PRODUCT INFORMATION

DUV60

QUICKLY CONFIGURABLE AND VERSATILE MEASURING WHEEL INCREMENTAL ENCODER

Measuring wheel encoders

SICK
Sensor Intelligence.

QUICKLY CONFIGURABLE AND VERSATILE MEASURING WHEEL INCREMENTAL ENCODER

Product description

The DUV60 is a measuring wheel encoder with DIP switch configuration, designed to be optimized for conveyor and web feedback. The ability to configure the output voltage, resolution, and counting direction reduces the number of variants, enables easy replacement and quick commissioning, and increases the likelihood that spare parts will be in stock – all without any additional programming tools. The on-board status and signal LEDs and optional fault output quickly indicate the functionality of the encoder, minimizing time required for both installation and troubleshooting. The DUV60 offers a range of mounting configurations for dual or single wheel applications, making the DUV60 the ideal solution for conveyor, web, and logistics applications.

At a glance

- Single or dual wheel measuring wheel encoder
- DIP switches for programming resolution, signal output,
- And counting direction
- Universal 4.5 V ... 30 V supply
- LEDs that indicate encoder status and output signal.
- M12 male connector, 4- or 8-pin, or universal cable outlet
- Optional fault output directly from encoder

Your benefits

- Quickly commission the encoder using the built-in DIP switches. No additional programming tool or laptop required
- Status and signal LEDs quickly indicate whether the encoder is properly connected, functional, or needs to be replaced
- Universal voltage supply and multiple bracket options for the measuring wheel encoder provide increased installation flexibility
- Maintain a high level of productivity using the anti-dither functionality
- Compatible with existing and low-cost input cards with output types like Clockwise/Counterclockwise and Signal/Direction

Additional information

→ www.sick.com/DUV60

For more information, simply 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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	Single wheel mount	Dual wheel mount
Recommended pretension	10 mm [4]	20 mm [4]
Max. permissible working area for the spring (continuous operation)	± 3 mm	± 10 mm
Service life of spring element	> 1.4 million cycles [4]	–

[1] The surface of a measuring wheel is subject to wear. This depends on contact pressure, acceleration behavior in the application, traversing speed, measurement surface, mechanical alignment of the measuring wheel, temperature, and ambient conditions. We recommend you regularly check the condition of the measuring wheel and replace as required.

[2] For an encoder with connector outlet.

[3] Based on an encoder with a plug connector output and urethane rollers, no mounting necessary (arm mount)

[4] Only applies to variants with spring arm mounting.

Electrical data

Electrical interface	4.75 V ... 30 V, TTL/HTL DIP switch, selectable output
Connection type	Male connector M12, 8-pin, universal [1] Male connector M12, 4-pin, universal [1] Cable, 8-wire, universal, 1.5 m [2] Cable, 8-wire, universal, 5 m [2]
DIP switch parameters	
Pulses per revolution	✔
Output voltage	✔
Direction of rotation	✔
Operating power consumption (no load)	≤ 120 mA
Power consumption max. without load	≤ 1.25 W
Load current max.	≤ 30 mA, per channel
Maximum output frequency	60 kHz
Reference signal, number	1
Reference signal, position	180°, electric, gated with A
Reverse polarity protection	✔
Short-circuit protection of the outputs	✔
MTTFd: mean time to dangerous failure	275 years (EN ISO 13849-1) [3]

[1] The universal connection is rotatable so that it is possible to position the conector in the radial or axial direction.

[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.

[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 EN 61000-6-3
Enclosure rating	IP 65 [1]
Permissible relative humidity	90 % (condensation of the optical scanning not permitted)
Working temperature range	–30 °C ... +70 °C
Storage temperature range	–40 °C ... +75 °C

[1] When the mating connector is installed and the DIP switch door is sealed with the encoder housing.

Fields of application

Measuring the position, speed and distance in applications with low speeds and low resolution in the logistics and factory automation markets.

- Conveyor belts
- Packaging machines
- Printing machines
- Storage systems
- Web tracking applications

Detailed technical data

Performance

Linear resolution	0.125 mm/pulse to 304.8 mm/pulse (type-dependent)
Pulses per revolution	1 ... 2400 [1]
Measuring step	90° electric/pulses per revolution
Measuring step deviation	± 18°, / pulses per revolution
Error limits	Measuring step deviation x 3
Duty cycle	≤ 0.5 ± 5 %
Initialization time	< 5 ms [2]

[1] Available pulses per revolution see type code.

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

Mechanical data

	Single wheel mount	Dual wheel mount
Measuring wheel circumference	300 mm	300 mm 12 in
Measuring wheel surface	O-ring NBR70 [1]	O-ring NBR70 [1] Smooth plastic (urethane) [1]
Spring arm design	Spring arm, encoder on mounting side Spring arm, wheel on mounting side	Spring tension, under-belt yoke mount Spring tension, under-belt flange mount Counter-weight, under-belt yoke mount Over-belt yoke mount Without mount
Mass	0.45 kg [2]	0.9 kg [3]
Encoder material		
Shaft	Stainless steel	
Flange	Aluminum	
Housing	Aluminum	
Cable	PVC	
Spring arm mechanism material		
Spring element	Spring steel	
Measuring wheel, spring arm	Aluminum	
Yoke	–	Aluminum
Counterweight	–	Aluminum
Start up torque	1.2 Ncm	0.5 Ncm
Operating torque	1.1 Ncm	0.4 Ncm
Operating speed	1,500 /min	
Bearing lifetime	3.6 x 10^9 revolutions	
Maximum travel/deflection of spring arm	14 mm [4]	40 mm [4]

[1] The surface of a measuring wheel is subject to wear. This depends on contact pressure, acceleration behavior in the application, traversing speed, measurement surface, mechanical alignment of the measuring wheel, temperature, and ambient conditions. We recommend you regularly check the condition of the measuring wheel and replace as required.

