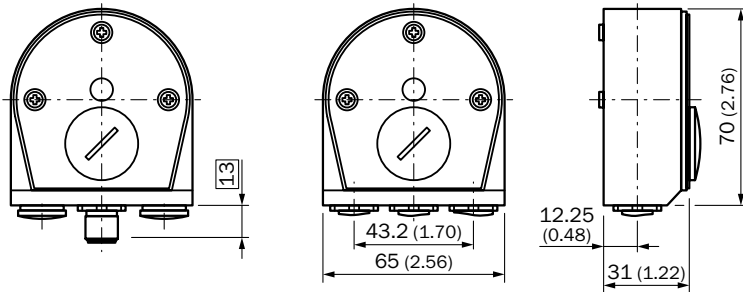
AD-ATM60-KA3PR
AD-ATM60-KRxCO



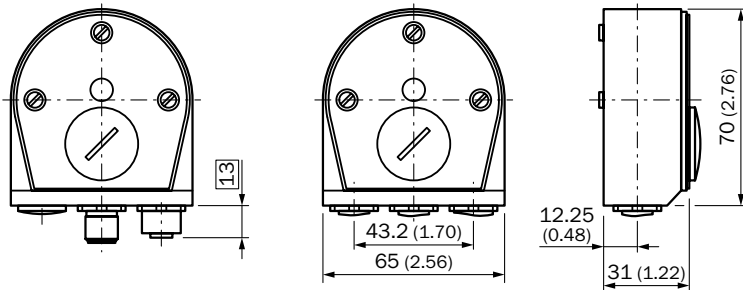
AD-ATM60-KRxDN
AD-ATM60-SR3PR



AD-ATM60-SR1xx
AD-ATM60-SR2DN



AD-ATM60-SR2CO





A

Analog interface

Standard analog interface: As required from 4 to 20 mA, or 0 to 10 V output signal.

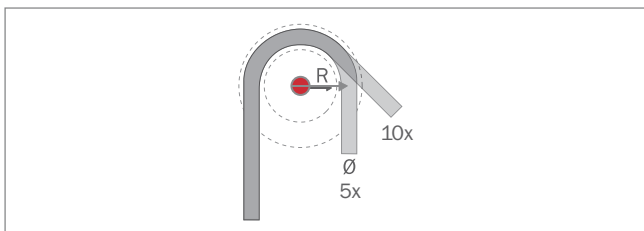
B

Baud rate

Gives the signal rate and hence the speed of serial data transfer in bits per second.

Bend radius

In cabling terms, the bend radius relates to the smallest curve radius a cable may have when installed, without the cable properties being altered. The bend radius is given in relation to the cable diameter.

**Bus system**

A system for transferring data between multiple devices over a common cable. A bus system makes it possible to control all sensors and actuators centrally. Additional information such as process data, service data and diagnostics data can also be exchanged.

Well known examples are:

DeviceNet, PROFIBUS, CANopen, PROFINET, EtherNet/IP, EtherCAT.

Additional information on bus systems can be found in this glossary under the CANopen, DeviceNet, EtherCAT, EtherNet/IP, PROFIBUS and PROFINET entries.

C

CANopen

CANopen: is a communication protocol based on CAN.

User organization: CiA (CAN in Automation)

More detailed information about this technology is available at www.can-cia.org

Channel

Signal path upon which a signal is output.

Code disc

→ See "Output frequency, maximum" on page I-473

Code type

Unique encoding of the measured values according to a defined scheme at the encoder output. In practice, different codes are used for different electrical interfaces, e.g. SSI interface with Gray code.

Cycle

→ See "Service life" on page I-474

D

DeviceNet

DeviceNet is a CAN based communication protocol.

User organization: ODVA

More detailed information about this technology is available at www.odva.com

Differential evaluation

Evaluation of signals produced by a circuit which produces a signal and its invert. The 1/0 level, or sine/cosine signals are transferred in the form of voltage differences between two cables. In this way, the signal used (the difference) remains uncorrupted as interference normally affects both cables equally.

Drag chain use suitability

Drag chain use suitability is the ability of cabling to be used in moving applications. PUR cabling is suitable for drag chain use, but PVC cabling is of limited suitability or completely unsuitable.

In the case of PUR cabling, the number of bend cycles is generally greater and the bend radius smaller than with PVC cabling.

Drum circumference

The resolution in mm of a wire draw encoder can be determined using the circumference of the drum and the resolution of the rotary encoder (e.g. 12 bits per revolution).

E

EMC

Electromagnetic compatibility (EMC) means that technical equipment should not be affected by electromagnetic interference. This is achieved both by limiting sources of interference in devices and by devices being designed to be sufficiently resistant to interference. EMC is regulated by EU Directives and Standards.

Enclosure rating

The enclosure rating indicates the degree of protection of a machine or sensor against contact and penetration by impurities and water. The enclosure ratings begin with the letters IP, followed by the first digit, which indicates the degree of protection provided against touch and particles. The second digit describes the protection against penetration by water.

Encoders

Encoders are sensors for monitoring position, angle and speed. Essentially, encoders can be categorized as rotary or linear. Rotary encoders are sub-divided into incremental and absolute encoders. Linear encoders are further sub-divided into wire draw encoders and non-contact linear encoders.

Encoders, absolute

Absolute encoders generate information relating to position, angle and rotation counts in type-specific angle steps. For this, a unique code pattern is assigned to each angle step. The number of code patterns available per revolution determines the resolution. Each code pattern forms a unique reference, and is therefore absolute position information. There is therefore no need for a reference run after switching on. A singleturn encoder measures the absolute position within a revolution. A multiturn encoder not only provides the position within a revolution but also the number of revolutions.

Encoders, incremental

Incremental encoders generate information related to position, angle and number of rotations. The number of lines per revolution determines the number of impulses that the encoder transmits to the control unit for each revolution. The current position can be determined by the control unit counting these impulses from a reference point. When the machine is switched on, a reference run to the reference point is required to determine the actual position of the encoder.

Error limit

The error limit is the largest positive or negative deviation of any angle position (absolute) or of a measured angle (incremental) from the true value.

EtherCAT

EtherCAT is an Ethernet based fieldbus.

User organization: EtherCAT Technology Group

More detailed information about this technology is available at www.ethercat.org

EtherNet/IP

EtherNet/IP is an Ethernet based fieldbus.

User organization: ODVA

More detailed information about this technology is available at www.odva.com

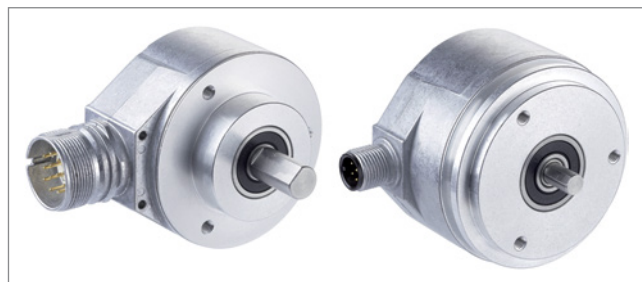
F

Fieldbus

Bus system in the process area for direct connection of sensors and actuators that have their own intelligence. Data in digital form is transferred between sensors, actuators and control devices via a fieldbus. This transfer must be as rapid as possible, i.e. close to real time. For this, a fixed minimum and maximum response time must be guaranteed.

Flange

Part of the encoder for fixing to the customer installation interface. There are various mechanical versions, for example:



Left: Face mount flange; Right: Servo flange.



Left: Blind hollow shaft; Right: Through hollow shaft.

G

Gray code

Constant code that is also used with the SSI interface. When the position value changes from one value to the next, only one data bit changes. This ensures reliable data transfer.