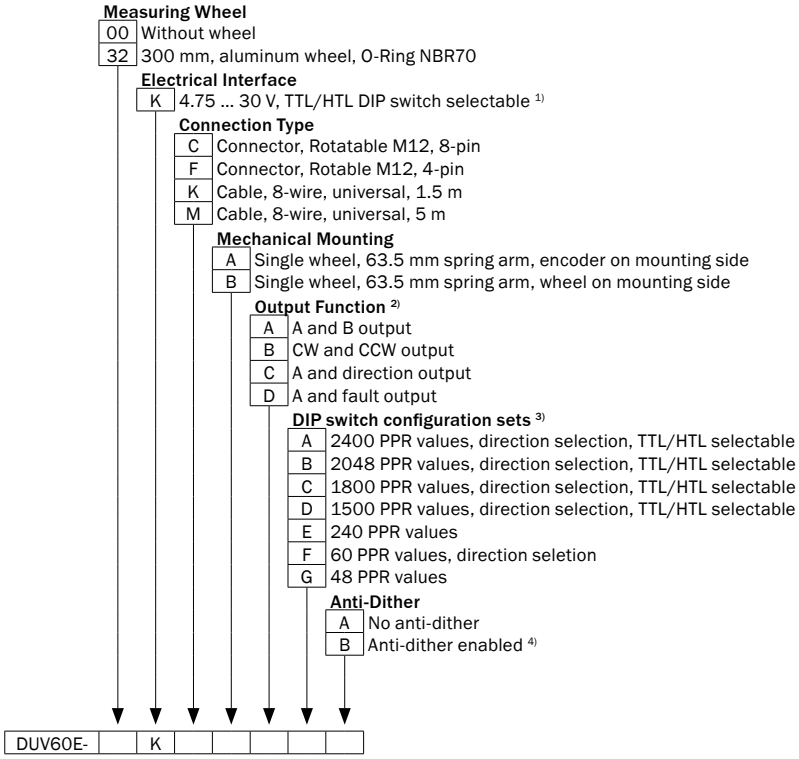
[2] For an encoder with connector outlet.

[3] Based on an encoder with a plug connector output and urethane rollers, no mounting necessary (arm mount)

[4] Only applies to variants with spring arm mounting.

Type code

Single wheel mount



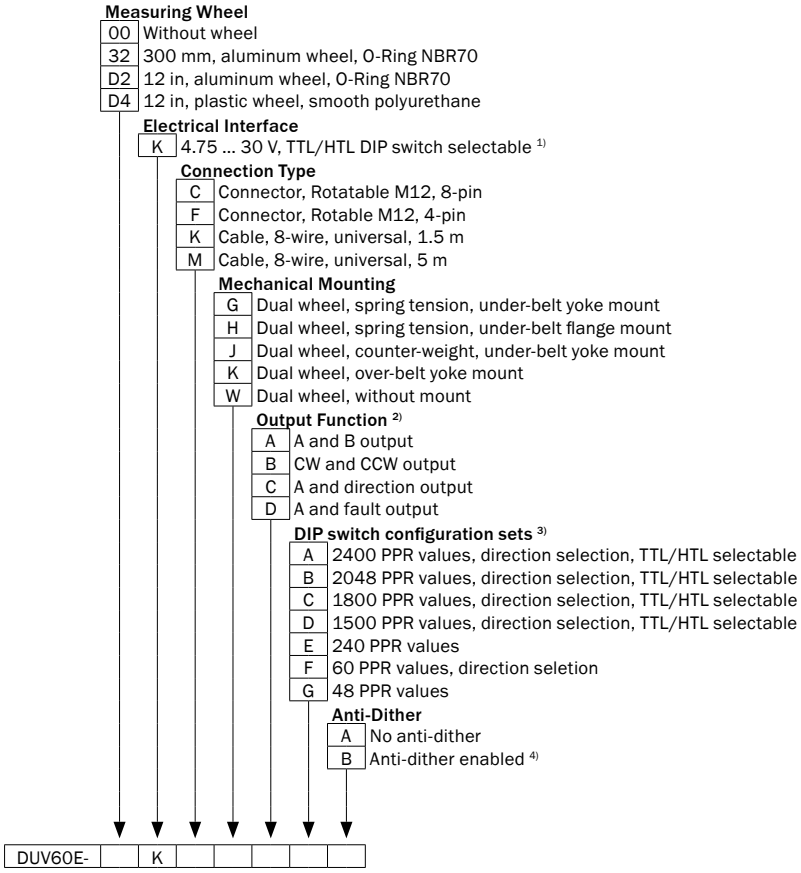
1) Output voltage selection not available for DIP switch configurations E, F, and G. Output voltage level is dependent on supply voltage.

2) See Output Function Table.

3) See Pulses per revolution table for full resolution offering within each group.

4) Not available for Output Function A and B output (A). Connection Type must be male connector M12, 4-pin (F).

Dual wheel mount



1) Output voltage selection not available for DIP switch configurations E, F, and G. Output voltage level is dependent on supply voltage.

2) See Output Function Table.

3) See Pulses per revolution table for full resolution offering within each group.

4) Not available for Output Function A and B output (A). Connection Type must be male connector M12, 4-pin (F).

Ordering information

Single wheel mount

- **Electrical interface:** TTL/HTL DIP switch, selectable output
- **Voltage area:** 4.75 V ... 30 V
- **Anti-dither:** –
- **Output function:** A and B output

Connection type	DIP switch configuration	Type	Part no.
Male connector M12, 4-pin, universal	1500 PPR values, direction selection, TTL/HTL selectable	DUV60E-32KFAADA	1084921
		DUV60E-32KFBADA	1084925
	2400 PPR values, direction selection, TTL/HTL selectable	DUV60E-32KFAAAA	1084920
		DUV60E-32KFBAAA	1084924
Male connector M12, 8-pin, universal	1500 PPR values, direction selection, TTL/HTL selectable	DUV60E-32KCAADA	1084919
		DUV60E-32KCBADA	1084923
	2400 PPR values, direction selection, TTL/HTL selectable	DUV60E-32KCAAAA	1084918
		DUV60E-32KCBAAA	1084922