Gray excess code

If a suitable section for encoder resolution is extracted from the middle of the complete Gray code, this results in the "Gray Excess Code" (capped Gray code). The use of this Gray excess code allows only a single data bit to be altered even when the encoder crosses zero, although the number of steps is not 2^n where n is a whole number.

H

Halogen-free (wiring technique)

Cables and wiring are said to be halogen-free if the materials used do not contain salt forming chlorine, fluorine, bromine or iodine. The insulation and sheath materials of these cables consist of polymers based on pure hydrocarbons. When such materials are burned, no corrosive or toxic gases are produced, but only water vapor and carbon dioxide.

HIPERFACE®

High Performance Interface (HIPERFACE®) is a hybrid interface developed by SICK that can transfer analog speed values and digital position values. Electrical compatibility is guaranteed by the use of HIPERFACE® as the obligatory interface for all physical parameters.

The advantages of HIPERFACE® are that only one interface is required on the drive electronics for all applications, only one type of signal cabling is needed between the drive electronics and the signal encoder and manual configuration of the speed sensor is not necessary.

HIPERFACE® DSL

The High Performance Interface DSL is a pure Digital Servo Link interface developed by SICK that provides new servo drive system architecture for HIPERFACE® with a completely new range of options as it is not hybrid (analog/digital), but is completely digital.

Thanks to the innovative and interference-free HIPERFACE DSL® protocol, rugged and reliable communication can be achieved using just two wires that are integrated into the motor cable. In addition, the digital protocol requires a minimum of connection

cables between the frequency inverter and the motor feedback system.

The absence of motor feedback connections achieves significant cost savings and distinctly increased performance.

HTL push-pull

High Voltage Transistor Logic functions with a voltage supply in the range 10 and 30 V DC, with 24 V DC being the most usual. "Low" is defined as an output of between 0 V and 3 V and "high" as between V_{CC} and $V_{CC} - 3.5$ V.

I

Interface, electrical

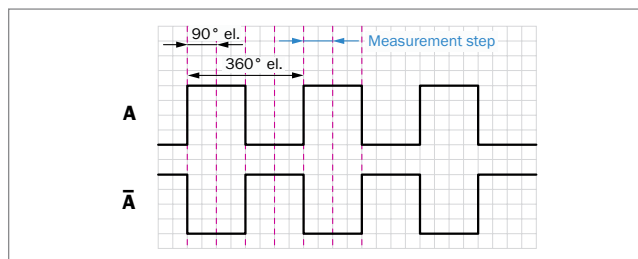
Connection point between two devices or systems. The devices or systems on either side of an interface are connected to each other by interface cabling over which data, addresses and control signals are exchanged. The term interface embraces the complete functional, electrical and constructive conditions that make up the point of contact between the devices or systems. Depending on the type of data transfer, a distinction must be made between parallel (e.g. Centronics, IEEE 488) and serial interfaces (e.g. RS-422, RS-423, RS-485) that are designed for differing transfer speeds and distances.

Interface, mechanical

→ See "Flange" on page I-470

Inverted signal

Reciprocal signal for the suppression of interference impulses when using differential sampling.



A = Original signal; \bar{A} = Inverted signal.

→ See "Differential evaluation" on page I-469

J

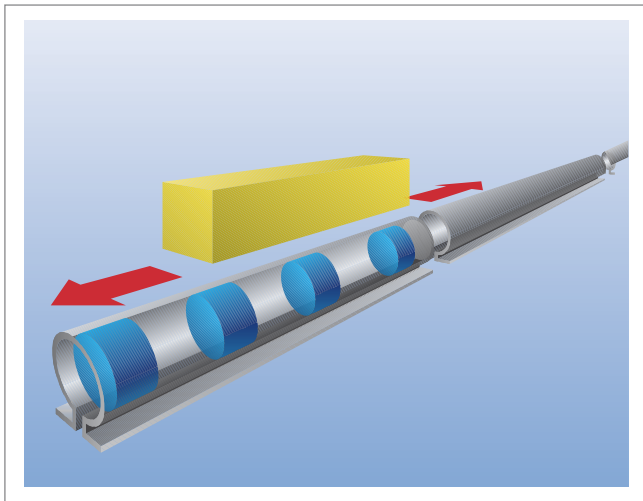
Jitter

From the English verb "to jitter": flicker, tremble; time variation of the output signal resulting from constantly present tolerances.

L

Linear encoders

A linear encoder is for frictionless length measurement and determining positions. A read head samples a code pattern or the magnetic field of a magnetic scale and outputs the appropriate electric signal.



Principle of operation

Linearity

The accuracy of wire draw encoders is described by the linearity. This indicates the maximum deviation for the measurement of a defined measurement distance or rotation. In contrast to repeatability, this relates to the measuring range covered and not to the positioning point.

The data sheet values for wire draw encoders refer to the particular measuring range.

M

Material resistance, PUR

Flexible silicone and halogen-free cabling with PUR outer sheath: The oil and fire resistance requirements of VDE 0472 are fulfilled. Can be used in drag chain applications with a minimum bend radius. This cabling is most suitable for flexible use in robot technology, for machine tools, as well as for machining production.

Material resistance, PVC

Pure PVC cables, suitable for medium mechanical strain in packaging machines as well as for assembly and production lines: good resistance to acids and alkalis and hence ideal for use in the foods and drinks industries. Resistance to wear as well as oil and chemical resistance is limited.

Measurement range

The range within which a rotary or linear encoder can produce a valid measurement signal.

Measurement step

There is a differentiation here between the measurement step for absolute and incremental measurement systems.

Incremental measurement systems:

In this case, the measurement step represents the period of the output signal. Here, the number of periods is the same as the number of lines per revolution on the measurement scale, or a multiple thereof.

Absolute measurement systems:

In this case the measurement step is the smallest possible angular movement of the rotor that will produce a change in the output signal.

Measurement step deviation

The measurement step deviation indicates the maximum measurement deviation from measurement step to measurement step. For this, measured values are taken at one or more adjacent positions in the test range and their maximum deviation from the desired value determined.

Multiturn (MT)

A version of an absolute encoder that in addition to the angular position of the shaft (singleturn) can also definitively determine and output the number of shaft rotations (multiturn).



Example: Magnetic multiturn with gearing.

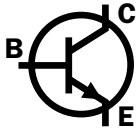
N

NPN Open Collector

The NPN Open Collector is an interface based on an output circuit with an NPN transistor.

An open collector is the unconnected collector connection of an NPN transistor, whose emitter is connected to earth and whose collector is connected to the output.

NPN output

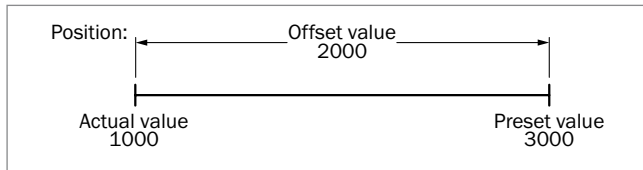


NPN output is an interface based on an output circuit with NPN transistor.

O

Offset

The difference between the actual physical value and the preset value is described as the offset. This can be both a position offset for position measurement, as well as a voltage offset.



Output frequency, maximum

The maximum encoder output signal frequency, for which the correct sequence of the code values is assured is called the maximum output frequency.

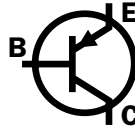
The formula used is as follows:

$$f = \frac{n * Z}{60 s}$$

Z = Number of encoder lines; n = Revolutions per / min; f = Output frequency.

P

PNP output



The PNP output is an interface based on an output circuit with a PNP transistor.

Preset

For absolute encoders, a preset value can be allocated to the actual physical position value. In the case of an allocation via the set wire, this equates to the value 0. For programmable absolute encoders, the preset value can be any value within the measuring range.