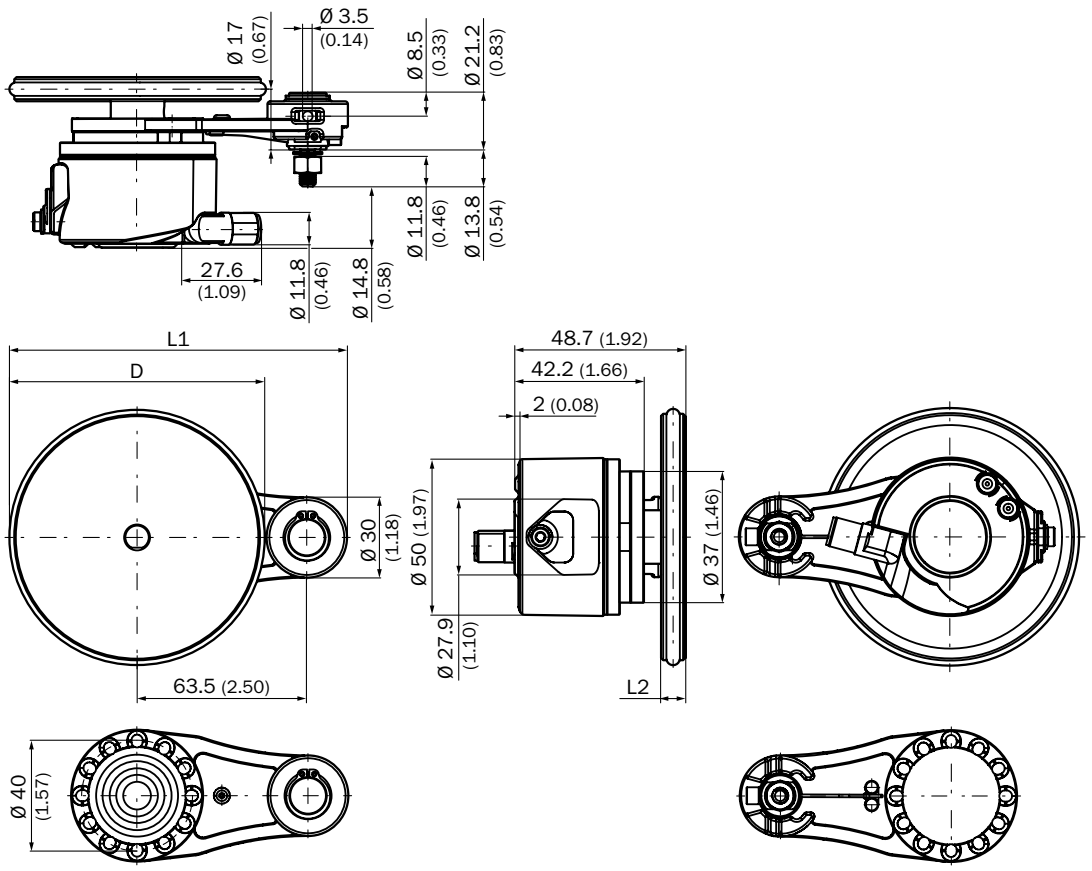
Dual wheel mount

- **Electrical interface:** TTL/HTL DIP switch, selectable output
- **Voltage area:** 4.75 V ... 30 V
- **Anti-dither:** –
- **Output function:** A and B output

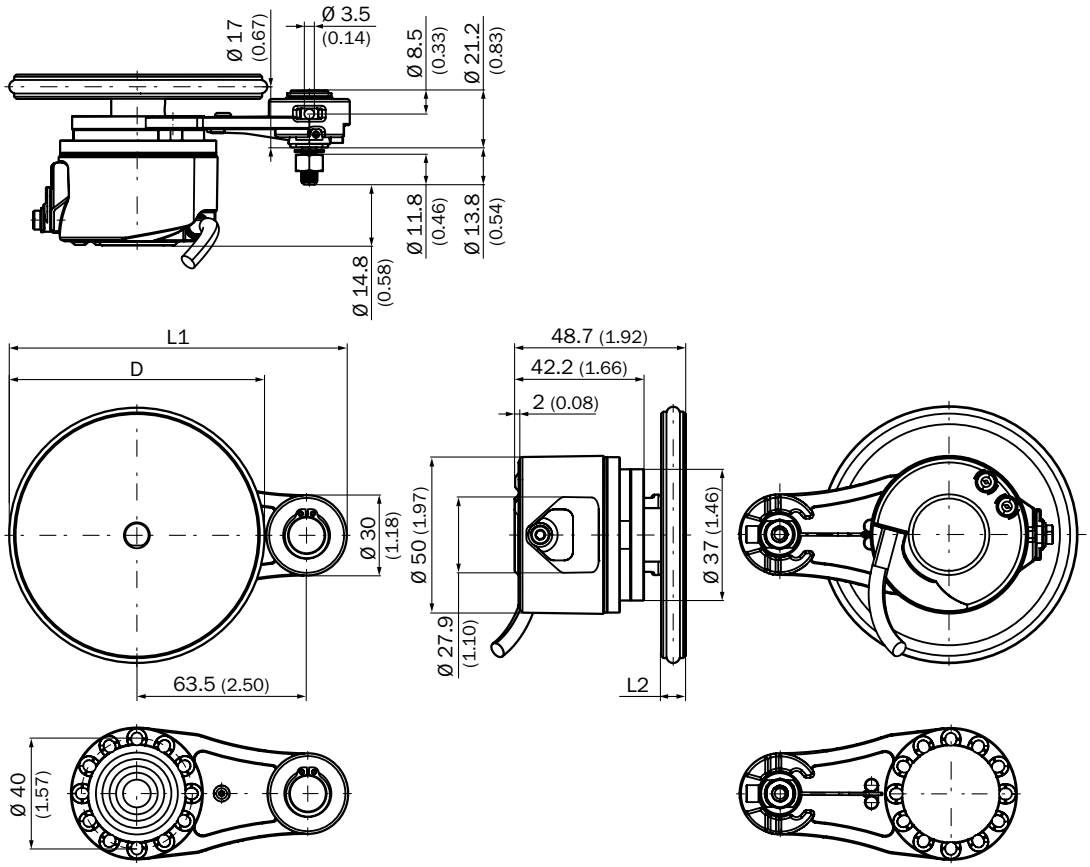
Connection type	DIP switch configuration	Type	Part no.
Male connector M12, 4-pin, universal	1500 PPR values, direction selection, TTL/HTL selectable	DUV60E-D4KFHADA	1084928
		DUV60E-D4KFJADA	1084931
	2400 PPR values, direction selection, TTL/HTL selectable	DUV60E-32KFHAAA	1084933
		DUV60E-D4KFHAAA	1084927
		DUV60E-D4KFJAAA	1084930
Male connector M12, 8-pin, universal		DUV60E-32KCHAAA	1084932
		DUV60E-D4KCHAAA	1084926
		DUV60E-D4KCJAAA	1084929

Dimensional drawings (Dimensions in mm (inch))