PROFIBUS



PROFIBUS is a fieldbus for industrial communications.

User organization: PNO (PROFIBUS Nutzerorganisation e.V.)

More detailed information about this technology is available at www.profibus.com

PROFINET (Process Field Network)



PROFINET is an Ethernet based fieldbus.

User organization: PNO (PROFIBUS Nutzerorganisation e.V.)

More detailed information about this technology is available at www.profibus.com

R

Reference signal

→ See "Zero pulse" on page I-476

Repetition accuracy

→ See "Reproducibility" on page I-473

Reproducibility

Reproducibility, repetition accuracy or repeatability is defined as the maximum distribution from at least five consecutive measurements, carried out under identical conditions.

Resolution

The resolution is expressed as the number of impulses per revolution or path units.

Encoder type	Resolution definition
Rotary, incremental	Resolution as number of impulses
Rotary, absolute, single-turn	Resolution as number of steps per revolution
Rotary, absolute, multi-turn	The total resolution consists of the number of steps per revolution and the number of revolutions
Linear encoders	Resolution in mm Special for cable pull: Circumference of cable drum Resolution for one revolution of the encoder

If, for example a rotary incremental encoder has a resolution of 12 bits, this means the number of impulses is 4096.

The formula for calculation is: Number of impulses = 2^x , where x is the resolution in bits.

Rotation direction, clockwise (cw)

Rotation to the right, when viewing the shaft.

Rotation direction, counterclockwise (ccw)

Rotation to the left, when viewing the shaft.

S

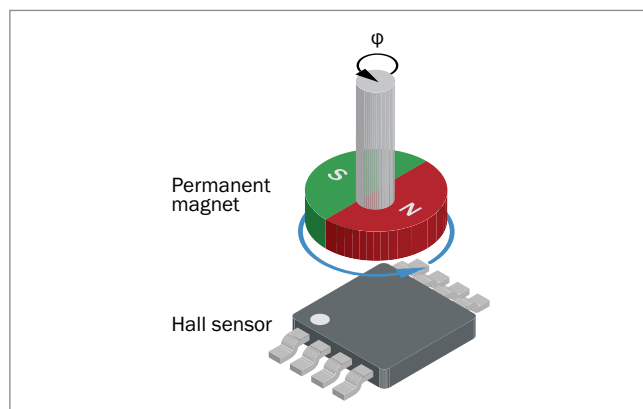
Sampling frequency

The frequency with which the signal periods of a sensor system are measured per second.

For incremental measuring systems, the speed is limited by the maximum sampling frequency.

Sampling, magnetical

Position, angle and speed determination for rotary or linear encoders using permanent magnets and appropriate evaluation units to determine the magnetic field. Encoders with magnetic sampling are usually of lower resolution than optical ones.