Single wheel, 63.5 mm spring arm, encoder on mounting side, connector



Single wheel, 63.5 mm spring arm, encoder on mounting side, cable conntection



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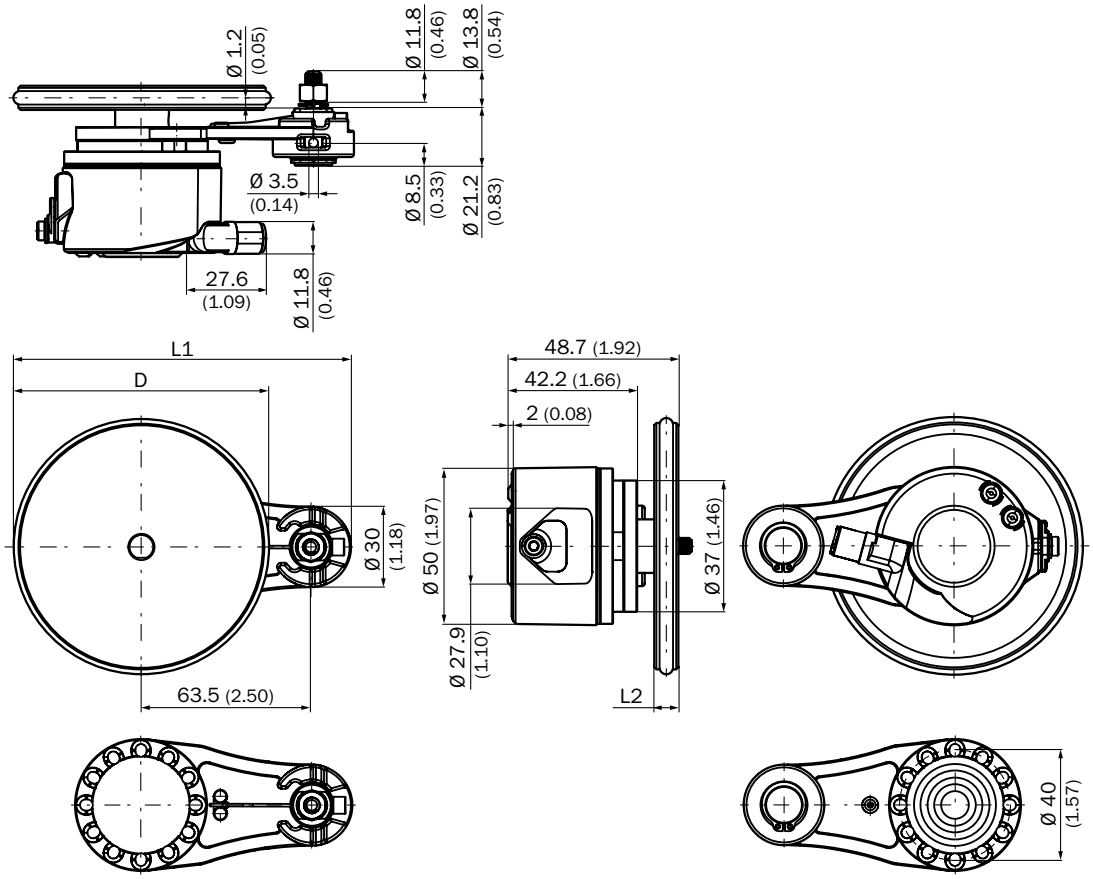
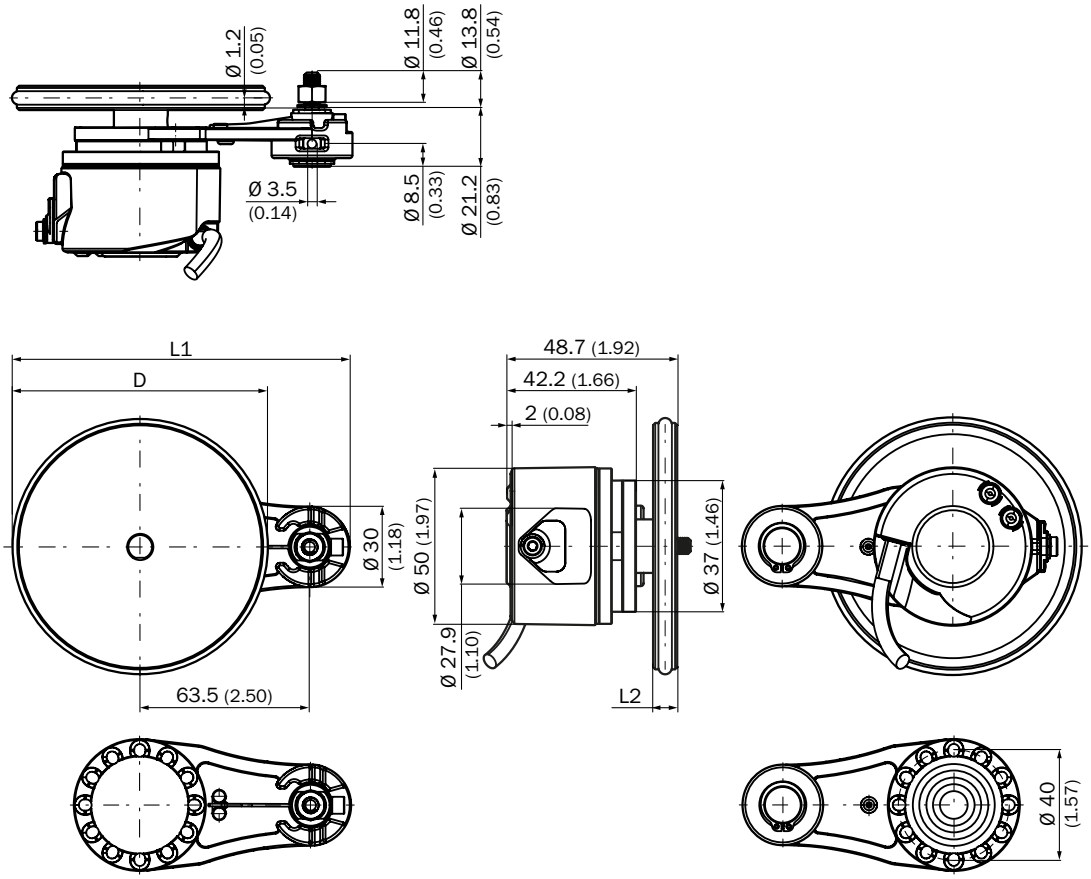
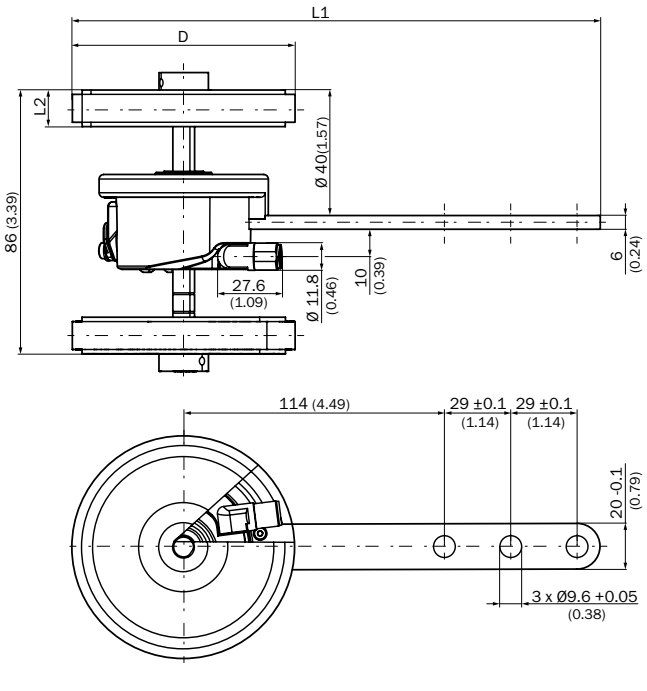
Single wheel, 63.5 mm spring arm, wheel on mounting side, connector



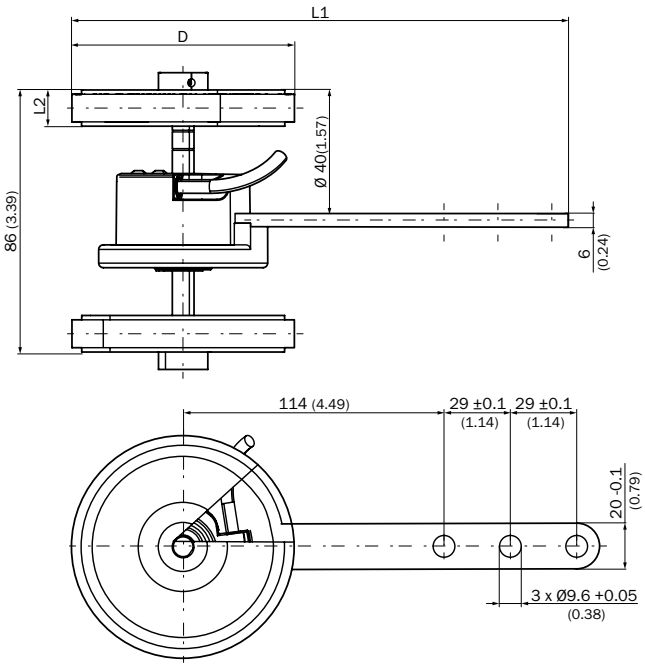
Single wheel, 63.5 mm spring arm, wheel on mounting side, cable connection



Dual wheel, 12 in, plastic, over-belt yoke mount, connector



Dual wheel, 12 in, plastic, over-belt yoke mount, connector, cable conntection



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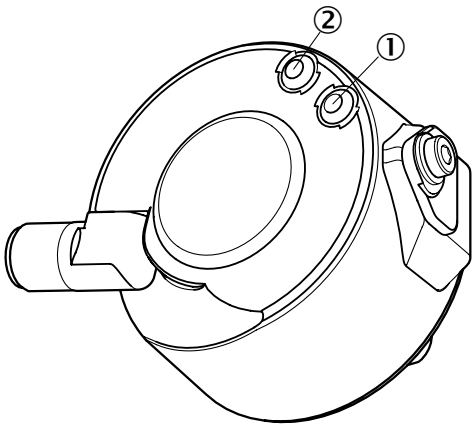
Output function

	Male connector M12, 4-pin	Male connector M12, 8-pin	Cable, 8-wire
Option A A and B output	A, B	A, A-, B, B-, Z, Z-	A, A-, B, B-, Z, Z-
Option B CW and CCW output	CW, CCW	CW, CW-, CCW, CCW-, Fault, Fault-	CW, CW-, CCW, CCW-, Fault, Fault-
Option C[1)] A and direction output	A, Direction	A, A-, Direction, Direction-, Fault, Fault-	A, A-, Direction, Direction-, Fault, Fault-
Option D A and fault output	A, Fault	A, A-, B, B-, Fault, Fault-	A, A-, B, B-, Fault, Fault-

[1)] when direction channel is LOW, encoder is rotating in the clockwise direction. When direction channel is HIGH, encoder is rotating counter-clockwise.

Status and function display

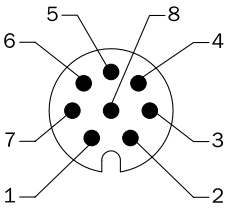
Status indicator LED



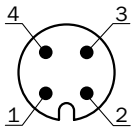
① Signal
② Fault/Power

PIN assignment

View of M12 male device connector on encoder



View of M12 male device connector on encoder



Colour of wires (cable outlet)	Male connector M12, 4-pin	Male connector M12, 8-pin	Output function				Explanation
			A	B	C	D	
Brown	-	1	A-	CW-	A-	A-	Signal
White	4	2	A	CW	A	A	Signal
Black	-	3	B-	CCW-	Direction-	B-	Signal
Pink	2	4	B	CCW	Direction	Fault (M12, 4-pin) B (M12, 8-pin and cable outlet)	Signal
Yellow	-	5	Z-	Fault-	Fault-	Fault-	Signal
Violet	-	6	Z	Fault	Fault	Fault	Signal
Blue	3	7	GND	GND	GND	GND	Ground connection
Red	1	8	U_S	U_S	U_S	U_S	Supply voltage
-	-	-	Case	Case	Case	Case	Case ground
Shielding	-	-	Shielding	Shielding	Shielding	Shielding	Shielding

DIP switch configuration

	DIP switch configuration A – 2400 pulses				
Pulses per revolution	1	10	32	100	400
	2	12	40	120	480
	3	15	48	150	600
	4	16	60	160	800
	5	20	75	200	1200
	6	24	80	240	2400
	8	30	96	300	

	DIP switch configuration B – 2048 pulses				
Pulses per revolution	1	8	64	256	1024
	2	16	128	512	2048
	4	32			

	DIP switch configuration C – 1800 pulses				
Pulses per revolution	1	9	30	120	600
	2	10	36	150	900
	3	12	40	180	1800
	4	15	60	200	
	5	18	72	300	
	6	20	75	360	
	8	24	100	450	

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	DIP switch configuration D – 1500 pulses				
Pulses per revolution	1	5	15	75	1500
	2	6	20	100	
	3	10	30	150	
	4	12	60	300	

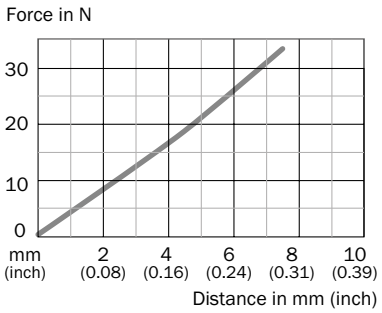
	DIP switch configuration E – 240 pulses				
Pulses per revolution	1	5	12	30	80
	2	6	15	40	120
	3	8	16	48	240
	4	10	20	60	