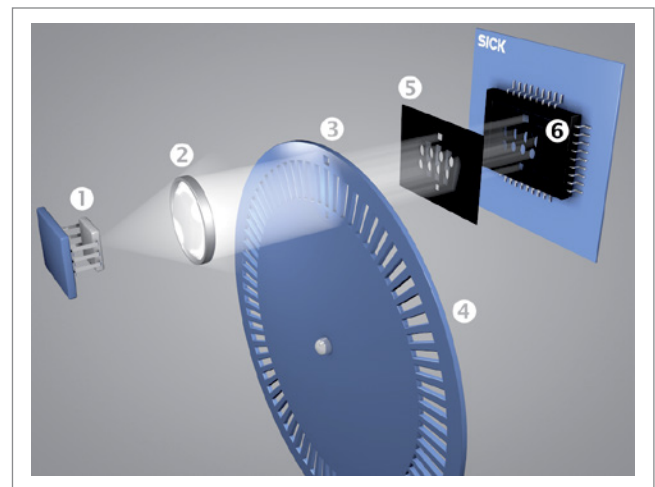


Sampling, optical

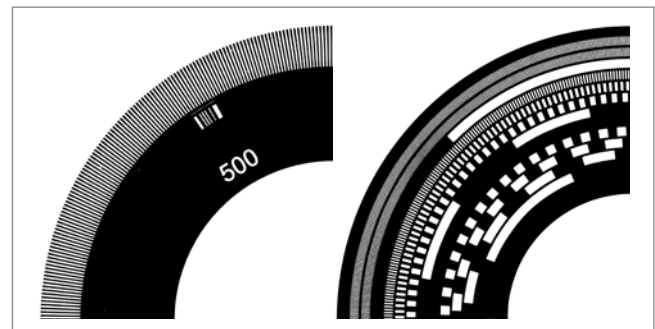
Position, angle and speed determination for rotary or linear encoders using LEDs, code patterns and photo-diodes.

The line marks (for incremental encoders) or codes (for absolute encoders) are inscribed as digital patterns on a glass, metal or plastic disc and are sampled by a light source (light emitting diode) and photo-diodes.

Encoders with optical sampling are usually of higher resolution than magnetic ones.



① LED; ② Lens; ③ Reference point; ④ Code disc; ⑤ Mask; ⑥ Photo-diode.



Code discs: Left incremental, right absolute.

Scaling

For programmable encoders, the encoder actual value is multiplied by a scaling factor. This means that the resolution can be adapted to the application in question.

Service life

For rotary encoders, the service life of the bearings represents the overall service life of the encoder expressed in revolutions.

For wire draw encoders, the service life is expressed as the total number of cycles. A cycle is defined as one withdrawal and rewind movement (load cycle).

The service life depends on the type of load. This is influenced by factors such as the environment, the installation location, the measuring range in use, the travel speed and acceleration. If the value of one or more of these influencing factors is in the high range, the service life may be reduced proportionally.

Shaft

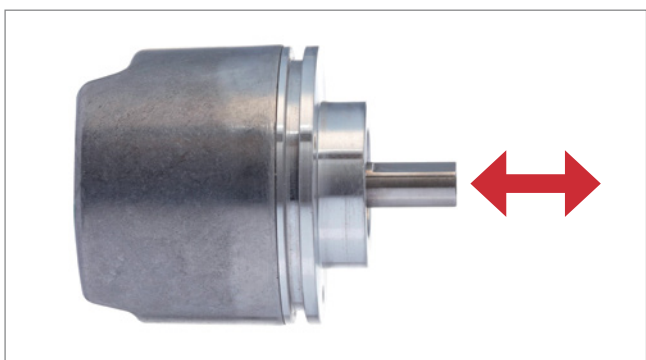
The component of a rotary encoder that transfers the rotation movement and torque from the application to the sensor unit of the encoder.

Shaft coupling

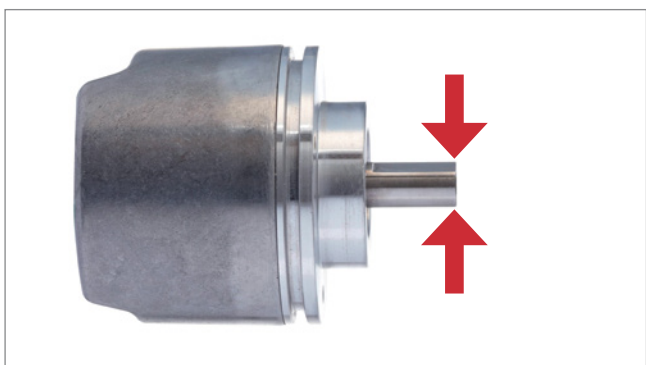
A shaft coupling is for the indirect connection of two shafts to balance radial, axial or angular offset.

**Shaft load capacity, axial**

The axial shaft load capability describes the load capacity along the axis of the encoder shaft.

**Shaft load capacity, radial**

The radial shaft load capability describes the load capacity about the radius along the encoder shaft. For this, the point of action must be applied to the end of the shaft.