	DIP switch configuration F – 60 pulses				
Pulses per revolution	2	5	10	16	30
	3	6	12	20	60
	4	8	15	24	

	DIP switch configuration G – 48 pulses				
Pulses per revolution	1	3	6	12	24
	2	4	8	16	48

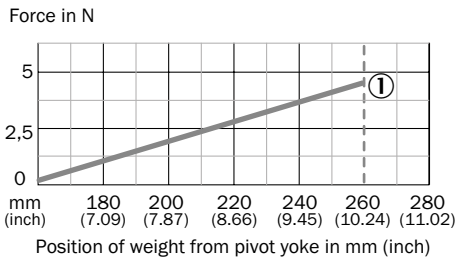
Force/distance diagram

Single wheel, 63.5 mm spring arm



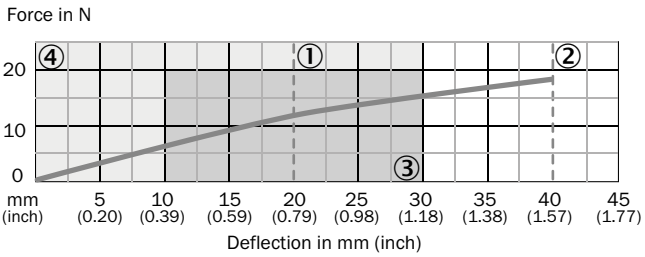
① Recommended pre-tension (10 mm)
② Permissible working area (±3 mm)
③ Recommended spring deflection (2 – 13 mm)
④ Maximum spring deflection (14 mm)

Dual wheel, counter-weight, yoke mount



① Maximum contact force when the counterweight is positioned at the end of the rod (260 mm)

Dual wheel, spring tension, yoke mount



① Recommended pre-tension (20 mm)
② Maximum deflection (40 mm)
③ Recommended deflection range (10 – 30 mm)
④ Permissible working area (0 – 30 mm)

Accessories

Mounting systems

Mounting brackets and plates

Mounting brackets

Figure	Brief description	Type	Part no.
	Mounting bracket for dual wheeled encoder systems, overbelt yoke mount, Aluminum	BEF-MK-YOKE2A	2088625
	Mounting bracket for dual wheeled encoder systems, spring tension underbelt mount with flange bracket, Aluminum	BEF-MK-FA	2088626
	Mounting bracket for dual wheeled encoder systems, spring tension underbelt yoke mount, Aluminum	BEF-MK-YOKEUB	2088522
	Mounting bracket for encoder with spigot 36 mm	BEF-WF-MRS	2084709
	Mounting bracket for encoders with two mounting brackets, counterweight, mounting from below with mounting fork, Aluminum	BEF-MK-GG10Z	2057023

Dimensional drawings ➜ page 16

Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Aluminium measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227
	Aluminium measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Aluminum measuring wheel with cross-knurled surface for 10 mm solid shaft, circumference 500 mm	BEF-MR10500AK	4084733
	Aluminum measuring wheel with ridged polyurethane surface for 10 mm solid shaft, circumference 500 mm	BEF-MR10500APG	4084736
	Aluminum measuring wheel with smooth polyurethane surface for 10 mm solid shaft, circumference 500 mm	BEF-MR10500AP	4084734
	Aluminum measuring wheel with studded polyurethane surface for 10 mm solid shaft, circumference 500 mm	BEF-MR10500APN	4084735
	Measuring wheel shaft kit for dual wheel DUV60, includes 10mm shaft and collet, for measuring wheels with 10 mm bore	BEF-MK-DUV10	2088713
	Measuring wheel shaft kit for dual wheel DUV60, includes 3/8” shaft and collet, for measuring wheels with 3/8” bore	BEF-MK-DUV38	2088715
	Measuring wheel with O-ring (NBR70) surface, for 3/8” solid shaft, 12” circumference	BEF-MR38Z12A0	2088716
	Measuring wheel with smooth polyurethane surface, for 3/8” solid shaft, 12” circumference	BEF-MR38Z12PU	2088717
	O-ring for measuring wheels (circumference 300 mm)	BEF-OR-083-050	2064076
	O-ring for measuring wheels (circumference 500 mm)	BEF-OR-145-050	2064074
	Plastic measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989

Dimensional drawings ➜ page 19

Modular measuring wheel system

Figure	Brief description	Type	Part no.
	SICK modular measuring wheel system for face mount flange encoder with S4 mechanical design (10 x 19 mm solid shaft), e.g., DFS60-S4	BEF-MRS-10-U	2085714

Dimensional drawings ➜ page 19

Connection systems

Plug connectors and cables

Cables (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: cable Head B: cable Cable: SSI, drag chain use, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: CANopen, DeviceNet, drag chain use, shielded, 2 x 0.25 mm² + 2 x 0.34 mm², 6.9 mm, twisted pair	LTG-2804-MW	6028328

Connecting cables with female connector

Figure	Brief description	Cable length	Type	Part no.
	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: drag chain use, PUR, halogen-free, shielded	5 m	DOL-1204-G05MAC	6038621
	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: drag chain use, PUR, shielded, 4 x 0.34 mm², 5.9 mm	10 m	DOL-1204-G10MAC	6041797
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: drag chain use, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm², Ø 7 mm	2 m	DOL-1208-G02MAC1	6032866
		5 m	DOL-1208-G05MAC1	6032867
		10 m	DOL-1208-G10MAC1	6032868
		20 m	DOL-1208-G20MAC1	6032869
	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: drag chain use, PUR, halogen-free, shielded	2 m	DOL-1204-G02MAC	2088079
		20 m	DOL-1204-G20MAC	2088080

Dimensional drawings ➜ page 20

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 5-pin, straight Cable: CANopen, DeviceNet, shielded	DOS-1205-GA	6027534
	Head A: female connector, M12, 8-pin, straight, A-coded Head B: - Cable: Incremental, SSI, shielded, CAT5, CAT5e	DOS-1208-GA01	6045001

Dimensional drawings ➜ page 20

Male connectors (ready to assemble)

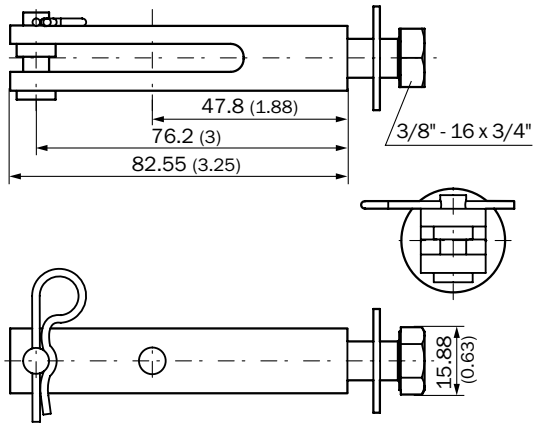
Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, A-coded Cable: CANopen, DeviceNet, shielded	STE-1205-GA	6027533
	Head A: male connector, M12, 8-pin, straight, A-coded Head B: - Cable: Incremental, shielded, CAT5, CAT5e	STE-1208-GA01	6044892

Dimensional drawings ➜ page 20

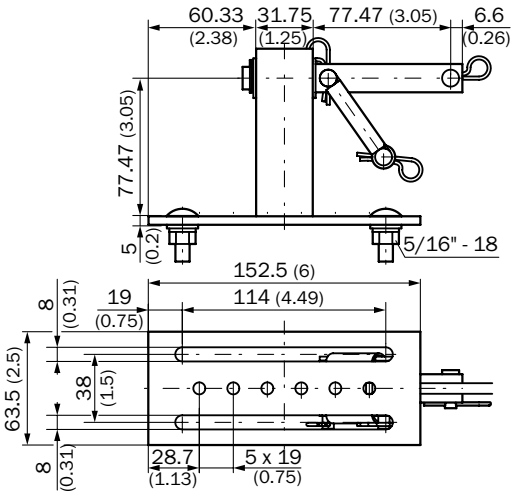
Dimensional drawings for accessories (Dimensions in mm (inch))

Mounting brackets and plates

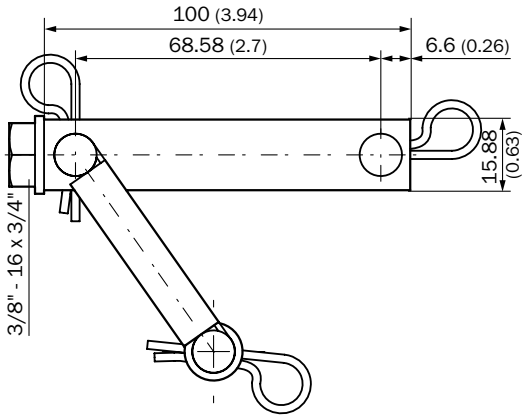
BEF-MK-YOKE2A



BEF-MK-FA



BEF-MK-YOKEUB



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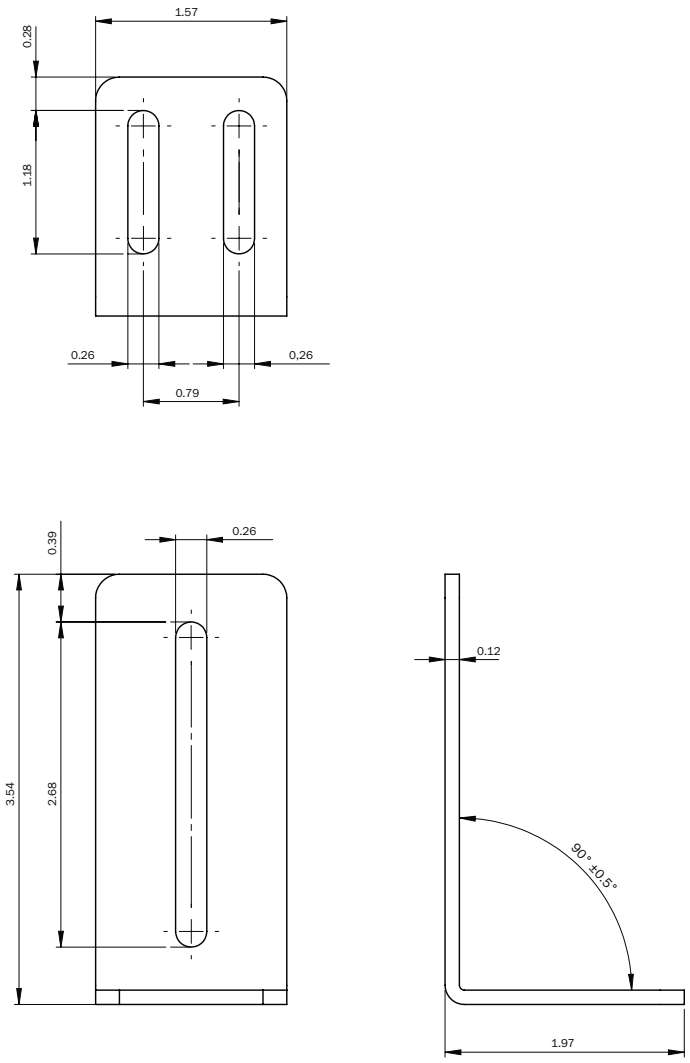
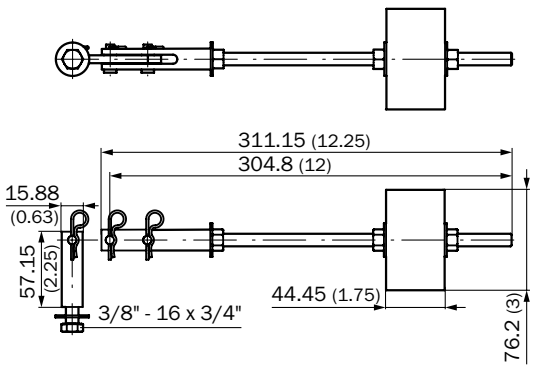
BEF-WF-MRS