**Shielding**

The shielding of equipment or connecting cables is the design-dependent protection of equipment against radiated electromagnetic interference. Sensitivity to radiated electromagnetic interference, as well as the intensity of radiated electromagnetic interference, must be reduced by full shielding so that the encoder can be used properly. This should be extensive and all around.

Silicone-free (connections)

Silicone-free connections must be used in certain industrial fields, such as paint shops. The reason for this is that silicones can reduce the effectiveness of or disrupt adhesive or other joints.

Sine-Cosine interfaces

Unlike conventional pulse signals, sine-cosine signals are emitted in sine-wave form. These signals can be output at a higher resolution, as there is also an option to sample the signals using an analog-digital converter. For this reason also, encoders with sine-cosine interfaces are preferred for demanding servo applications for which a high level of accuracy is required. In addition to the signals, a zero set can also be emitted, from which the absolute position can be calculated.

Singleturn (ST)

A version of an absolute encoder that can definitively determine and output the angle position within a single revolution.

SSI

A synchronous serial interface is a standardized interface originally developed by Max Stegman GmbH (now SICK) for serial data transfer that makes it possible to transmit absolute positions. The advantage of this type of transfer is that, as well as the time of the recording of the position, the speed of the data transfer can be controlled by the PLC. This guarantees safe transfer.

Starting torque

The torque required to move a shaft from the rest position in the rotation direction.

Stator coupling

The stator coupling compensates for both the radial and axial shaft movements of the drive element as well as installation tolerances without significantly affecting the accuracy of hollow shaft encoders. The stator coupling absorbs the torque derived from the bearing friction during angular acceleration.



Surrounding field strength

The surrounding field strength describes the maximum permitted influence of external magnetic fields. These external influences must be within the permitted limits to guarantee interference-free functioning of magnetic (linear) encoders.

T

Thermal expansion coefficient

This describes the behavior of a material in relation to changes of its dimensions as influenced by changes in temperature.

TTL RS-422

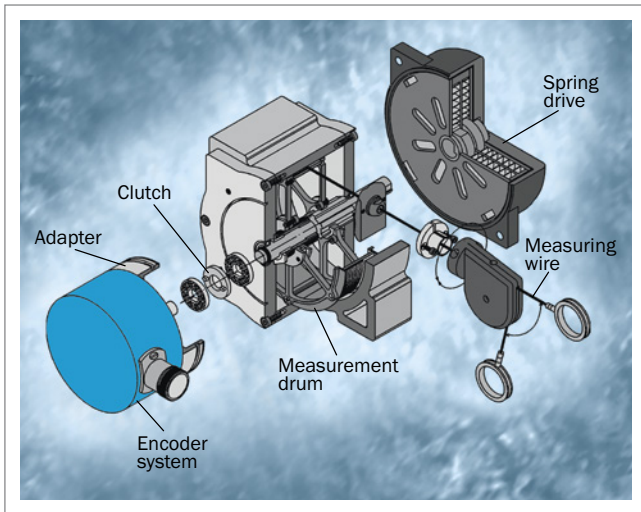
In a transistor-transistor logic (TTL), both the logical status and the amplification are done by transistors, hence the name.

The TTL output is supplied with either a fixed 5 V voltage or a variable voltage of between 10 and 32 V. For this the low range is defined as the ≤ 0.4 V and the high range as ≥ 2.4 V.