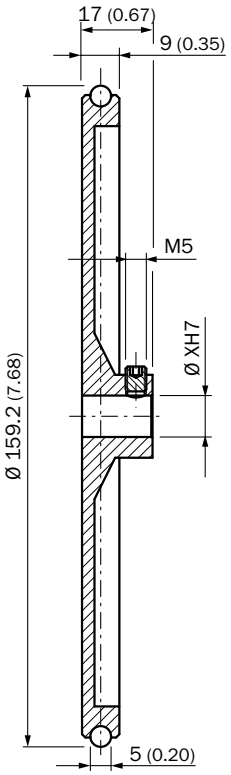


BEF-MK-GG10Z

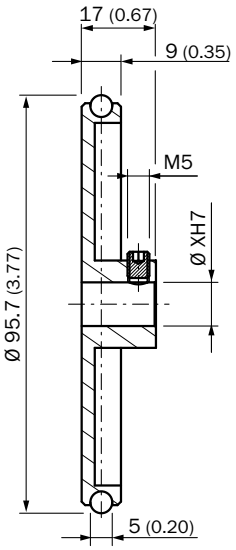


Other mounting accessories

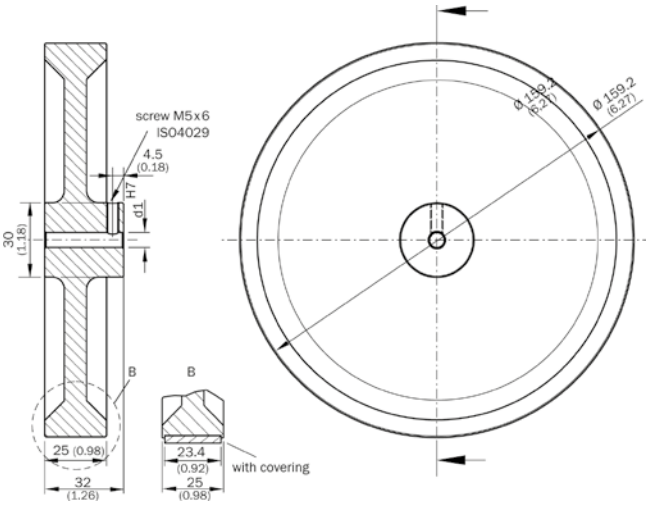
BEF-MR010050R



BEF-MR006030R



BEF-MR10500AK
BEF-MR10500APG
BEF-MR10500AP
BEF-MR10500APN



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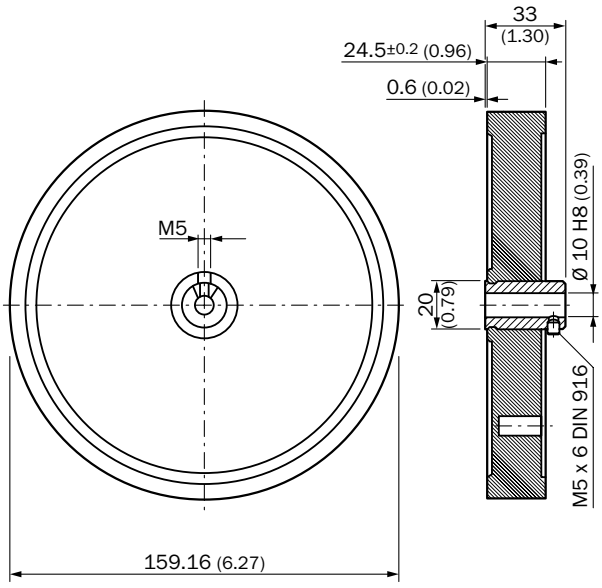

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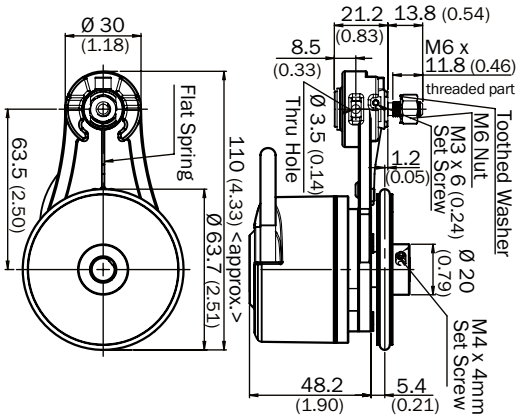
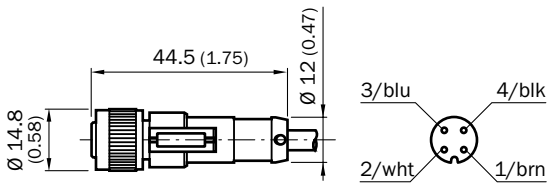
Other mounting accessories

BEF-MRS-10-U

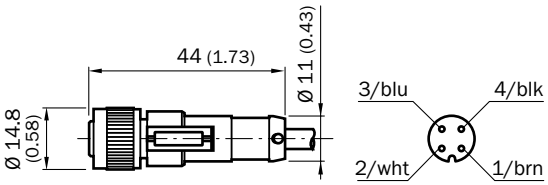


Plug connectors and cables

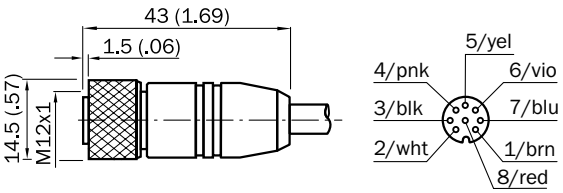
DOL-1204-GxxMAC



DOL-1204-G10MAC



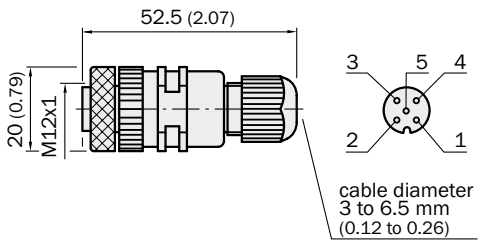
DOL-1208-G02MAC1
DOL-1208-G05MAC1
DOL-1208-G10MAC1
DOL-1208-G20MAC1



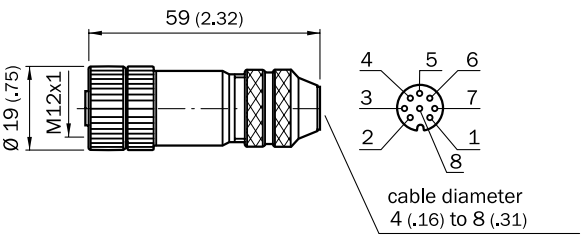
All dimensions in mm (inch)

Plug connectors and cables

DOS-1205-GA

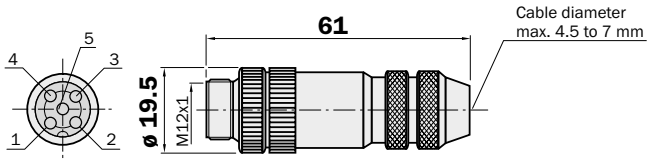


DOS-1208-GA01

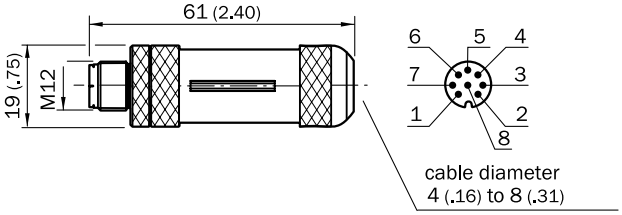


Plug connectors and cables

STE-1205-GA



STE-1208-GA01



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