W

Wire draw encoder

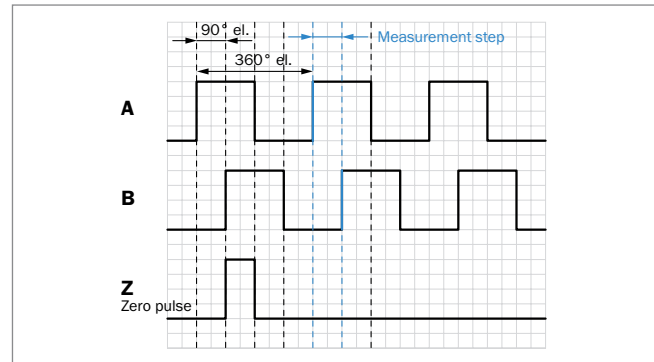
Wire draw encoders are position sensors that function according to the cable extension principle. The sensor system consists of a wire draw mechanism and a rotary encoder. The core component of a wire draw encoder is a drum around which a wire is wound in a single layer. Winding is achieved by means of a spring. The resolution of the wire draw encoder can be determined from the relationship between the circumference of the drum and the resolution of the rotary encoder.



Z

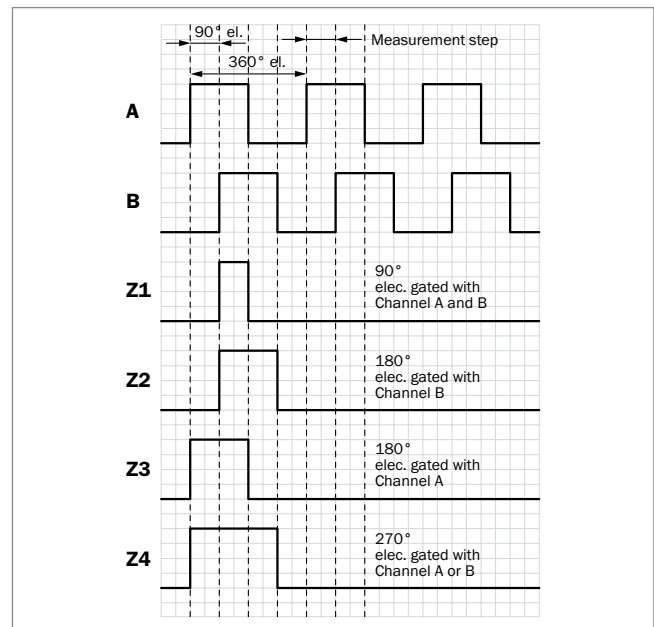
Zero pulse

A signal (e.g. Channel Z) to determine the zero point of an incremental encoder, that is output once during a rotation of the encoder shaft. The zero pulse is normally used for the reference run of a machine.



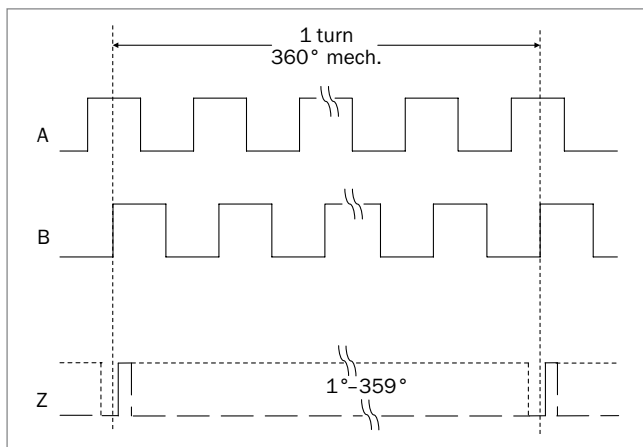
Zero pulse width, electrical

Width of the zero pulse (= length of the high signal) in relation to an impulse period.



Zero pulse width, mechanical

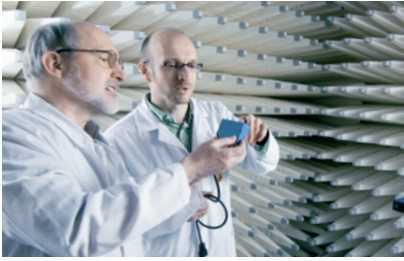
Width of the zero pulse (= length of the high signal, occasionally of the low signal as well) in relation to a mechanical rotation of the shaft.







SICK at a glance



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